White paper

Empowering the workforce to control the Future of Automation
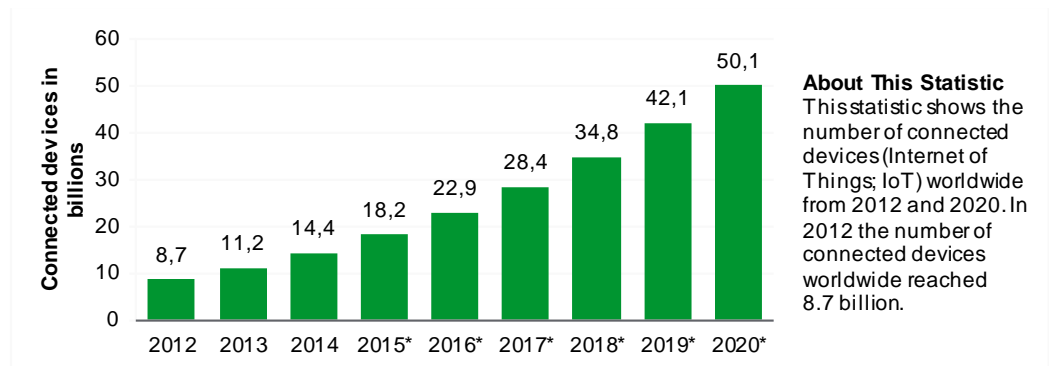
By Dr. Peter Martin & Tom Clary

Executive summary

The advent of the Industrial Internet of Things (IIoT) and the ensuing pervasiveness of connected devices mean that new and unprecedented levels of control are now possible in a plant. This extended control can deliver important business variables right at the asset level, including safety/environmental safety, reliability and, of course, operational profitability. Yet, technology alone is not sufficient to optimize business performance and profitability because the asset controller doesn't always know enough about process dynamics to automatically control these variables. That is where the empowered workforce comes into play and why it is so important. A strong strategy to cultivate and empower staff is critical if a company is to take advantage of the technological advancements of the IIoT.

Introduction

Stagnancy breeds inefficiency. It's a motto that rings true in many sectors, but none more so than in automation and manufacturing. Technological advancements, such as the Internet of Things, big data, and cloud computing are transforming everything within the industrial operation, from cybersecurity to the supply chain.

The number of connected products is expected to approach 30 billion by 2020, with utilities, telecommunications, and manufacturing as the top three segments utilizing the IoT. The trend has even spawned its own manufacturing subset—the Industrial Internet of Things (IIoT)—that is revolutionizing process automation and manufacturing, in general. The revolution is that finally companies have a real opportunity to move from managing their business to actually controlling it.

About This Statistic
This statistic shows the number of connected devices (Internet of Things; IoT) worldwide from 2012 and 2020. In 2012 the number of connected devices worldwide reached 8.7 billion.

Source

Statista

But seizing this opportunity means companies can't remain stagnant. A priority needs to be placed on empowering their workforce to make smarter, faster, more efficient real-time business decisions. Why? Because with the IIoT, an abundance of sensors – wired and wireless pressure, level, flow, temperature, vibration, acoustic, position, analytical and various other types – will be installed in plants and machines, and they will be connected at the edge to the systems that control the process. These connected sensors can quickly improve process efficiency, but the actionable data they provide can also be used to begin to control other important business variables right at the asset, including safety/environmental safety, reliability and, of course, operational profitability.

The changing face of control

Moving from real-time process control to real-time business control has always been a critical challenge, one that seemed impossible until today.

For decades computing technology has constrained industrial automation architectures. These constraints have meant it was impossible to build a control system that accurately matched the topology of an industrial plant. However, as we move into the Future of Automation, process automation will no longer be constrained by technology. Because autonomous, intelligent plant assets, like pumps, for example, are now able to control, monitor, and secure themselves, future industrial automation and control systems will work from the bottom up, beginning at the equipment asset level and moving upward to include unit, area, plant, and enterprise assets. This means that important business variables, like safety and reliability, can be controlled automatically right at the asset level.

However, in many other cases, the asset controller doesn't know enough about process dynamics to automatically control these other business variables, and that's where the empowered workforce comes into play.

Over the years, many new control strategies and initiatives have been based on the idea that automatic control without human involvement was the best method to eliminate costs and maximize revenue. However, most of these initiatives failed

Life Is On | Schneider Electric

because they overlooked the positive attributes humans possess and technology does not, from judgment and adaptability to the ability to deal with the unknown.

People power

In the plant of the future, the industrial workforce will have more and new opportunities to become more critically involved in the business, leveraging the IIoT to begin to control more than the efficiency of the process, which was the historical goal. Soon the workforce will begin to control all those other important business variables too, including cybersecurity risk, safety/environmental risk, reliability risk and, most importantly, profitability.

