

# 7 Technology Trends in Hazardous Area Operations

Aegex Technologies March 2019

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## Introduction: Adopting Digital Technologies to Drive Improved Performance



As industries strive for continually greater efficiency, productivity and safety, Aegex Technologies is observing several key trends in the adoption of digital technologies to drive improved performance. In hazardous industrial operations like oil and gas, where traditional mobile devices are not permitted due to strict anti-explosion regulation, the evolution to digitalization has been slower than for non-combustible environments. However, digital transformation has begun an upward trend as new devices emerge that are certified for use in these hazardous locations. <sup>1</sup>

Here, we outline seven trends that point to the increasing need for, and eventual adoption of, certified hand-held mobile devices for hazardous operations.

<sup>1</sup> "Mobile Workforce Transformation in Oil & Gas," solution brief, Intel 2016



## Trend #1: Mobilizing the Oil and Gas Workforce

Many industries have adopted mobile device programs that enable personnel to be constantly connected, and the mobility trend is on the rise. A recent study commissioned by Panasonic found that the use of ruggedized mobile devices including tablets, laptops and handhelds is increasing, with 40% of respondents planning to purchase these types of devices in the subsequent 12 months.<sup>2</sup> However, organizations that operate hazardous areas prone to explosion are at high risk because typical rugged devices could cause a spark or ignite in these combustible environments. Thus, even if users power down their devices, the risk is very real. Most workers leave their consumer-grade devices outside of the hazardous areas, in their locker or vehicle, when entering high risk zones, but this leaves them without real-time communications and reliant on pen and paper to capture crucial information.

Some companies try to mitigate this risk with “explosion-proof” cases that are supposed to protect the device from dust and gas as well contain the explosion should one ignite. This leaves personnel literally with a handful of risk.



## Intrinsically Safe vs. Explosion-Proof Devices

Intrinsically Safe devices are designed to operate at power levels low enough that the potential for incidental arcing is physically eliminated under normal conditions. Explosion-proof devices are typically pre-existing equipment designs where the cases have been sealed to keep out flammable gases.

Now, with the emergence of certified “intrinsically safe” devices, an oil and gas operation’s entire workforce – even critical workers in the most restrictive hazardous areas – can be mobilized. Rather than hazardous area personnel completing their work with pencil and paper and then transferring the information to digital systems later, they too can remain connected and work more efficiently inside of hazardous zones, capturing information and reacting in real-time by using certified, cloud-connected, devices.

Following the “Great Crew Change” in the oil and gas industry that saw a shift in workforce demographics over the past decade toward tech-savvy digital natives, broader workforce mobilization has become essential. While challenges remain for pervasive adoption of mobile technologies among workers who joined the industry in the 70’s and 80’s, workforces in hazardous area operations are generally becoming more amenable to using new technologies to help perform their jobs more efficiently.<sup>3</sup>

<sup>2</sup> “The Rise of Digitalization and Rugged Devices in Oil and Gas”, research by Zpryme via Panasonic Inc.

<sup>3</sup> <https://www.spe.org/en/jpt/jpt-article-detail/?art=3062>



## Trend #2: Asset Performance Management via Intelligent Asset Maintenance

Increased adoption of cloud-based asset performance management (APM) systems is resulting in reduced downtime, decreased maintenance costs and lowered environment, safety and health risks in industrial operations. <sup>4</sup> Mobile asset maintenance applications that facilitate work order fulfillment, work history, asset descriptions, images and more, are providing field technicians with all the information they need to make better decisions about current maintenance requirements, thus streamlining maintenance processes. <sup>5</sup>

Through the use of new mobile technologies like intrinsically safe certified tablets, technicians can now manage all assets, even those in high-risk areas such as combustible oil and gas environments. Performing maintenance inspections, recalling previous maintenance data, and recording maintenance reports onsite on digital devices helps organizations assess assets in near real time and report more rapidly and accurately on situations that may need to be addressed. Real-time data entry reduces human errors and immediately relays critical information to back-office personnel. Thus, work orders can be issued, orders can be processed, repairs can be made, and compliance requirements can be completed quickly and correctly, resulting in cost savings, plus better overall asset integrity.

<sup>4</sup> <https://www.ge.com/digital/blog/everything-you-need-know-about-asset-performance-management>

<sup>5</sup> <https://aegex.com/learning-center/blog/intelligent-asset-maintenance-ventureforth-webinar-recap>



## Trend #3: Digital Analytics and Digital Transformation Reign

An October 2018 survey by McKinsey reports that success rates of digital transformation are still low. <sup>6</sup> However, the report found that companies who do succeed tend to follow 21 best practices in five categories: leadership, capability building, empowering workers, upgrading tools, and communication. Tools that provide the ability to communicate in real time and gather, record and analyze data on the spot can improve work efficiency and promote better safety.

