HIMA SMART SAFETY.

Use Your Data to Its Full Potential to Prevent Outages

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In a process plant, a safety system is responsible for protection of personnel, resources, and the environment. Usually that means taking the plant to a safe state in the event of a fault – but is it capable of doing more and actually contributing more to the plant's uptime and profitability?

In fact, opportunities for modern safety systems to make such contributions do exist; they are based on the large amount of process, diagnostic and instrument data that these systems hold. If this data can be extracted in real time, and converted into beneficial information it can be used to allow plant personnel to act quickly and with confidence. That can reduce downtime, increase safety, and potentially prevent outages. The safety system can actually contribute to the plant's efficiency and profitability.

This article looks at practical ways in which these benefits can be achieved, specifically by using data related to sequence of events (SOE), critical alarms, and diagnostics. →

From Safety to Smart Safety

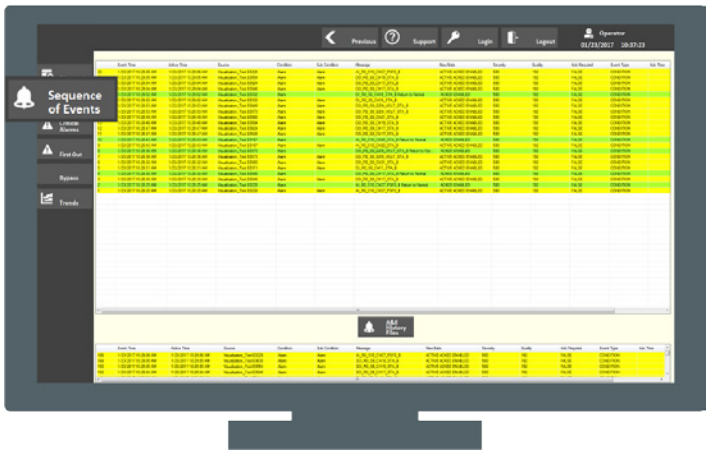
During normal operation, a safety system continuously receives data from the process it is monitoring, but that data remains captive in the safety system. Only when a process parameter crosses a critical threshold does it take action as appropriate; shutting down the faulty process, diverting suspect product to a suitable waste storage facility, and/or fulfilling any other programmed response. Production time is lost and product may be wasted, but the overriding consideration is that personnel, equipment and the environment have been protected. And, that is the main function of a safety system.

By taking the programmed action when an event occurs, the safety system has done its job by keeping the plant safe. However, at this point all of the data it has been collecting throughout both the normal and abnormal phases of its operation is usually lost. Extracting this data to obtain the productivity and safety benefits described above will add considerably to the value of any safety system, transforming it into a smart safety system that contributes to the profitability of the plant.

When an event occurs, the immediate pressure is to understand what caused the shutdown, and bring the plant back into operation. Almost every safety system has a first out indication, which means the system stores information on what SIF triggered the shutdown. A smart safety system helps operators to take quick action in case of a shutdown by highlighting the SIF that triggered the shutdouwn. This allows plant personnel to move directly to the cause of the shutdown, correct the situation, and get the unit back up as quickly as possible. This allows the plant to get back to normal operation, reducing downtime and optimizing profitability.

Sequence of Events and Alarm Rationalization

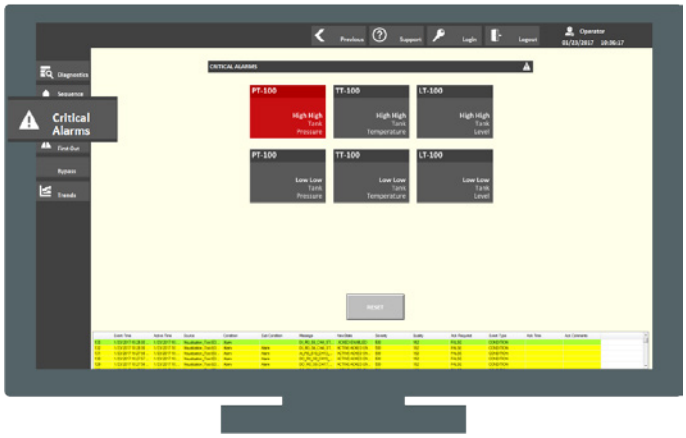
Once the plant is back in normal operation, the next question is: how did this happen? The smart safety system provides sequence of events data which can be used to do a root cause analysis. Traditional safety systems could provide limited SOE but it was difficult to configure and to use. In the smart safety solution, the SOE data is presented to the user and can be scrolled and replayed so that events before and after the triggering event can be analyzed. In this way, the user can take necessary actions which might prevent the recurrence of this event in the future.



Prevention of future shutdowns again adds to the profitability of the plant. Another way that the smart safety system can contribute to the profitability of the plant.

