SITUATIONAL AWARENESS – THE NEXT LEAP IN INDUSTRIAL HUMAN MACHINE INTERFACE DESIGN

Adapted from our 2014 Situational Awareness Whitepaper authored by John Krajewski (AVEVA Director of Product Management, HMI/Supervisory)

WHITEPAPER

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Executive Summary

Examine the challenges of managing an increasing volume of process data with the proliferation of the IIoT and an increased span of control. Discover how with a results-driven approach to HMI design, of which the cornerstone is Situational Awareness; operators can benefit from superior operational context to help streamline and optimise operations.

INTRODUCTION

The users of modern industrial systems are constantly aiming for improvement in the availability and maximum efficiency of those systems without compromising the quality of offerings or safety of operations teams. One area where improvements can have significant impacts quite literally staring them in the face; the human machine interface used to control and operate these systems. By implementing improvements in the software tools used to control and operate industrial systems, operations teams can significantly improve both the business value and the safety of industrial systems.

Continual Evolution

The way people have interacted with industrial systems has changed dramatically, as depicted in **Figure 1.** These changes were driven by operations staff to improve the way that they use, manage, and maintain systems, coupled with advances in technology that facilitated those improvements. Changes like this will proceed organically over coming decades, and will be driven by market needs coupled with advances in technology that address those needs and provide further opportunities for improvement. There are several trends in current implementations of industrial automation Human Machine Interface (HMI) systems that are driven by market needs. The trends currently driving the needs of industrial HMI application design are larger systems, greater volumes of data, increased levels of automation, staffing proficiency issues, and expanded use of remote operations. Each of these industry trends poses new challenges that can severely impact the ability for an operations team to achieve optimal business performance of their systems and safe operations.

Figure 1: An Illustration of Industrial Operator Interface Evolution

Proliferation of the IIoT and the Increased Span of Control

The number of components used in modern industrial systems increases as the cost of connected devices continues to fall, the capabilities of control systems to integrate disparate equipment rises, the reliability and bandwidth of networks grows, and the demands of industrial systems are driven by the business needs of larger global markets. The rise in expectations is exacerbated by the exponential growth in the Internet of Things (IoT) and its application to the domain of our customers in the Industrial Internet of Things (IIoT), coupled with the rise of secondary sensing and other complementary methodologies for the installation of low-cost sensing technologies alongside the incumbent "critical control" SCADA and HMI systems. While the technology has enabled more pieces of equipment to be connected into an integrated system, the user interfaces into these systems have not evolved at the same pace to effectively handle this increase. Modern operations teams are using fewer resources to staff these systems and the control of an operator increases, while the techniques to manage his system lack standards for managing this volume of equipment.

Another key factor in the growth of systems has been the integration of much larger geographic areas into single systems. These larger systems allow users to make key operational decisions in real time, such as determining which production facility can produce a service or product at the least cost. The costs and reliability of networking systems together continue to improve, and as a result these integrated systems are commonplace today. Regardless of the business driver, the result of these larger systems is an overload of the operator with much greater volumes of data than they can effectively manage.

Greater Volumes of Data and the Increased Operator Load

Even as system complexity grows, the equipment itself is generating more data. In the past, a single transmitter may have generated only a single value connected into the monitoring system, but modern transmitters have additional diagnostics, onboard control, and many tuning parameters all of which increase the data density per component by multiple orders of magnitude. In many cases the user interfaces that contain this data have not been designed to optimise the operator interpretation of this data and further compounds operator overload.

Increased Levels of Automation and the Unintended Consequences

To reduce the variability that human operators can introduce, more functions performed in industrial automation systems are automated by control loops and process sequences. These control loops and process sequences do offer the operator some relief from the factors already discussed that increase their workload, but may also have unintended side effects. As operations teams are rarely involved in the design and implementation of industrial control systems they have little understanding of the actions being taken by the control system, and may become disconnected from the process. This generally leads to an over-dependency on the system to drive operator behaviour through mechanisms like alarms or process interlocks. It is common to hear that operations teams are reduced to either resolving interlocks or reacting to process alarms. In this type of environment, the operator is performing reactively and therefore cannot prevent disruptions or predict future trends.

Staffing Issues and the Impact on Proficiency

As control systems evolve, and the user interface design techniques remain relatively unchanged, it has increased the time required to implement new elements and enable operators to become proficient in utlising these systems. It is common expected to take about two years for an operator to become proficient on a system. This extended period is required to make operators experts on the system, and to make up for deficiencies in system design. However, conditions in the market are shortening the length of employment for skilled operators. Operations staff have more freedom to seek employment elsewhere, may advance through their organisations. A variety of additional factors result in an average term of employment at or just below two years, meaning that operations rarely operate at maximum proficiency. Another common concern in nearly every market is the impending retirement of the skilled employees who best understand the systems. There is a growing need to replace these experts and bring replacements up to speed quickly. Something must be done to reduce the amount of time taken to achieve both operator proficiency and decrease variability in the quality of the process from one resource to another..

Remote Operations and the Challenge of Distance

Advances in networking technologies and reduction in costs for these technologies make it possible to remove the operator from the geophysical location of the process. This is often driven by needs such as safety, optimising staff utilisation through increased span of control, or a need to locate the operations where subject matter experts are available. Whatever the business case, this separation presents further challenges to operations teams. Operators can no longer employ the same observational methods as they can when located near the actual equipment. Many describe their understanding of the equipment and process status through observing sound, vibration and smell alone. When the operations are remote and these additional senses are no longer available, the operations team becomes even more dependent on the effectiveness of the HMI in communicating the state of the system or process. But too often the user interface has been implemented by recreating and animating the Piping and Instrumentation Diagrams (P&ID). Unfortunately, these P&IDs were never designed to overcome these challenges, and this results in operators that poorly understand their systems and how to properly manage them.

