Instrument Training Enables IIoT Implementation

The first step to implementing digital transformation, IIoT, Industry 4.0 and other modern technologies, is proper use of smart instrumentation.

By Jerry Spindler, Endress+Hauser

Process instruments have been digital for many years. In fact, microprocessor-based measuring devices for flow, level, pressure, temperature, etc. have been available since the 1980s. However, a vast majority of units purchased and installed still rely on the 4-20 mA analog output of the process variable, with the digital interface completely ignored.

Smart instruments can provide a wealth of information via HART, EtherNet/IP and other digital interfaces, but most plants do not use these communication protocols. There is even a surprising percentage of instruments with no outputs connected where users rely only on the displayed values as a visual indication.

In many cases, the problem is a lack of training for the plant technicians expected to work with these smart instruments. A skills gap often exists that can only be filled with some type of training. Whether it's internal onboarding and mentoring; informal institutional knowledge absorbed organically; online eLearning; classroom instructor-led events (Figure 1); or some combination of these. There's no doubt that training is needed to take place before a plant undergoes digital transformation.

Learning the New Technology

Some of the leading buzzwords in the process industry include Industrial Internet of Things (IIoT), digitization, Industry 4.0, edge computing and the cloud. Many people are excited about these technologies but are not sure how to implement them. Most believe it's coming and will be a reality in their plants someday, but don't know how to select the best approach. There are so many solutions being touted nowadays that it can be overwhelming.

Figure 1: With instrument training, such as this Endress+Hauser class, students learn how modern instruments provide digital data to IIoT cloud services.

In addition, there is an abundance of new apps released every day for mobile devices, exploding WiFi, Bluetooth and RFID connections, a growing portfolio of Ethernet connected devices, IO-Link, etc., plus new handheld Windows 10 tablets that are intended to be an integral part of this evolving IIoT ecosystem.

Control engineers working on a new design should also think beyond how the process can work on day one of commissioning and think about how that "system" can evolve, improve and keep getting better.

A good place to start is by learning what their current instrumentation can do. The data in those instruments are

the “things” in the IIoT. That is, the diagnostic data, status, process value, calibration, and other data that a modern instrument can provide often form the basis for maintenance and process management decisions made by sophisticated software higher up in the process automation pyramid. Learning the capabilities of smart instrumentation is the starting point before one can proceed to more complex software applications such as a computerized maintenance management, other asset management systems, or a distributed control system. The good news is most plant engineers and technicians already know how flow, level, pressure and temperature instruments work to provide a process value; they just aren’t familiar with the full range of digital capabilities.

Training should include working on actual smart instrumentation connected to an IIoT system (Figure 2). For instance, in the Endress+Hauser PTU® (Process Training Unit), students can see how the data is generated, transmitted, processed and what the results can be.

Figure 2: Modern training isn’t just conducted in a classroom. Students participating in Endress+Hauser courses can apply what they learn in a hands-on experience at a PTU.

Getting Ready for IIoT

Many companies look for ways to cut expenses, and training programs have often fallen victim to this short-sighted approach. But a long-term strategy for IIoT adoption cannot take place unless the right skillsets are in place.

Instrument training makes engineers and technicians aware of how modern digital technology works. They can evaluate the installation of new devices and the use of the generated data to improve operations. With this preparation, the plant will be well prepared to implement IIoT installations. Economical flow, level, pressure, temperature and analytical devices are available today, some for under $500 per measuring point. These can be a modern upgrade for older devices that are starting to cause issues or even failures, so