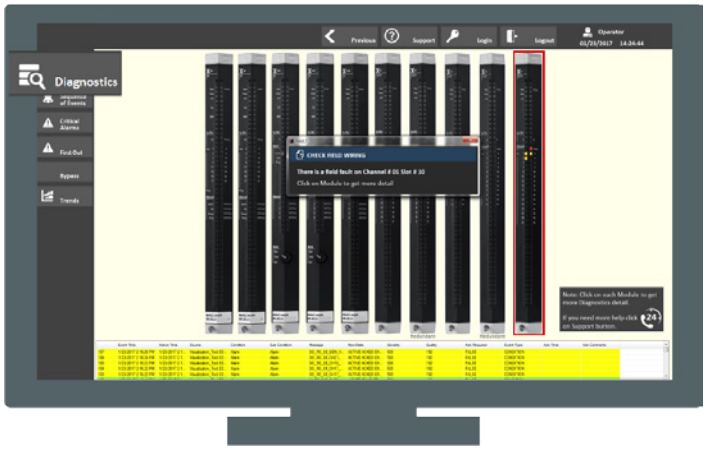
The smart safety solution also includes an alarm application. Every control room has an alarm screen. However, all too often, it tracks so many alarms that it is difficult for the operator to determine

which alarms require his action. For years, users have struggled with alarm rationalization. Some report that it is a never-ending task. Some have made progress but others have all but given up. Many companies have started to develop priority alarm systems segregating critical alarms from the myriad of alarms that are routinely generated. Such systems assist the operator in knowing when action is critical.



Often these critical process values already exist in the safety system. Thus, a critical alarm system, fed by the safety system fills several needs. The operator can clearly see critical alarms. He can use this information to prevent process upsets which could cause downtime. And, this can all be done without the cost of creating a totally separate critical alarm system.

While the level of diagnostics may vary, all safety systems constantly perform tests to ensure that the system is operating properly. If this information is available to the user, it is usually in the form of an error code. In the event of a detected fault, either in the safety system or in the sensors or actuators attached to it, the user receives an error code. Before a technician or engineer can begin to correct the issue, he needs to consult the documentation to interpret the error code. If that information was available in English, the user could immediately know the issue and it could be corrected more quickly preventing or reducing downtime.



An intelligent safety system can eliminate this problem if it includes diagnostics software. This can convert an error code into a human-language message that an operator can understand. As 95% of alarms are related to the failures of connected devices rather than the safety system, the user will be able to begin a repair immediately. Downtime can be reduced or prevented.

Diagnostic software also allows for further exploitation of the measured data; engineers reviewing a fault message can drill down if they wish, to reveal more detailed information about the fault condition.

HART Protocol

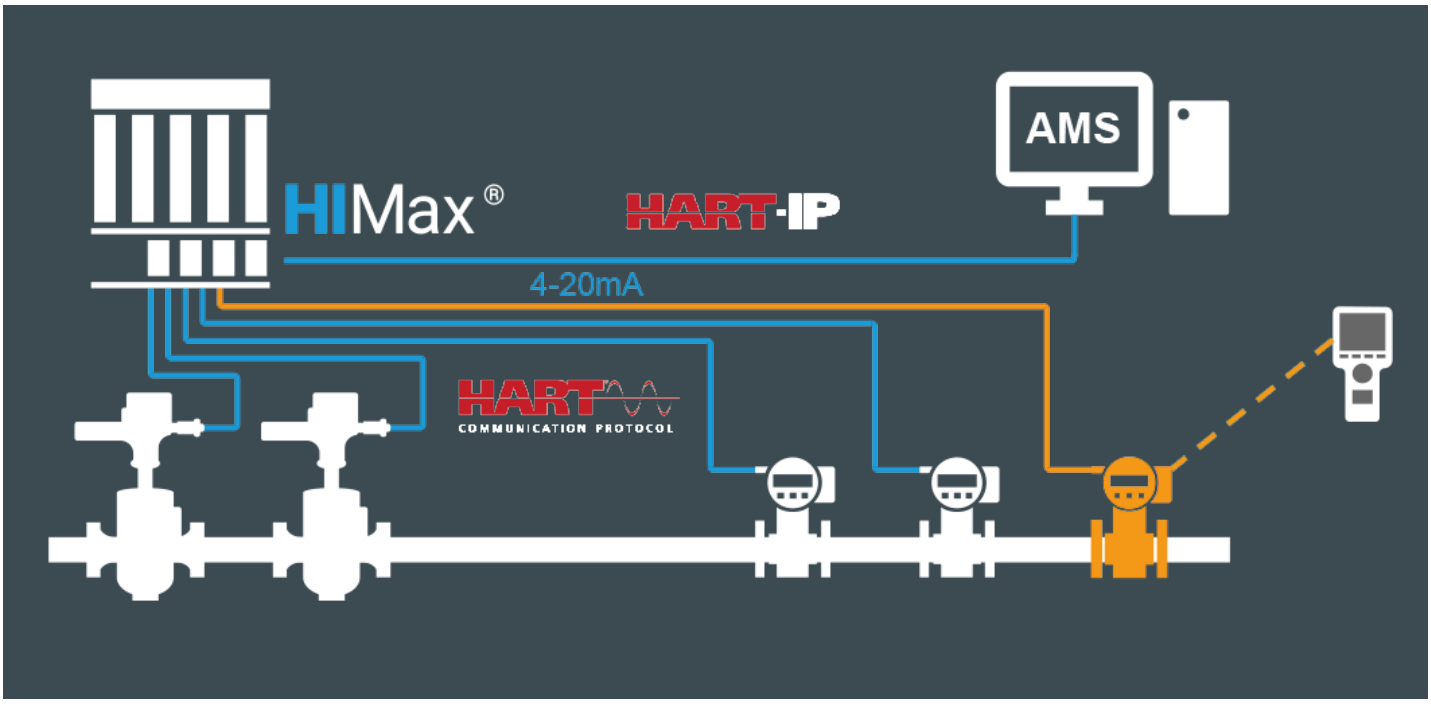
HART diagnostic information exists in almost all plant instrumentation. It is a powerful, information-rich protocol, yet safety systems typically do not use the information available from their connected sensors and actuators. The HART capability is more likely to be restricted to using handheld devices for configuration.