THE IMPACT OF HUMAN ERROR

With control system design trends pushing the limits of operations teams, a common result is interruption and inefficiency due to human error. These errors account for 42% of abnormal situations in industrial systems[1] which unsurprisingly have a direct correlation to economic losses and safety concerns.

Economic Losses

Abnormal situations in industrial processes directly result in economic loss due to a total or partial loss of system availability, reduced efficiency of the industrial process, or a reduced quality of the resulting product or service. Studies indicate that loss of system availability costs industrial systems 3-8 percent of capacity.[2] When summed up over the operational lifetime of a system, the losses experienced due to process inefficiencies are likely much higher due to a reduced capacity or a reduction in the quality of product or service. These inefficiencies can result in a great deal of economic loss over the lifetime of a system. These losses can be prevented, and if an approach to improve HMI design is not taken, it is highly likely that the amount of loss will continue to increase. Far too often the business value of a process is poorly understood by the operations teams and completely ignored in the development of the HMI design.

Safety Risk

In many industrial processes there is significant potential for bodily injury or loss of life. There are multiple factors to consider for overall system safety including, but not limited to, alarm management, control loop performance and the HMI design.

In this document we will limit the discussion to the HMI aspects of safety while recognising it is a much broader topic. In the investigation of many industrial accidents the HMI design has been cited as a contributing cause. One of the most common ways that HMIs communicate potential safety issues is through alarm notifications. However, in a recent survey of industrial systems users, nearly 70 percent of respondents indicated that alarm overload impacts their ability to properly operate the production process.[3] The techniques for alarm communication that are commonly employed in HMI design do a poor job of enabling an operator to quickly assess the severity of many alarms and decide on the appropriate action. Without an improvement in how this critical information is being communicated and processed, the overall safety of the system is being compromised.

Business Value Model.

In just about any industrial process there is a simple model than can be used to describe the business value of the process as depicted in **Figure 2**. While many processes vary in terms of the product or service they produce, just about any process has raw material and energy inputs and product/service and waste outputs. The key goal for the process itself is to maximise availability while minimising the costs (raw materials, energy, and waste) and maximising the quality and quantity of the products and/or services provided by the process. Unfortunately, the HMIs that are used to operate most of the industrial processes in the world were designed with the main purpose of achieving or maintaining a certain operational state rather than optimising the performance of the business. In order to best drive the business value of these systems the design of the system must take the business values into account.

[1] https://www.asmconsortium.net/defined/sources/Pages/default.aspx
[2] http://www.asmconsortium.net/Documents/2007%20ASM%20Overview%20--%20MKO%20Symposium.pdf
[3] http://www.automationworld.com/operations/why-nuisance-alarms-just-wont-go-away

The process needs to be analysed to determine which decisions the operator should be making to drive the desired business value. Once the decisions that the operations team should be making are known, the user interface should be designed in a manner that facilitates those decisions and drives the operator to the desired action.

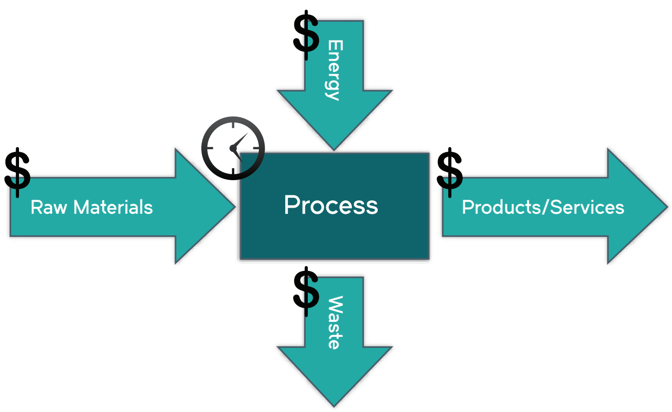


Figure 2: Generic Industrial Process Business Value Model

A RESULTS-DRIVEN APPROACH

The cornerstone of improving the overall HMI design is to deliver Situational Awareness. Only by achieving Situational Awareness can the operations team make effective decisions that will deliver overall business success. In **Figure 3** Situational Awareness has been broken into 3 Levels; perception, comprehension, and projection. Most HMI applications only assist the operations teams in achieving the first Level; perception.[4] HMI applications often only place a numerical value representing a current transmitter signal on the screen in a location that will orient the origin of the signal to the operator. How the operator processes this information will vary greatly based on the experience Level. The HMI should provide information that will facilitate attaining the second Level of Situational Awareness; comprehension. In addition to the current value of the transmitter signal the HMI can provide the operator with a clear indication of the expected value from the transmitter. Typically the difference between experienced operators and the inexperienced operators is that the experienced operators have memorised the system parameters and have familiarised themselves with the expected values. By providing this information up front it is possible to empower an inexperienced operator to behave more like an experienced operator. However, in most cases, even the most experienced operators will inconsistently achieve the highest level of Situational Awareness; projection. In order to reach projection, the system must enable operators to determine if an action is required, and understand the consequence of that action or inaction. The good news is that there are tools and techniques available to improve the operations outcomes through goal oriented design, effective window structure, effective color usage, actionable alarm management, and effective design elements.