To achieve this, the empowerment of the workforce to make real-time decisions that improve business results needs to be a critical component of any control strategy. In today's fast-paced industrial environments, real-time decisions typically need to be made quickly with limited information. Therefore, making the best real-time decisions does not necessarily require more data; rather, it might actually require less data but more high-level content and context, i.e., the right data. With easy-to-use tools and easily understood information, received in a format that is easily actionable, the enterprise workforce can make better, more effective business and operating decisions at the right time.

New HMI designs are key

For example, one major operating challenge is the ability to more quickly identify and address abnormal situations before they impact operations. Many industrial human machine interface (HMI) designs are now obsolete as a result of recent trends in the industry, including larger, more complex control systems, greater volumes of data, increased levels of automation, staffing proficiency, and the expanded use of remote operations. Today's HMIs need to be designed on "situational awareness," a methodology that allows the overwhelmed and sometimes undertrained industrial workforce to perform their jobs with fewer errors.
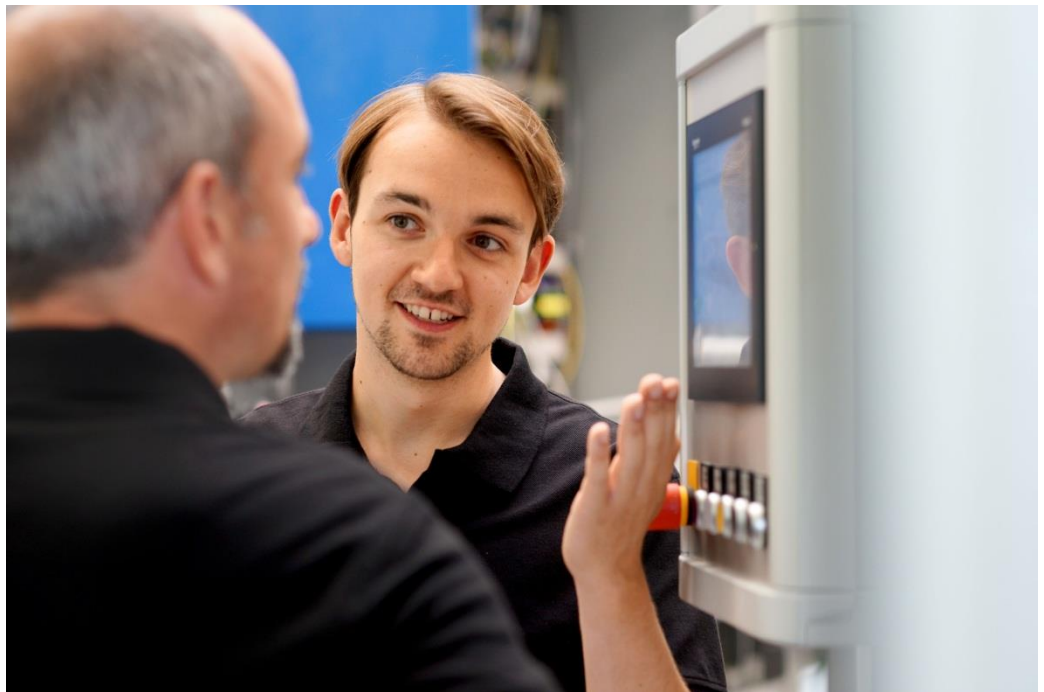
Updated object templates, consistent and standardized styles, colors and fonts, and consistency in the way alarms are represented across the operation transform the operators' relationship with their HMIs and maximize their performance. New HMIs move from simply presenting data to displaying operations information in the correct

Life Is On | Schneider Electric

context. Enhancing situational awareness can lead to a five-fold improvement in detecting abnormal situations before they occur.

And then, after an abnormal situation has been detected, better navigation techniques can cut the time it takes to respond and resolve it by more than 40 percent. In addition to reducing economic losses related to unscheduled downtime, proper HMI designs, based on situational awareness concepts, can also help improve safety, throughput, and overall plant and business performance.

The empowerment toolbox

Connected predictive maintenance and decision-support platforms also empower the workforce to reduce operating costs, improve organizational effectiveness, and increase throughput and productivity. Consider that the average unscheduled shutdown or slowdown costs process plants 6.2 days of production annually. The financial impact of such an incident can be massive, ranging anywhere from $1,500 per hour to $1 million per day for some refineries or petrochemical plants. But by providing actionable early insight into asset performance and abnormal operating conditions across the plant, advanced predictive maintenance tools uniquely enable plant personnel to make smarter business and operating decisions and then act on them from anywhere before an incident even occurs. These tools can pay for themselves within three months of implementation because of their ability to help the workforce slash unscheduled downtime.

Another advancement that empowers the workforce is the new Ethernet-equipped process controllers. Developed for the IIoT, these new process automation controllers (ePACs) have more processing power and memory, stronger embedded cybersecurity and even redundancy, and common I/O and programming platforms. With more connectivity and power, they provide operators with better visibility into the operations and help drive better business decision making. ePACs are proven to reduce time to market by up to 25 percent, reduce process energy consumption by up to 30 percent, and significantly speed and increase ROI.