The existence of the HART protocol by itself can cause issues. First, there is the risk that a transmitter could be reconfigured. If that happens and the safety system is not aware, it could render the safety system ineffective and the plant unprotected. Every user implements passwords and/or DIP switches that prevent such reconfiguration but can we really rely on these measures?

If the HART information is used, it is often connected via a HART multiplexer to an asset management system (AMS). While this makes the information available to the user for maintenance and reliability purposes, it still leaves the safety system vulnerable as now an operator at the AMS system can modify all devices connected to the AMS. The vulnerability of the safety system has been increased, not decreased.

These factors mean that HART-enabled instruments represent a risk to plant safety – yet such instruments are, and will remain, an integral part of most installations. This presents both a challenge and an opportunity for smart safety system design; is it possible to mitigate the risk posed by HART, while also benefiting from the information it carries?

One solution lies in following a step-by-step approach. The first step is to allow data tunneling to the AMS, but prevent the AMS from writing to an instrument unless permission is granted – and this will be done on a point by point basis. However, this still leaves the possibility of unauthorized writing from a handheld device.



This can be countered by reading the HART information into the application of the safety system. The safety system will then receive a HART diagnostic message if an instrument is reconfigured. It may not be aware of what the new configuration is, but will be able to take corrective action to prevent that reconfiguration from making the safety system ineffective.

This approach has further benefits. For example, HART diagnostics will flag if an instrument has a fault. The value of this information can be highlighted by the experience of a refiner where a safety system repeatedly detected a fault within the plant instrumentation that did not exist. It initiated a series of shutdowns. Each event cost the refiner hundreds of thousands of dollars. All of these shutdowns could have been prevented if HART data had been available in the application program.

Other diagnostic information is available via HART. Some instruments can also indicate when they are going to fail, so preemptive or preventative maintenance becomes possible. Additionally, instrument configuration data can be uploaded to a smart safety system, then downloaded to a new instrument after installation. This ensures that configuration remains consistent even after instruments are changed.

