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# System 800xA® Operator Effectiveness

It's all about smooth operations



# Focused operations and operators for increased performance

Process plants and control systems are becoming increasingly complex. Production flexibility is key to performance and the market is trending toward using larger process areas with less people to do the job. The result is additional data to interpret and more alarms to process.

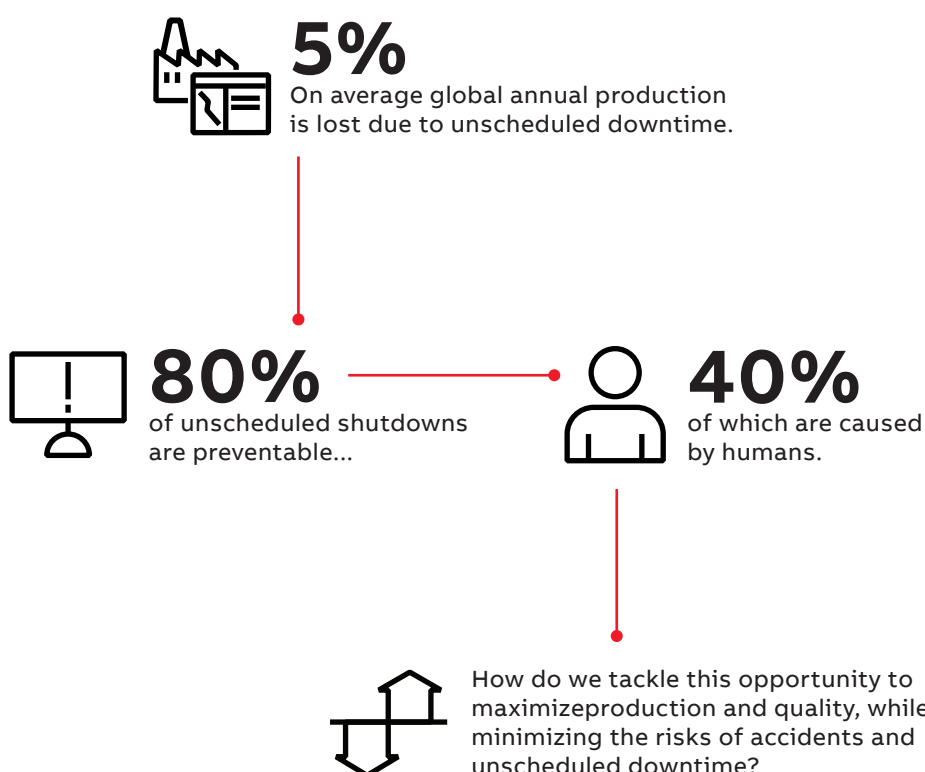
Improving Operator Effectiveness is all about empowering plant operators to do their job better and make more accurate, timely decisions.

Process operators live under constant challenge. The operator's actions have a direct impact on uptime, production output, quality, and safety. However, operators are often hindered by a lack of attention to human factors like: operator interface design, information flow and preparation on how to handle abnormal situations.

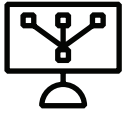
ABB Ability™ System 800xA® and its use of Aspect Object™ technology provides a unified environment for operations that helps to increase operator effectiveness and thus, production performance.

It accomplishes this by integrating information regardless of its source and filtering out irrelevant data with features like personalized workplaces, advanced alarm management, and multi-system integration. In addition, extended operator workplace console keeps the 'operator in focus' by providing unparalleled operator ergonomics, control room consolidation and a preintegrated large screen operator view display for clear and concise plant-wide visualization.

Integrating operations opens up a new world of efficiency – processes flow as never before while operators gain fresh insights, work smarter and can make better informed decisions.

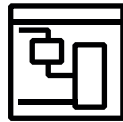


# The four pillars of Operator Effectiveness



## Integrated Operations

Intuitive access to actionable information and dynamic views allow management to seamlessly consolidate and rationalize data from various sources.



## High performance HMI

Clear process graphics and great support for implementation of high performance alarm management strategies.



## Human Factors

Ergonomic operator environment built to reduce stress and operator fatigue.



## Operator Competence

Simulation mimics environment for active and intuitive decision-making.

**ABB is at the forefront of operator effectiveness. To help customers reach the optimal goal we have brought together the necessary technology and business practices as four essential pillars:**

### Integrated operations and embedded functionality

Raw data and other input must be transformed into actionable information in context with plant equipment to promote better decision making. The challenge is to provide seamless access to multiple sources of information while being careful not to overload the operator with irrelevant data.