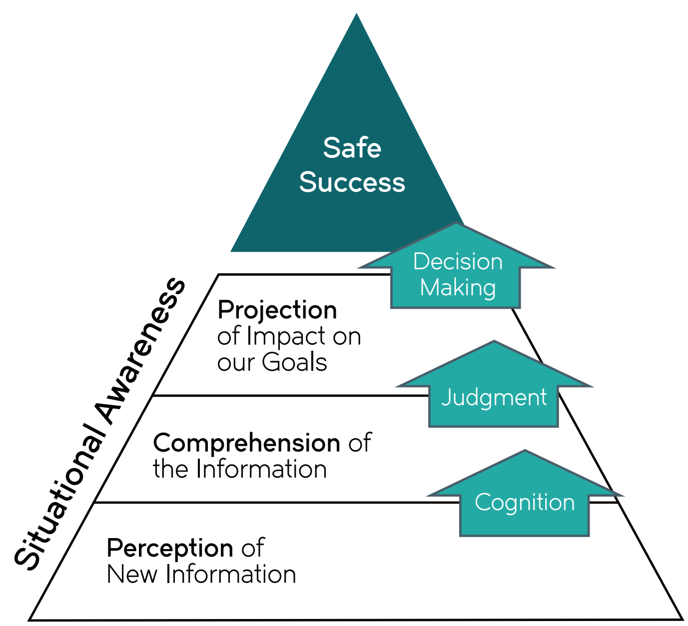


Figure 3: Three Levels of Situational Awareness

[4] https://en.wikipedia.org/wiki/Working_memory

Goal-Oriented Design

Above we described the needs of achieving safety and economic goals in order to deliver the expected business value. However, if the safety and economic goals of a process are not considered during the design of the control interface and implemented, then it is doubtful those goals will be achieved. To better achieve these goals, they must be strongly taken into consideration during the design of the HMI application. One method for assisting in designing and identifying the goals of an application is called the Goal Directed Task Analysis (GDTA).[5] As depicted in **Figure 4**, the GDTA process begins with the major business goals of the system. An example of a business could be to minimise the cost associated with energy. From these major goals an analysis of the system will be performed to determine the sub-goals. The sub goals will be more specific goals that are directly related to the process, such as minimising steam utlisation during the cleaning process. These subgoals need to be actionable. It must be understood what decision the operator is being asked to make and then design the HMI so that an operator can be easily trained on how to make that decision and ultimately achieve the original goal. For each sub-goal it must be considered how the operator will attain Level 1 perception, Level 2 comprehension, and ultimately Level 3 projection. Only once the business goals of a system are clearly understood can the system itself be designed to achieve them.

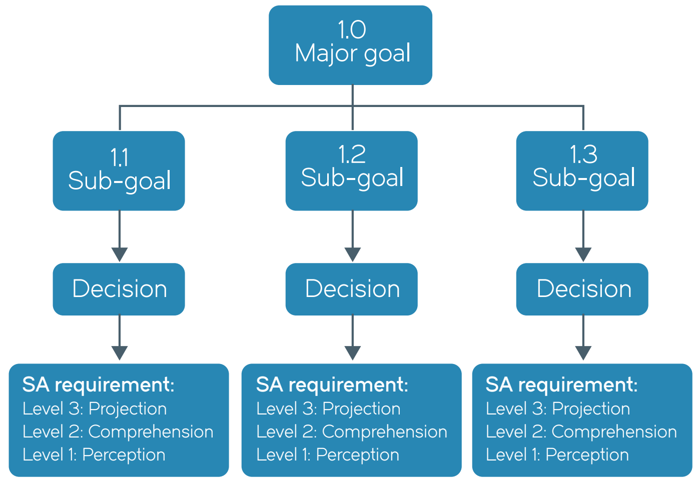


Figure 4: Goal-Decision-SA Requirement Structure

Effective Window Structure

An extremely common method of designing the window layouts of an industrial HMI is to simply replicate the P&IDs and then to provide navigational methods to each P&ID representation. By utlising the P&IDs, the design effort is very low but the issue with this approach is that the P&IDs were not created with the intention of the operations teams achieving the key business goals, and this design approach rarely achieves them.

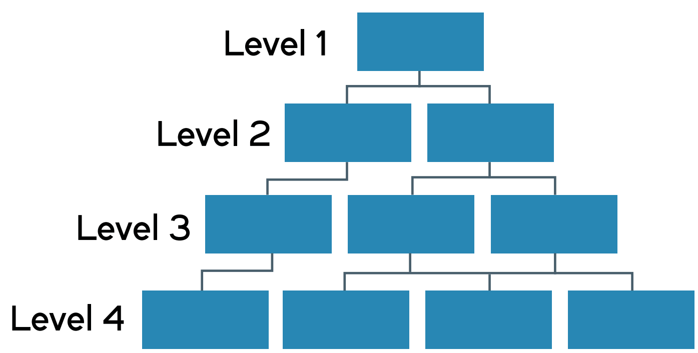
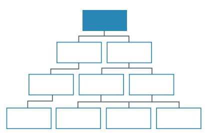


Figure 5: Effective HMI Window Structure

Another common approach taken when there is a great deal of information contained within a system it to pack in the content as densely as possible. At first glance this may seem logical, but this approach really only serves to overload the operator. Research has shown that on average a person can process only about four chunks of data at a time.[6] With this in mind, we must use an approach that will allow an operator to scan as few items as possible to determine if an action must be taken. To best achieve this, the system needs to be modeled in a 4 Level hierarchical nature as depicted in **Figure 5**. The windows in this structure will effectively orient the user to awareness, action, or details depending on the window Level being observed.