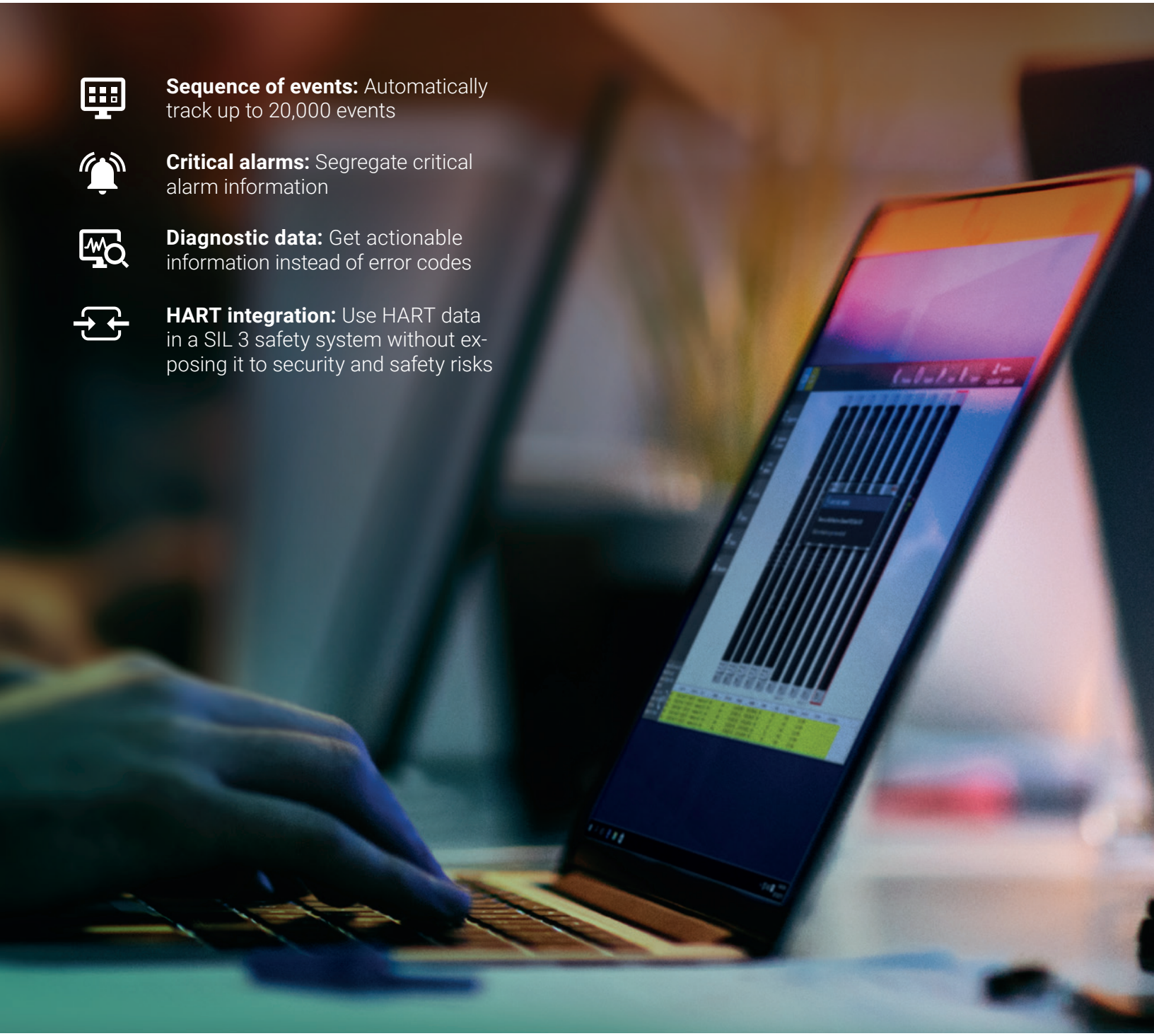
Equipping safety systems to handle HART in this way is an attractive approach, because it provides protection from the protocol's risks, while unlocking its advantages.

Conclusion

HIMA's new solution enables operators to make easy use of the data inherent in safety systems! There is a lot of potentially valuable data contained within plant safety systems, but, to date and for a variety of reasons, this data has not been readily available to users.

HIMA has developed its smart safety solution to allow the data that exists or could exist in the safety system to be converted to actionable information that can prevent outages, reduce downtime, improve safety and security, and increase profitability.

HIMA's belief in the value of this data is reflected in their development of a software visualization tool, which handles conversion of diagnostic data from HIMax into beneficial, actionable data.



Sequence of events: Automatically track up to 20,000 events

Critical alarms: Segregate critical alarm information

Diagnostic data: Get actionable information instead of error codes

HART integration: Use HART data in a SIL 3 safety system without exposing it to security and safety risks

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About HIMA

The HIMA Group is the world's leading independent provider of smart safety solutions for industrial applications. With more than 35,000 installed TÜV-certified safety systems worldwide, HIMA qualifies as the technology leader in this sector. Its expert engineers develop customized solutions that help increase safety, cyber security, and profitability of plants and factories in the digital age.

For over 45 years, HIMA has been a trusted partner to the world's largest oil, gas, chemical, and energy-producing companies. These rely on HIMA solutions, services and consultancy for uninterrupted plant operation and protection of assets, people, and the environment. HIMA's offering includes smart safety solutions that help increase safety and uptime by turning data into business-relevant information. HIMA also provides comprehensive solutions for the efficient control and monitoring of turbomachinery (TMC), burners and boilers (BMC), and pipelines (PMC). In the global rail industry, HIMA's CENELEC-certified SIL 4 COTS safety controllers are leading the way to increased safety, security, and profitability.

Founded in 1908, the family-owned company operates from over 50 locations worldwide with its headquarters in Brühl, Germany. With a workforce of approximately 800 employees, HIMA generated a turnover of approximately €126 million in 2016. For more information, please visit: **www.hima.com**

HIMA has operated in the Americas since the early 1980s. Its headquarters for the Americas is located in Houston, Texas.

Discover more at **www.hima-americas.com**

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