Employers should also consider providing workers with access to an intuitive "smart logbook" application available on web browsers and smartphones that helps organize records, follow up on predictive and preventative maintenance, access log histories, create reports, view energy data, and integrate remote alarming from equipment.

On the same note, businesses can consider working with their seasoned employees to digitize their records, including old manuals and processes, to keep everything organized and accessible to any employee from any location. Additionally, creating a mentoring program which pairs experienced professionals with newer ones already familiar with emerging technology toolkits can help engender a new-age workforce.

Cultivating new talent to take the reins

We all know the workforce is aging. For example, some experts claim that 50 percent of all refinery staff will retire in the next five to seven years. These sorts of trends mean that the millennial generation—the digital natives—will soon make up the majority of the workforce. Crossing the gap from an average workforce age of 50+ to a new guard of 20-somethings who have vastly less experience and very different work practices will require digital tools, not only to capture the knowledge of the retiring workforce, but also to make that knowledge available to the new generation in a way that supports their preference for digital work practices.

Additionally, while traditional process control knowledge and experience will almost always be valuable, in the future, that knowledge will be a base on which newer technologies and tools will be layered. Because there is a shortage of workers who have the requisite technical skills to work in manufacturing, hiring managers should look for candidates who have skills that go beyond what is needed to perform traditional industrial tasks. Data science, artificial intelligence, and energy management—all non-traditional manufacturing skills—will be relevant and important.

Life Is On | Schneider Electric

Make manufacturing "cool"

Most entry-level prospects, college graduates, and other inexperienced candidates don't think manufacturing is a particularly exciting field. Yet manufacturing globally, especially in the United States, is growing, and it will absolutely remain a vital source of innovation and competitiveness, making outsized contributions to research and development, exports, and productivity growth.

There is a greater opportunity for companies to empower these younger and new workers with emerging technology so they can be more actively involved in and responsible for business success. For example, they can provide employees with augmented reality capabilities on their work tablets, generating digital overlays of equipment so they can more easily access and diagnose issues and reroute them to plant operators who determine the next best action for solving the problem. They can also enable employees to conveniently tag equipment with specific QR codes and scan them with their smartphones to access past control logs, user guides, wiring diagrams, and other resources for each specific piece of equipment. They can even incorporate geolocation, which allows users to take photos of equipment and tag its location in the plant, making it much easier to find when it's time for maintenance or repair, for example. Things like virtual reality training simulators and access to easy online support should also be considered.

Conclusion

With the advent of the IIoT, the industrial landscape is changing almost daily, despite challenges and barriers to adoption. But even with all the benefits this level of connectivity provides, almost every industrial operation is performing sub-optimally when it comes to the potential business value it can generate. Empowering the workforce to control cybersecurity risk, reliability risk, safety risk, and profitability in real time will change that trend. By providing the workforce with the right technology and deploying the right recruiting, training, and retention tactics, companies can finally stop merely managing their business and actually control it. An empowered workforce can help convert their connected products and existing automation and control systems into industrial profit engines that will drive measureable operational profitability improvements (OPI), safely. This is the Future of Automation.

Life Is On | Schneider Electric

About the authors

Dr. Peter G. Martin

Dr. Peter G. Martin, VP Business Innovation & Marketing for Schneider Electric's Process Automation business, is a recognized leader and innovator in automation and control. He has been a practitioner in the field for over 37 years; has authored three books, co-authored two, and been a contributing author for three more; and has published dozens of articles and papers in these disciplines. He holds or has pending multiple patents in the areas of real-time business measurement and control. He was recognized by Fortune as a Hero of U.S. Manufacturing, by InTech as one of the Fifty Most Influential Innovators in Control, and by Control as a member of the Automation Hall of Fame; he has also received ISA's Life Achievement Award. Martin has a B.A. and an M.S. in mathematics, an M.A. in administration and management, and a Ph.D. in industrial engineering, as well as a master's and a doctorate in biblical studies.

Tom Clary

Tom Clary is the Director of Global Business Communications for Schneider Electric's Process Automation business. He has more than 25 years of unique industry experience, including expertise in the technology, manufacturing, energy, infrastructure management, B2B hardware and software, and business and cloud services sectors. He joined Schneider Electric via the company's acquisition of Invensys in 2014, initially serving as the company's director of communications and media relations. He progressed into his current position in 2016. Throughout his career, he has designed communications strategies for a variety of internal and external audiences and has been thrice recognized for excellence in change management and crisis resolution. He has a Bachelor of Arts degree in political philosophy.

Related content

- Igniting the industrial profit engine
- The productivity trifecta

Contact us

For more information, please visit our website.

schneider-electric.com/smartoperations

Life Is On | Schneider Electric