[5] Mica R. Endsley, Designing for Situation Awareness: An Approach to User-Centered Design, 2nd Edition, pg. 65
[6] http://en.wikipedia.org/wiki/Working_memory

Level 1 – Area-Wide Overviews



The top of the structure or Level 1 windows will provide all of the key design elements that will communicate to the operator the information required to attain the projection Level of Situational Awareness for the key sub-goals identified in the GDTA (performed as part of the Goal- Oriented Design). Level 1 windows will very rarely look like the actual process but instead will more resemble an information dashboard as illustrated by the example in **Figure 6**. The most important aspect of the Level 1 windows is to drive the operator awareness and facilitate a determination of when action or further investigation is required and facilitate access to the Level 2 windows.

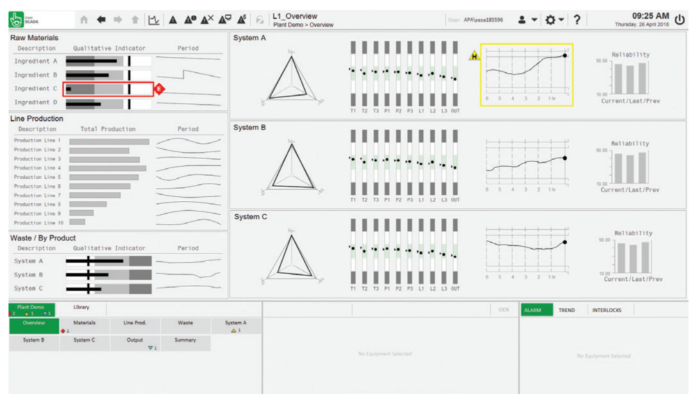
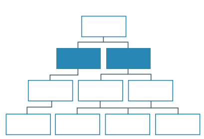


Figure 6: Level 1 Window Example

Level 2 – Facility-Wide Overviews



Once the Level 1 windows have created awareness of a need or prompted investigation, the next step is accessing the Level 2 window, which will enable the operations staff to execute the required action or perform the required investigation. Since the needs of HMI applications vary so widely, the division of awareness and action may be specific to the needs of your system.

A common technique is to design the Level 2 windows as the main operational windows. When designing the Level 2 windows, the operator actions should be strongly considered. As shown in **Figure 7** the Level 2 windows may contain elements that are recognised as process elements but are not expected to contain every detail. For example, if an operator is attempting to execute a system wide start-up procedure, then a specialty Level 2 window should be created that will consolidate the information and actions required during start-up on a single window. Far too often the operator is required to move between many windows to execute a process, which can be slow and prone to error. This technique can dramatically improve the success and efficiency of extensive procedures. There may be more than one Level 2 display for each Level 1 window. When a more detailed analysis of the equipment state and detailed process values is required, the operator will have direct access to the Level 3 windows.

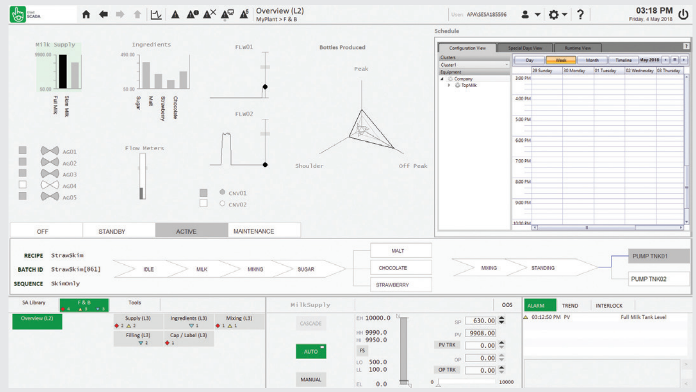
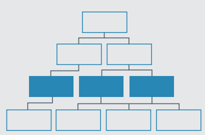


Figure 7: Level 2 Window Example

Level 3 – Detailed Operating Information



The Level 3 windows are those that most closely resemble the P&IDs of most systems, and are the most likely to already be present for existing systems. An example of a Level 3 window is shown in **Figure 8**. Observe that not every physical element (such as pipes) needs to be included, as they rarely offer any valuable information. These windows typically are used in support of the Level 2 displays. For example, if Level 2 displays are where process sequences are initiated, then the Level 3 display may be used to identify and clear process interlocks. The Level 3 windows will provide access to equipment status for all equipment in the scope of the associated Level 2 display. There may be more than one Level 3 display for each Level 2 display.