Purpose-built devices for hazardous environments allow organizations to “go digital” and eliminate the need for paper. Personnel can collect site data, fill out forms, bring their preferred data analytics applications directly to the site of data collection, and immediately analyze and act on that information. Digitizing processes allows technicians to perform tasks in an extremely contracted timeframe compared to manual data entry, thus freeing up their time to complete other activities, reducing man-hour costs and improving productivity. Using digital analytics applications on mobile devices onsite in hazardous area operations protracts the lag time between observing situations and remedying them.

The shrinking of time between data collection and reporting means not only improved productivity; in potentially hazardous environments, the implications for safety are enormous. If a leak is detected in an oil refinery, for example, a technician with a certified mobile device can investigate and immediately assess the situation, referring to digital manuals, adding photos and notes about the problem, and even communicating with offsite experts in real time to remedy the situation before it becomes disastrous.

<sup>6</sup> <https://www.mckinsey.com/business-functions/organization/our-insights/unlocking-success-in-digital-transformations>



## Trend #4: Industry 4.0 and the Fourth Industrial Revolution are Now

Broader than the German concept of Industrie 4.0, which is a shift from centralized to decentralized smart manufacturing and production, Industry 4.0 defined by McKinsey is, “the next phase in the digitization of the manufacturing sector, driven by four disruptions: the astonishing rise in data volumes, computational power, and connectivity, especially new low-power wide-area networks; the emergence of analytics and business-intelligence capabilities; new forms of human-machine interaction such as touch interfaces and augmented-reality systems; and improvements in transferring digital instructions to the physical world, such as advanced robotics and 3-D printing.”<sup>7</sup>

These advances in technology are part of a “Fourth Industrial Revolution” that is seeing an exponential increase in industrial process efficiencies. For manufacturing verticals such as petrochemicals and other industries that operate hazardous areas, smart sensors, automation and critical communications technologies are making operations management easier, even as the operations themselves become more complex.

Embracing Industry 4.0 is challenging for any organization, but those with hazardous location operations face unique challenges. The advanced technologies they employ must be certified for potentially explosive environments. Thus, these industries represent a whole new set of requirements for digitizing manufacturing. Yet, oil and gas companies and other hazardous industries are gradually adopting technologies like intrinsically safe mobile devices that bring them one step further into this latest “revolution” by connecting their workforce in real time, facilitating better data capture, and enabling further ability to manage critical data in even the most hazardous areas of the business.

<sup>7</sup> <https://www.mckinsey.com/business-functions/operations/our-insights/manufacturings-next-act>



## Trend #5: Compliance and Safety Remain Supreme

Naturally, the more hazardous the environment, the more organizations must pay attention to Environment, Health and Safety (EHS) protocols and procedures in order to comply with regulatory requirements, and, even more importantly, to protect persons and property. Oil and gas operations, for example, involve flammable materials being processed with powerful equipment under high pressure, with potentially deadly consequences in the event of an emergency. Companies that follow basic safety best practices – the buy-in from leadership for EHS plans, training programs and employee participation in EHS processes, solutions to safety challenges, communication about the value of safety and belief in the benefits of EHS programs - are some of the safest. <sup>8</sup>

When personnel in hazardous area operations have direct access to the right information about the safest and most correct ways to perform their jobs, they will be more likely to meet the standards set by their organizations – and keep themselves and others safe. According to research by the University of Salford Manchester in 2017, in the case of the Oil and Gas (O&G) industry, human error constitutes the largest contributor in more than 70% of all accidents. So, it should be of no surprise that surveys show that EHS applications are the most requested on mobile devices. <sup>9</sup>

But in hazardous environments, where traditional computing devices are not permitted because they themselves would be a safety risk due to potential for ignition, the devices that could provide access to EHS information must be highly specialized. Intrinsically safe devices like certified tablets or handhelds, which are designed to not cause a spark that could ignite a combustible environment, can be part of organizations' EHS plans to commit to better communication among all employees, even those working in the most hazardous areas. With more pervasive communication, teams can respond better to emergencies - or even prevent them - through people and machines being able to notify the appropriate personnel at the first sign of a potential problem.

<sup>8</sup> <https://www.ehstoday.com/americas-safest-companies-awards/americas-safest-companies-2018>

<sup>9</sup> The Rise of Digitalization and Rugged Devices in Oil and Gas", research by Zpryme via Panasonic Inc.





## Trend #6: Digital Governance is Essential

Many organizations have adopted BYOD (bring your own device) policies or otherwise mobilized their workforce, enabling them to access web-enabled products and services. But doing so opens a whole discussion about who is leading the company's digital strategy, which web-based products are allowed, who is allowed to use them and when, and other safety and compliance-related concerns. That's where digital governance becomes critical for implementing strategies that positively direct the ways organizations take advantage of increasing digital and cloud capabilities.