### High performance HMI

The user interface must be intuitive and allow operators to manage views dynamically and efficiently. A high performance interface supports situation awareness with how the information is displayed. It supports abnormal situation handling through efficient navigation and the application of best practices in alarm management.

### Attention to human factors

Just as manufacturing processes are designed to be carefully controlled and manipulated to achieve desired outcomes, high-performance control rooms and operator stations must be designed with operator performance in mind.

### Operator competence and confidence

Operator training simulators ensure process operator competence and confidence when dealing with normal production as well as unplanned events. In today's business climate simulators make even more sense due to the lack of experienced resources to instruct new, inexperienced operators.

Operator Effectiveness is about the operators' ability to supervise and control processes in the most efficient, safe and profitable way.

# Integrated operations enabled with embedded functionality

Enable timely and intuitive decision-making using actionable information with ready-made embedded functionality.

## One common Interface

800xA operator interface can be put on top of all ABB control systems. Likewise, it can be put on top of any other vendor's PLC or DCS system. This enables safe and cost-efficient system evolution. One common and consistent operator environment, regardless of the underlying control system, lets operators supervise and control larger parts of their process with an improved insight and visualization.

## Early alerts of deviations

Recent performance visualization is yet another 800xA feature that improves operator insight and overview. This built-in HMI function displays the recent performance data of an object right next to the object graphic and its current status. Having recent operating values side-by-side with real-time status alerts operators to deviations before they develop into something more serious. Recent performance graphics can be shown at all times and for all objects – operators no longer have to call up dedicated trend display windows.

## Alarm philosophy fully integrated in System 800xA®

ABB's alarm management is fully integrated in System 800xA, which improves navigation, analysis and handling, and reduces the cost associated with running and maintaining a non-integrated system. Without a separate system to distract them, operators can devote more time to running a safe and efficient process

## Safety Automation

800xA High Integrity integrates safety automation into process automation in ways unmatched by any other vendor. Operators enjoy a familiar all-in-one process overview with full visualization and common alarm lists that improve the understanding of process events and thus, reduce risk.

## Electrical control

Effectively balance availability and consumption of energy. Include load-shedding to enable fast and safe automated shutdown of selected process sections in case of a power shortage or soaring energy prices.

## Multi-system integration promotes enterprise collaboration and control center consolidation

Multi-system integration makes it possible to supervise and operate several 800xA systems from one central control room in a safe and effective way. The systems can be located in the same plant or distributed, i.e. geographically separated from each other. They can still be engineered separately, and be in different life cycles or versions.

“ABB's 800xA Multisystem Integration (MSI) functionality provided a great solution for integrating the remote stations provider systems into the Genesis Hydro Main Control Centre for monitoring and control.”

Robert Woods, Senior Project Engineer, Genesis Energy, New Zealand

## Point of Control clearly defines responsibilities

Point of Control is a recent 800xA addition. It means that control responsibilities automatically follow a pre-determined system set up. The interface shows everyone involved who is responsible for what, which eliminates misunderstandings. When a predesignated operator assumes control responsibility, the alarm list automatically transfers to him. Addition in 6.1.1 - location based POC (control can be done from a group of operator nodes - location more important than the user).

## CMMS reduces process disturbance & downtime

With CMMS (Computerized Maintenance Management System) fully integrated with 800xA, process operators can issue equipment fault reports to plant maintenance with only a few mouse clicks. This increases the rate of reporting malfunctioning objects. Furthermore, since the equipment





information is automatically filled in, manual errors are drastically reduced, saving time. The fault report is available for the maintenance department as soon as the operator clicks submit, thus enhancing collaboration and allowing ample opportunity to tend to anomalies before they negatively affect operation.

#### **Documentation ensures correct action**

Process operators need continuous access to CAD drawings, user-instructions and more. The worst-case scenario involves frantic searches for pieces of paper or hard-to-find binders. Once located, there's always the risk that the information is old or incorrect. The 800xA scenario is different.

Right-clicking a context menu immediately gives operators the correct documentation for whatever task they want to perform, e.g. instructions and drawings for a planned shutdown. It's all directly linked to the specific process object on the screen.

#### **Live video resolves problems faster**

System 800xA lets operators make full use of each camera without having to know where they all are located. With an integrated approach, live video images are available on an object level via two mouse clicks. Operators are quickly presented with a visual overview and can take fast actions.