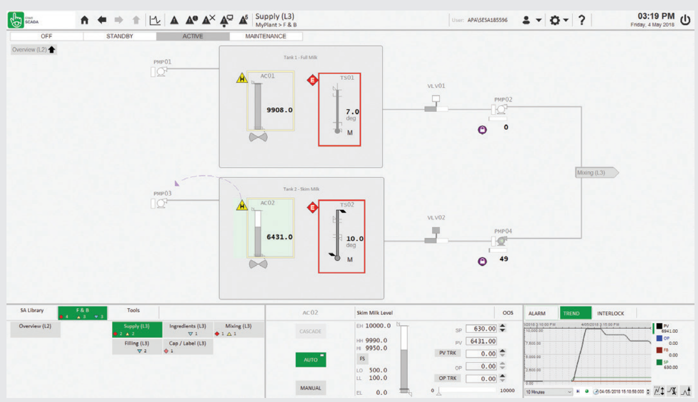
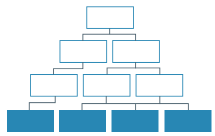


Figure 8: Level 3 Window Example

Level 4 – Auxiliary Information



There are a variety of activities that can be performed from the Level 3 Windows and the windows that provide the supporting information for those tasks are positioned at Level 4. Typically, these windows provide trend analysis, event analysis, alarm analysis, loop tuning, help/procedural information and a variety of other content. In **Figure 9** a Level 4 window example containing a combined Alarm Summary and Alarm History window is shown. There may be more than one Level 4 display for each Level 3 display. Level 3 – Detailed Operating Information.

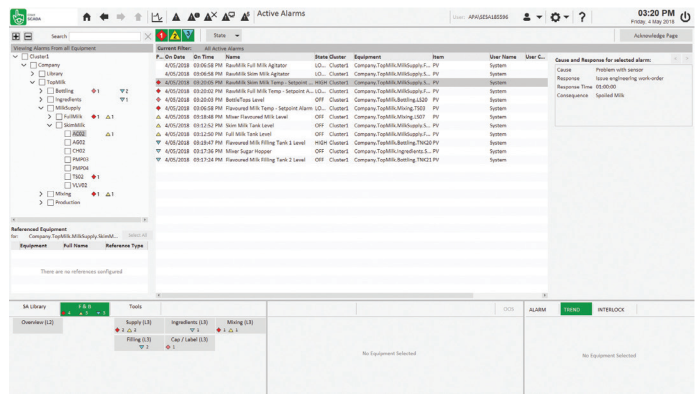


Figure 9: Level 4 Window Example

Color and Animation Usage

When computers were first put into use in industrial processes for the purpose of HMI they had only the most basic graphical capabilities. Eventually the computing systems gained graphical capability and HMI applications also began to leverage these improvements with little thought toward operator efficiency. It has become commonplace for HMI applications to act as a show piece that emulates the process in a very visual manner, and often that visual presentation is used to justify the automation investment to key stakeholders. However, these very elaborate visual approaches often impair the operator's ability to ascertain the current situation and ultimately make key decisions to maximise the business value of the application. In **Figure 10** the process is displayed with three dimensional pipes and flanges that offer the operator no real information, gauges with artificial glare applied, use of the color red to represent several statuses, and a variety of other poor design practices. The images shown previously in **Figure 6, Figure 7,** and **Figure 8**, demonstrate a much better use of color. There is a misconception that graphics designed for better Situational Awareness are not visually appealing. However, graphics that effectively communicate the state of the process to the operator are highly effective. A limited use of color draws operator attention to the point in the process that has deviated from a normal or expected state.

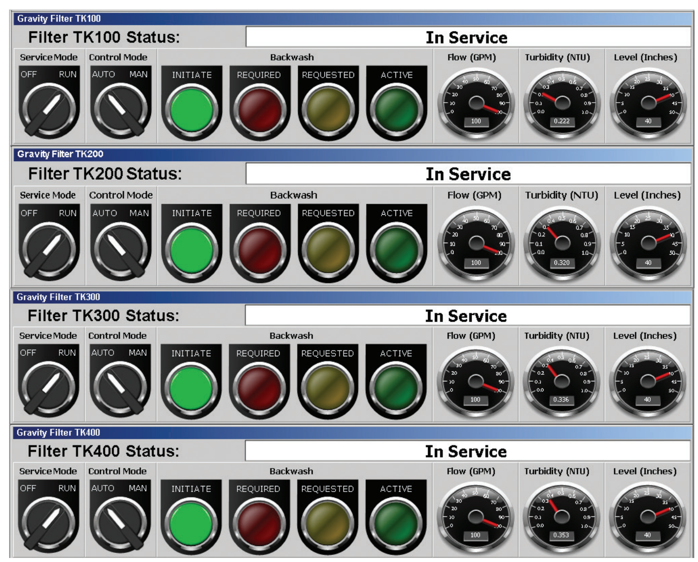


Figure 10: Example of Poor Color Usage

When the system state is within expected norms, the process graphics should not emphasise and draw the operator's attention to these normal conditions, as that only serves to overload the operator's attention. The utilisation of animations should be with the deliberate intent of drawing the operator's attention and not just to make an impressive visualisation. If operators are being distracted by spinning pumps or gradient shaded lights when they should be focusing on a process value drifting outside of operational limits, then the HMI is not likely to result in the improved ability to achieve the business goals or safe operation. While color should never be the only method used to communicate a value or state (up to 10% of people are colorblind) it can be a very effective tool for driving the user's attention. To ensure an optimal HMI design it is very important to establish and strictly utilise color standards.

Effective Design Elements

When designing and assembling an HMI that delivers effective Situational Awareness it is important to begin with a standardised set of design elements that will be used throughout the application. These design elements can be symbols or displays that have been optimised for their ability to communicate key information to the operator with minimal training and cognitive load. These design elements will be optimised to achieve the appropriate Level of Situational Awareness (perception, comprehension, or projection) to manage the associated process. Trying to cover all the possible design elements is far too large a topic to address here. To illustrate the point, examples of meters with trends will be reviewed.