Especially in large, critical industries, such as oil and gas, enforcing good digital governance is crucial for ensuring safety in hazardous area operations. With well-defined MDM (mobile device management) and mobile application management (MAM) parameters forming a complete enterprise mobility management (EMM) security solution, plus pervasive communication among all employees via certified mobile devices, these organizations can be better assured that their personnel are following the proper protocol and protecting themselves and the company's assets.<sup>10</sup>

In hazardous environments where devices must be certified to be intrinsically safe, consumer-grade iOS and Android devices should not be allowed. In a growing number of companies, workers are supplied Windows-capable certified intrinsically safe tablets for use in high-risk areas, while their BYOD devices are secured offsite, in their vehicles, or in other non-hazardous areas.

<sup>10</sup> [https://branden.biz/wp-content/uploads/2018/12/The-Forrester-Wave\\_Unified-Endpoint-Management\\_Q4-2018.pdf](https://branden.biz/wp-content/uploads/2018/12/The-Forrester-Wave_Unified-Endpoint-Management_Q4-2018.pdf)



## Trend #7: Proliferation of IoT Devices

The Internet of Things (IoT) encompasses connected devices that gather information, analyze it, communicate it with other devices via the internet, and create actions based on that data, often with benefits for increased efficiency and cost savings. By 2025, there are expected to be more than 64 billion IoT devices,<sup>11</sup> and some form of IoT will be included in more than half of all major new business processes and systems by 2020, according to Gartner.

Collecting data with IoT-enabled devices and sharing it in near real-time with personnel in hazardous environments can bring important advantages to manufacturing and other time-sensitive industries. Normally, edge devices, like IoT sensors, collect large amounts of data and transmit it to the cloud, where it is then processed. But in some operations, massive amounts of data are collected, yet only anomalies or specific pieces of data need to be reported. Millions or billions of data points are being collected but not acted upon.

In cloud-restricted hazardous environments - some offshore oil and gas operations, for example – IoT sensors can collect myriad data and then transfer it to a local device that compiles the data and sends periodic reports to a data/storage center or cloud. This local data processing greatly reduces backlog and allows IoT devices to not be constantly connected to the cloud. This helps to reduce cost and the sheer amount of data traveling across a network, including data from legacy systems that is also being incorporated into IoT platforms.<sup>12</sup>

<sup>11</sup> <https://www.businessinsider.com/internet-of-things-report>

<sup>12</sup> <https://www.accenture.com/us-en/blogs/blogs-top-tech-trends-oil-gas-2019>



## IoT devices in hazardous manufacturing environments can help:

- **Reduce downtime with predictive maintenance:** IoT sensors can monitor production flow and detect anomalies to forewarn potential issues. IoT sensors can also send condition-based maintenance alerts for equipment. Real-time data from IoT devices can alert technicians to act to prevent mechanical problems and downtime.
- **Increase safety:** IoT devices, including sensors and wearable, can share urgent information and also monitor personnel behaviors that may lead to accidents or equipment malfunction. Monitoring KPIs for injuries, incidents, damage, etc. can help improve overall safety and security in daily operations.
- **Optimize supply chain:** Asset tracking and fleet management can be streamlined with the IoT management of data about each asset and its location.
- **Improve inventory management:** IoT devices can track barcode or RFID tag information, identifying inventory pieces, plus storing information about those pieces, to increase efficiency and maintain optimal supplies.

## Conclusion – Ongoing Adoption

These trends, while by no means a comprehensive list, hint at the increasing acceptance of and move toward digitalization for hazardous area industries such as oil and gas. As organizations more generally see the benefits of efficiency, safety and productivity from adopting digital technologies, companies operating hazardous areas – which often are some of the world’s most critical industries like oil and gas, pharma or chemical manufacturing – are also seeking solutions that help them realize these types of gains.

Increased attention to the ways in which technology can assist with reducing cost, increasing uptime and meeting compliance goals, plus evolving mindsets among leadership and more tech-savvy workforces, are pushing organizations to seek out technology solutions to boost their ongoing efforts for ever-better productivity. With specially certified intrinsically safe mobile devices and IoT sensors, such as those offered by Aegex Technologies, critical hazardous industries are increasingly joining in the digital revolution that is driving greater efficiency, expanded safety and compliance, and overall improved performance.



**About Aegex Technologies:** A technology engineering and design company that provides intrinsically safe Industrial Internet of Things (IIoT) and mobile solutions for hazardous industries. Our globally certified intrinsically safe Windows 10 tablet, sensors and partner monitoring systems, form an IIoT platform that manages big data to improve efficiency, safety and productivity in hazardous industrial environments in oil & gas, chemical, pharmaceutical, utilities, public safety, defense and other industries with potentially explosive atmospheres.

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