They can also have embedded camera views in process displays, access to group displays, share images with anyone in the plant or outside, and control any camera directly from the screen. As several people can view at the same time, problem-solving and recovery are more efficient.

- Widescreen: support for additional aspect ratios, default is 16:9
- Integrated video wall (enables displaying several streams from integrated cameras at the same time) by creating a composite image of 4 or 12

camera images and delivering a single video stream of configurable size.

#### **Telecom improves operator collaboration**

A wide array of telecommunication possibilities, such as voice communication, public address or TMS enable effective collaboration with other operators, field technicians, shift supervisors, or maintenance staff, resulting in improved stability, productivity and safety.

In their daily work, control room operators communicate extensively with other people in a variety of ways. Instead of having the different communication tools lying on workstation desks, 800xA operators can rely on the system to connect them to the right person.

Preconfigured messages (translated into several languages if needed) can be sent out as voice messages over the PA system according to the specific alarm situation. Equivalent typed messages can also be sent out at the push of a button.

#### **Process Recall**

System 800xA's new Process Recall is an ideal tool for root cause analysis and incident investigations as it provides users with the ability to replay recorded data on PG2 Graphic displays.

#### **Snapshot reports improve process stability and safety**

Snapshot reporting is driven by an 800xA search engine and report tool extension that searches and presents information from the object database. Its findings increase engineering efficiency and system quality, and provides early warnings. Benefits include reduced time for shift handovers and shorter maintenance cycles.



# High Performance HMI for personalized and intuitive workplaces



Improving operator effectiveness through high-performance HMI is all about improving the operator's situation awareness and their effective situation handling.

ABB Ability™ System 800xA® offers a high-performance HMI that provides operators with an easy-to-use, optimized interface that supports fast operator process interaction and reduces the risk of disturbances and unplanned downtime.

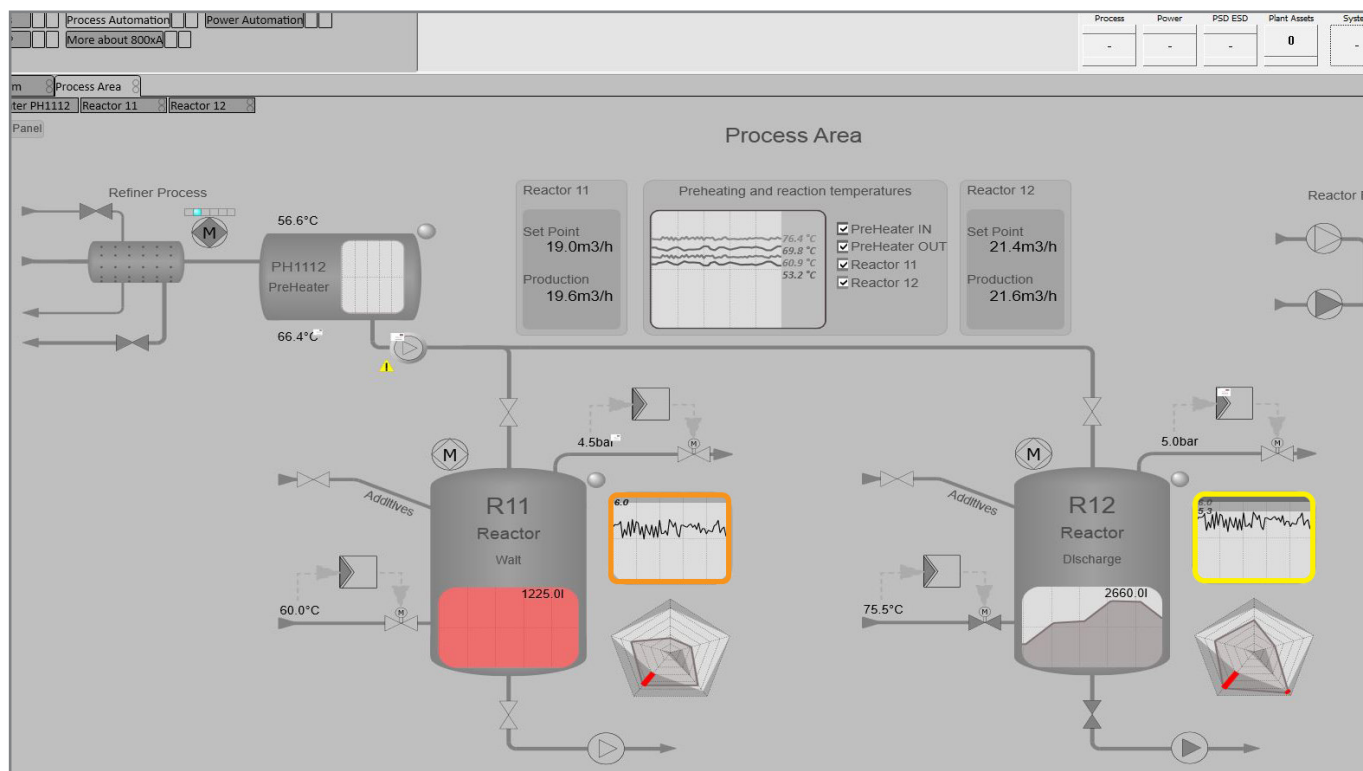
#### **A perfect process overview for everyone**