Meters with Trends

The most common approach to industrial HMI design has been to draw a P&ID style process depiction and to adorn the graphic with numeric values to indicate the current value of transmitters in the field. These numeric values typically are accompanied with the Tagname and units of the transmitter. This method of presenting information has a large number of deficiencies that hinders an operator's ability to take that data and turn it into actionable information. As shown in **Figure 11**, by indicating key alarm points, operational limits, optimal range limits, setpoints, and the current value in context, meters offer a great deal more information and are much more effective in increasing the operator's Situational Awareness. With this representation the operator can identify at a glance if the value is abnormal. When combined with a trend element, not only can the current state be communicated but the directional movement with rate can allow the operator to project where that value will be in the future and determine if an action is appropriate. Trends are one of the most effective methods of attaining the projection Level of Situational Awareness for a data value and should be used liberally in industrial HMI applications.

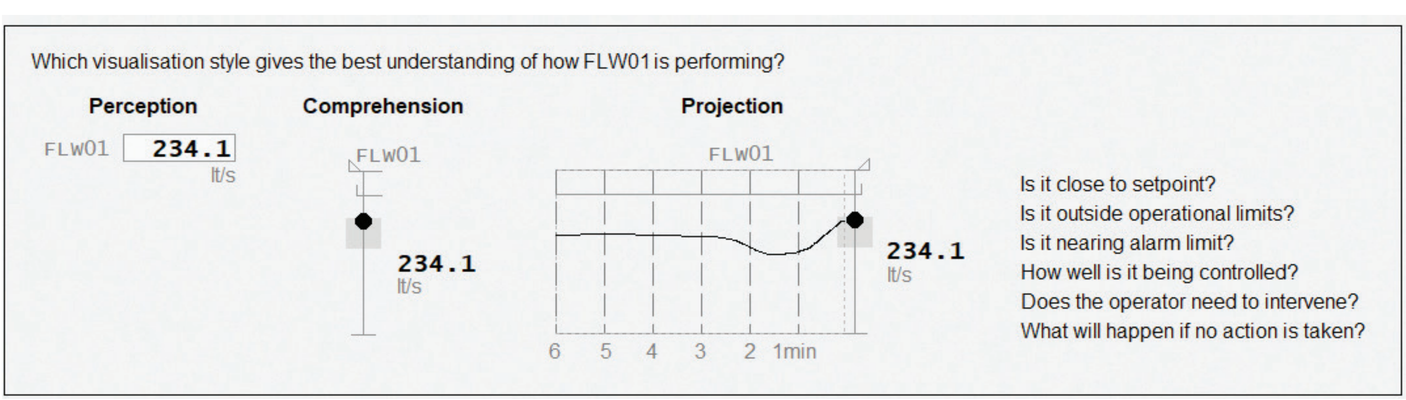


Figure 11: Attaining Different Situational Awareness Level with Different Design Elements

Actionable Alarm Management

Alarms, by definition, are events that require an action. As such, alarms are a pivotal mechanism for driving operator actions. However, most systems generate a volume of alarms that simply cannot be handled by operators. In a recent survey 52% of respondents said they do not perform an analysis of their alarm systems to identify strengths and deficiencies.[7] From these results alone, it's clear that something needs to be done to improve alarm management. To begin to address this issue, all configured alarms in the system need to be reviewed to evaluate the alarm's severity. While it has been commonplace to use a very large number of alarm priorities, this practice requires the operator to understand as many as thousands of alarm priorities, which is impractical. Under stressful conditions this lack of understanding can directly lead to errors in judgment.

The best practices in alarm management recommend the use of four severities at most; critical, high, medium, and low. These severities define the maximum response time for the alarms as five minutes, thirty minutes, sixty minutes, and one hundred and twenty minutes respectively, as shown in **Figure 12**. These times are a starting point and can be adjusted to fit the needs of the process. If the event does not require an action in the time defined for the low alarm severity then it should be changed to an event and removed from the alarm list. The configuration of every alarm should be reviewed to ensure that the alarm is only triggered when an operator action is required to minimise the potential for nuisance alarms. It may still be possible for the volume of alarms to be greater than can be processed by an operator, so methods must be used to allow an operator to identify which alarms must be actioned.

Past	Future
Process Parameters	Situational Awareness
Labor Resources	Information Craftsmen
Reactive Operations	Proactive Operations
Operating a Process	Real Time Business Management

Figure 12: Alarm Severities and Expected Action Time Limits

[7] http://www.automationworld.com/alarm-management-opinions

Alarm Borders

To ease the process of determining which alarms to action, each of the severities will have a unique mechanism for visual display comprised of unique color, unique shape and a unique identifier. **Figure 13** illustrates this concept as alarm borders. In the example of a critical alarm, it displays the color red (and red is used for no other reason), it displays a diamond shape, and it displays the number 1. This triple coding ensures that the critical alarms are clearly recognised. These borders can be used around any graphical element to draw the operator attention. Since there may be multiple alarms associated with an element these alarm borders also summarise all alarm information on the associated element to identify the most urgent alarm state for that element.

Figure 13: Alarm Borders for each Alarm Severity

Alarm Aggregation

A common practice in HMI design is to display an alarm banner to expose the current alarms to the operators but too often these alarm banners only show a handful of the alarms and alarms of a lesser severity can often obscure alarms of a higher severity. By aggregating all of the alarms in a system in the same hierarchical manner as the navigation structure it is possible to visually display the overall alarm state as badges right on the navigation element as is illustrated in **Figure 14**. In this image there are a number buttons; one for the F&B area and several buttons for the individual pages including Overview, Supply, etc. In this example there are 12 alarms in the system; 4 critical severity, 3 high severity and 5 low severity. These alarms originated from Supply, Ingredients, and Mixing pages as below (alarms also shown off-screen). The operator can easily click on the desired button to navigate directly to the associated graphic to address the alarm.