Different users require access to different information depending on their needs. With System 800xA® you can personalize workplaces with easy access to the right information, in the right place, to speed up decision-making and actions. Users can create role-focused work environments with information arranged according to user workflow. Creating specific workplaces for specific users is simple; the correct workplace appears automatically according to logging information.

#### **High performance graphics for consistent environment**

Together with the object-orientated architecture of System 800xA®, process graphics play a key role in helping plant operators work efficiently, act quickly and make correct decisions. System 800xA® high performance graphics convey a representative illustration of the process flow.

Their design supports pattern recognition and highlights the most important information for the operator. This results in an easy-to-understand environment where reduced stress and distraction contributes to confident decision-making for all parties involved.



### Intuitive navigation allows time for collaboration and enhanced decision-making

Since all relevant and up-to-date information is connected to a specific object, it can be accessed in real time by clicking on that object. Consistently, one-click navigation gives process operators more time to act.

Instead of spending time and energy looking for information, they can concentrate on applying it. They can also share data with colleagues and field operators. Collaboration like this is the key to running and maintaining an optimized process.

### Simplify view-handling and eliminate overload

A multitude of time-saving navigation tools is at each operator's disposal, many designed to simplify view-handling, eliminate 'window-overload', and make the most of the multiple-screens increasingly found in modern control environments.

In System 800xA®, a trend display always opens in the same window as the previous, and an alarm list is never covered by another view. As well as saving time and minimizing stress, this no-surprises view-handling simplifies the use of multiple monitors so that operators can supervise and control larger process areas with the same efficiency and safety.

### Built-in process graphics support across whole interface

System 800xA® has built-in process graphics support that reaches across the complete operator interface, including fast and effective creation:

- Full-vector graphics enable distortion-free scaling with maintained resolution
- Fast, cost-effective graphics builder
- Solution library allows graphics reuse via drag-and-drop
- Display Documentation takes a snapshot of any engineered graphic and converts all details to a standard Excel file for record keeping
- User-friendly expression editor with simple and intuitive syntax
- Built-in animation support speeds up creation while simplifying the build process

### Better image quality for process operators

System 800xA® process graphics not only provide graphics builders with better engineering tools, they give process operators a improved image to view. True vector graphics enable scaling with maintained resolution. This effect is especially appreciated when operators need to scale-down graphic image windows to fit several onto one screen. Process graphics is now extended with "rich" trend functionality.

### Easy-to-learn and use full-vector process graphics

With information designed and presented for human interpretation, operators can see what is going on and act promptly. Key tasks like monitoring the process, solving problems and creating the conditions for uninterrupted, cost-effective production become much easier. Graphics are becoming more and more intuitive and the tendency is towards reducing elements and colors instead of overloading process overviews, helping operations flow more smoothly.

# Increased situation awareness with the latest research in Human Factors

The control room is the most important room in your facility – it's where daily decision-making affects corporate goals and return on plant assets. ABB's dedication to human factors and ergonomic research ensures the most efficient control room environment for ABB Ability™ System 800xA®.

ABB provides complete control room solutions with a clear focus on operator performance, health and job satisfaction. Our solutions often exceed current ISO/EEMUA requirements. Get ABB involved early in your next project, and we'll provide layout proposals that include the latest and most advanced environments and solutions – for the control room as well as adjacent areas.

## **Reduce operator stress and increase focus**

Good workstation ergonomics and a well-designed control room layout reduce operator stress and increase focus.

System 800xA with Extended Operator Workplace (EOW) offers unparalleled ergonomics, visualization and communication solutions for operators. Everything is designed to support effective interaction and collaboration:

- Plant visualization and information all in one view
- Process overviews on close-by large interactive panels
- One fast-acting functional keyboard for controlling the complete operator environment
- Control room space reduced by around 30 % or more
- Improved plant-wide collaboration and optimization
- Increased applicant appeal and job satisfaction

## **Large-screen interactive overview boosts control and collaboration**

Operators have close-by, large-screen overview displays and several personal screens. The EOW workstation is customized with either two or three large overview displays. Operators can arrange graphics to give an optimal view of the process under their control. The EOW's interactive

nature means that it can immediately show any information relevant to any situation to anyone they choose – either in the control room or elsewhere. This facilitates collaborative problem solving by ensuring that key personnel groups always have a clear view of what is happening, and can see what needs to be done.

## **More effective operations from a much reduced working space**

Since operators always have personalized, interactive displays close at hand, the need for huge 'full-wall, cinema-like' screens is eliminated, which naturally saves space in all directions. Floor space requirements can be cut by a third or more using modular design and integrating information into one operator environment. Additional features such as directed 'sound showers' (where only the operator at a specific console will hear a conversation) mean that they can sit closer to one another yet still enjoy a quiet workplace free from distraction.

## **Going beyond the control room walls**

In our view of plant operations, the whole control infrastructure should enhance operator performance via improved information flow and collaboration. Our attention to operator well-being and efficiency thus extends beyond the control room walls to encompass the entire operations center.

ABB offers 800xA Control Room Pre-studies as part of the 800xA portfolio for control room design with special attention to human factors.

By tackling not only the control room but the entire operations center, we ensure that all who work there enjoy an effective operating environment that inspires them to greater productivity and new levels of collaboration.



# Effective alarm management for fast corrective action



**An effective alarm system lets operators focus on important events and act accordingly. They must always know what a particular alarm means, and what they should do to address it. Acknowledging or silencing it without investigating is not an option.**

To help operators see and react correctly to an alarm, the system itself must be proactive and user-friendly, especially with fewer operators controlling larger process areas.

## **Operators focus on key events and correct actions**

With every relevant fact and event in a single system, operators get consolidated time-stamped alarm lists that include power automation safety and all controllers irrespective of brand or supplier. This leads to an improved overview of what has happened in the process (and in exactly what order) in addition to what is happening right now. Troubleshooting becomes faster and more effective through enhanced collaboration with other key functions.

Operators know instantly what each alarm means and have both the time and the information to deal with it correctly.

“The environment in the control room reflects how the plant is feeling.”

Morgan Wännlund, operations manager at Gärstadsverket, Tekniska Verken, Linköping, Sweden

Several alarm system functions help promote safe plant operation. Consistent right-click navigation to and from the alarm list makes alarm-related information instantly available. In addition, alarm shelving temporarily moves an alarm from the list to a special shelved list for a defined period of time or a certain occurrence.

“Instead of constantly reacting to alarms, operators can now address alarm situations before they occur”

Thomas Elfving, System Engineer, AkzoNobel Functional Chemicals, Sweden.

## **Many embedded alarm management features**

Numerous alarm management features come with the 800xA base system such as Alarm and Events Lists, Alarm Hiding or Alarm Response Navigation. Other popular additions are ready-made in the system and can easily be implemented. Please see our 800xA Alarm Management brochure for further information.

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# Simulator training boosts competence that brings safety

While control systems automate large sections of most plants, human error remains a critical aspect in most accidents. 800xA Simulator provides a safe and realistic environment where operators can learn to master the process, thereby reducing risks and the number of unplanned shutdowns.

## **Effective operations with confident and focused operators**

Better trained operators can help increase overall plant safety, reduce start-up time as well as the number of unplanned shutdowns. Simulation gives process operators a safe and realistic environment where they can learn to master the process and improve their operator skills. A simulator is also a powerful tool for engineering testing and optimization studies to improve productivity and energy savings. Trained operators and tested process control result in higher returns as both product quality and productivity are improved.

## **Behavior identical to the real system**

The 800xA Simulator, uses the same engineering data, visualization and control logic as the System 800xA environment, but connected to a dynamic process model. This provides the most realistic simulator solution with behavior identical to the real system, and is much easier to maintain as changes are made. Skills acquired are 100% transferable from simulator to plant.

In addition to being able to simulate the various functions of the control system, it supports essential simulator functions for training purposes, including the ability to set initial conditions, capture snap shots and freeze/resume process dynamics.