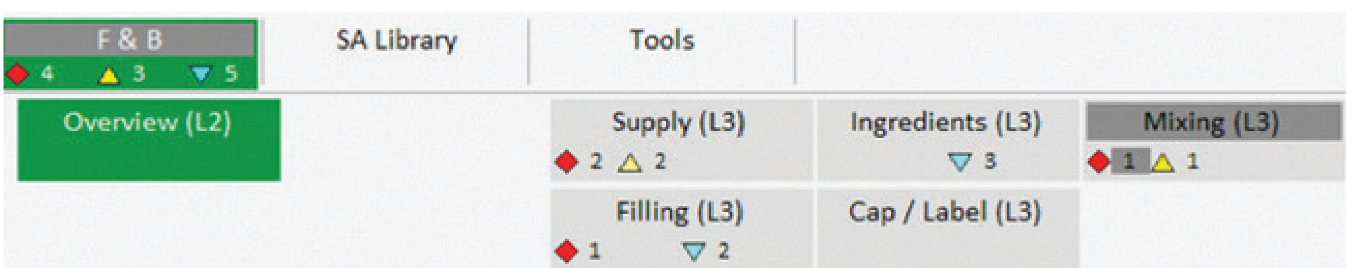


Figure 14: Alarm Counts on Navigation Buttons

Alarm Cause & Response

With the increased levels of automation and rising prevalence of staffing issues, operator experience across all areas of the plant is increasingly difficult to achieve. An operator without the necessary expertise, or access to an experienced superior/peer, can be put under immense pressure when tasked with diagnosing and resolving situations they've never seen before. Especially in cases of alarm floods, inexperienced operators can often focus their attention on the consequential alarms, rather than the root cause, further delaying the necessary steps required to resolve the situation and return the plant to normal operating condition. By providing a quick-reference guide, as shown in **Figure 15**, to the potential alarm causes, recommended responses, expected response time, and possible consequences of their inaction, the operator is supported through unfamiliar scenarios so they can respond more effectively.

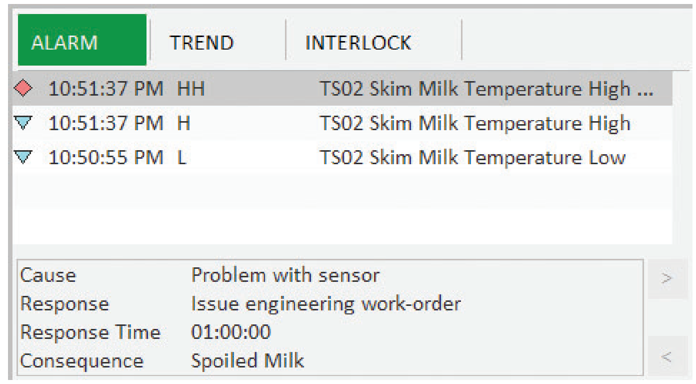


Figure 15: Alarm Cause and Response Information

Alarm Shelving

While regrettable, systems and instruments malfunction from time to time and require maintenance. A malfunctioning instrument often results in alarm conditions constantly being generated within the SCADA/HMI system, and acknowledging these repeated alarm incidents can quickly overload the operator, or worse, create undesirable learned behaviour of automatically acknowledging the alarm. Providing the ability to quickly shelve these nuisance alarms until they have been properly troubleshooted and fixed, as shown in **Figure 16**, is a mandatory requirement in the alarming systems of today, and can be enhanced with support for shelving for a defined duration, as well as until a defined end date/time, rather than forcing the operator to separately calculate the shelving duration. This should also be complemented with direct access to show all shelved alarms as shown in **Figure 17**, so these alarms can be individually restored after the necessary maintenance activity has been completed.