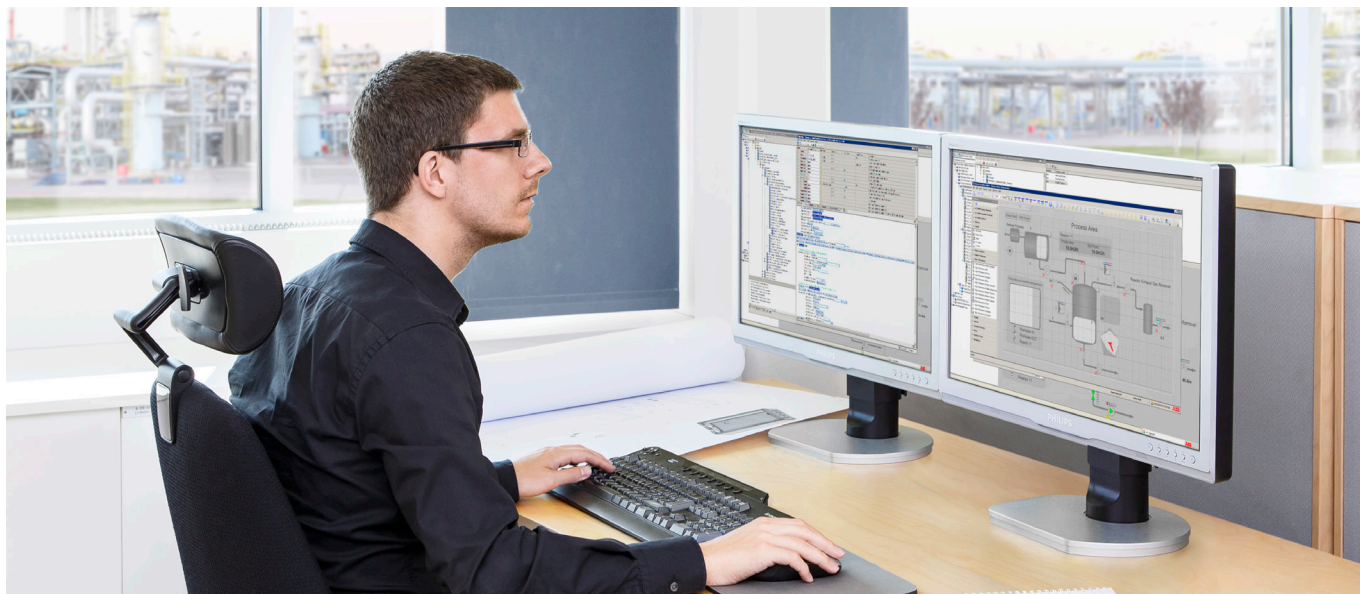
## **From simulation to production**

For a new plant, use of an operator training simulator can contribute to shorter initial start-up, better operator performance and help to prevent trips and incidents. It allows the testing of operational procedures and the tweaking of display and control strategies before initial start-up, when changes are always easier and less risky to make.

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“Our documented experience from the Ormen Lange project provides evidence that the use of the simulator facility has provided us with good safety routines in the process, as well as significant savings in the startup period of the facility.”

Geir Fillip Håseth, Operations engineer, Shell







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## Smooth and intuitive information handling, with the right tools at the right time - embedded in System 800xA®.

**To keep your plant running safely and at its optimum level, your operators need to be equipped to recognize abnormal situations and handle them through effective decision making.**

During every shift there are hundreds of vital decisions made by operators. The actions they take are vital to your process and to your enterprise. Raising productivity, increasing energy efficiency, achieving goals. It's all in their hands – and the more focused, alert and in touch they are, the better they perform. This state of operator enlightenment is far from easy to achieve – if it wasn't for System 800xA.

System 800xA® offers everything needed to improve an operators' performance in one common interface: Advanced alarm management, easy navigation, actionable information, high performance HMI, training simulation and ergonomics. The whole control room environment is delivered in one integrated system with a vast number of ready-made embedded functionalities.

ABB consistently deepens research and development in these areas. New software and hardware such as the EOW-i, the next generation of operator

environment with intelligent ergonomics, are some of the numerous examples of near-future advancements. User experience and interaction design for ever-better human machine interfaces and implementation into control room design for the optimal operation environment are and will be key focus areas.

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The potential benefits of an integrated approach to operator effectiveness are basically the opposite of all the problems already attributed to less well equipped operators. The key is improved decision-making. When operator effectiveness improves, so do productivity, efficiency, asset utilization, safety environmental compliance and profits.



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