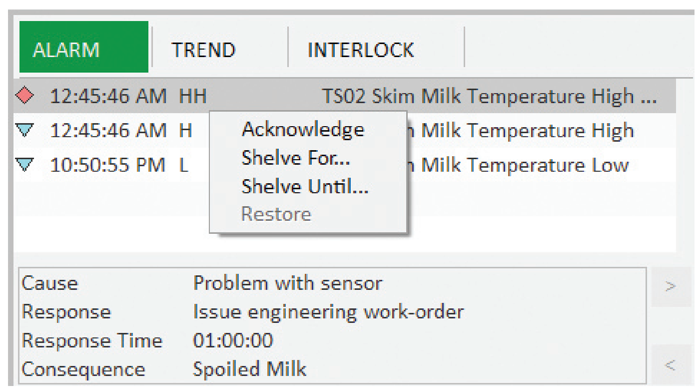


Figure 16: Alarm Shelving

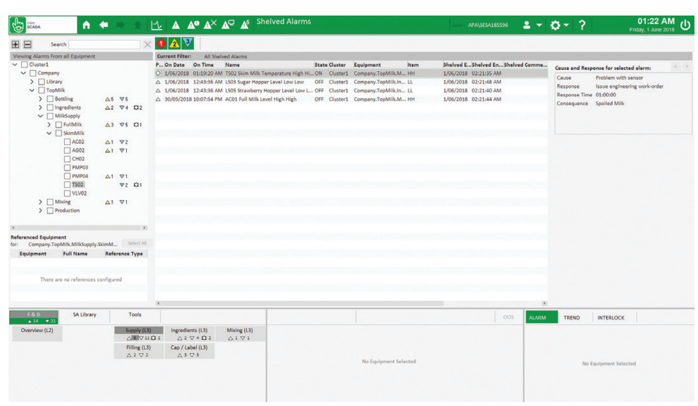


Figure 17: Display of all Shelved Alarms

PUTTING IT ALL TOGETHER

Modern industrial systems continue to get larger, generate greater volumes of data, have increased Levels of automation, suffer staffing issues, and are commonly operated from remote locations. These changes in the industry require a new approach to industrial process visualisation. A systematic approach to delivering Situational Awareness can greatly improve the likelihood of an industrial process achieving its business goals. Research studies have shown that these techniques make it 5 times more likely that an abnormal situation will be recognised before system availability is impacted than traditional techniques.

As industrial processes evolve, so will the design of the HMIs that are used to operate those processes. **Figure 18** summarises the key points of this evolution. Instead of asking the operators to focus on a large volume of process parameters, the data will be placed into context to deliver Situational Awareness.

Instead of viewing operations staff being viewed as labor resources they will be empowered as information craftsmen that will make key business decisions in real time. Instead of operating in a reactive mode the systems will be proactively managed to extract the maximum business value from those systems. And ultimately the focus of the operations teams will shift from merely operating the process to real time business management.

Past	Future
Process Parameters	Situational Awareness
Labor Resources	Information Craftsmen
Reactive Operations	Proactive Operations
Operating a Process	Real Time Business Management

Figure 18: Evolution of Industrial Process Management

CITECT SCADA

Within the latest release of CITECT SCADA many of the techniques described in this document are now available out-of-the-box in a very easy to use product set. These methodologies can be integrated into existing systems or used on the design of new systems. Where an existing system already has P&ID type windows it can be simply augmented with the appropriate displays to facilitate achieving improved Situational Awareness on any budget.

In helping achieve this efficiency, some of the latest features of Citect SCADA include:

- Out-of-the-box Situational Awareness libraries and workflows, leveraging Abnormal Situation Management (ASM) design standards
- Context aware Workspace for fast development, deployment and contextual navigation, from Level 1 to Level 4 ASM interfaces
- Alarm Cause and Response enhancements, driving knowledge capture and transfer, as well as laying the foundation for Smart Alarming using analytics and machine learning.

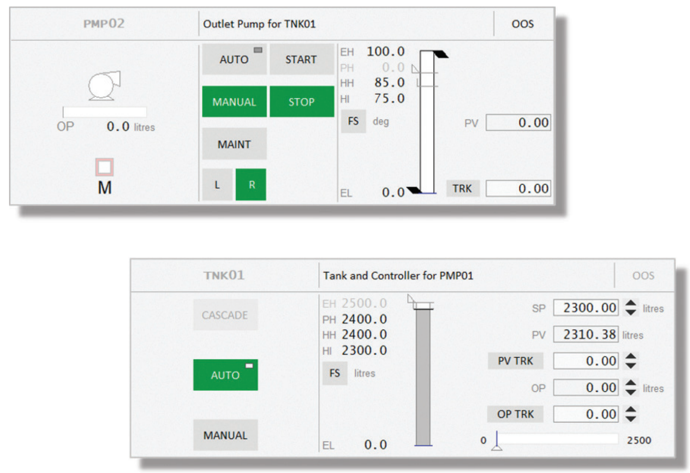
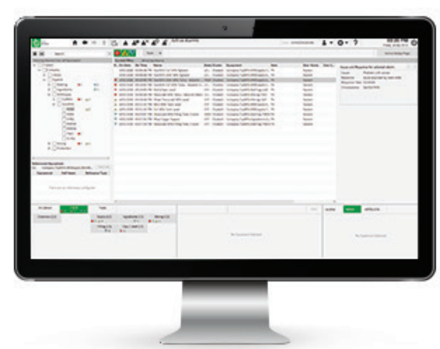


Figure 19: Citect SCADA's out-of-the-box faceplates that match the Situational Awareness library objects

In helping to deliver a new level of efficiency, a selection of out-of-the-box faceplates are available matching the Situational Awareness library objects, with a set of genie components for editing existing faceplates or building custom faceplates. See **Figure 19**.

Context aware Workspace

Library of Configurable Objects



Superior Alarm Management

Using the Situational Awareness functionalities and technologies available within Citect, any business can experience world class industrial system performance with minimal cost and fast return on investment.

To learn more about the latest release of CITECT SCADA visit https://sw.aveva.com/monitor-and-control/hmi-supervisory-and-control/scada-powered-by-citect.

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About the Author

Brad Shaw is an industrial automation professional based at AVEVA's Australian R&D headquarters in Sydney. With more than 10 years' experience in the planning, management and execution of a number of Control Systems projects on many continents, Brad has particular expertise in the effective delivery of a wide variety of Telemetry and remote SCADA applications. For the past 5 years Brad has served in multiple Product Management roles across Schneider Electric's Telemetry and SCADA/HMI portfolio. In his current capacity as Global Product Manager Citect SCADA, a key pillar of AVEVA's Monitoring & Control SCADA / HMI portfolio, Brad is responsible for the product roadmap, feature definition and successful delivery of the software offer and is the conduit between engineering and development, sales and marketing, support and the customer voice.

AVEVA