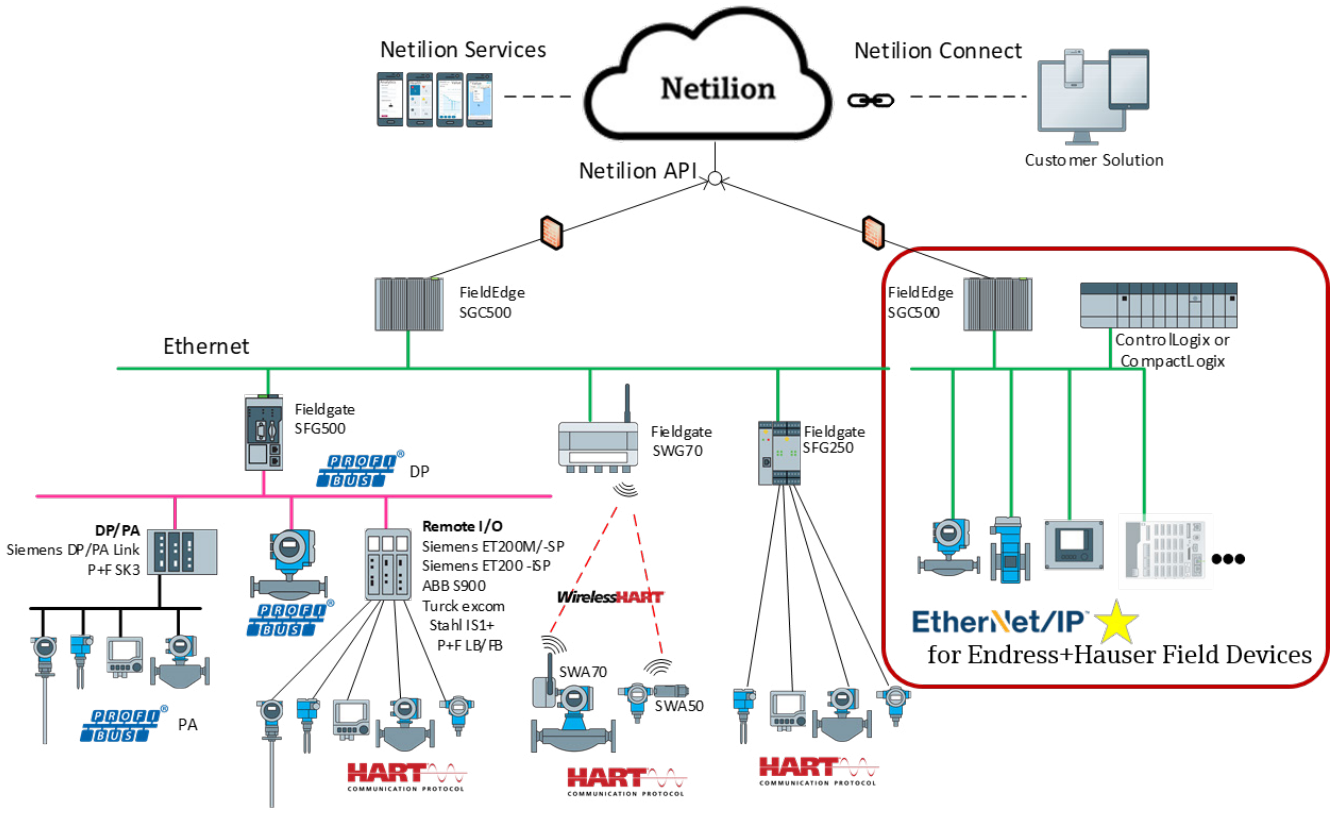

Figure 3: Industrial Internet of Things (IIoT) and Industry 4.0 examples are available now for learning how to apply in the field at a PTU.

plants should consider looking into a more capable smart device instead of just ordering an exact replacement.

Ask your supplier if they offer a more modern alternative. The accuracy will not change, but now you'll be prepared for the connected future.

Development is occurring at a fast pace. Some of the newest devices are smarter now than they were just one or two years ago. Innovations, like self-calibrating RTD temperature transmitters, flowmeters and level measuring electronics with built-in self-monitoring and verification capabilities are hitting the market.

But this capability isn't beneficial unless end-users know that these devices exist and can be installed in the process. It's important to ask vendors what's new, to read the ads in magazines, to attend trade shows and see devices firsthand, or to attend IIoT seminars. Many of these newer capabilities are now installed and live for demonstration and training at Endress+Hauser PTUs in the US. Figure 3 shows a Network example with various protocols which will also have applications for Cloud based data analysis in the future.

Important for the process industries will also be implementation of IEC 2-WISE standard for 2-Wire Intrinsically Safe Ethernet. This IEC technical specification, IEC TS 60079-47 (2-WISE) is one topic that will be of interest to attendees of future training classes to understand plant applications.

IIoT and digitization are here today and will soon be a competitive necessity. With proper training, users can realize a path toward adoption. And with the industrial communications standards continuously evolving and even newer technology, the PTUs will keep up with those changes allowing users to see exactly how they can be implemented. Figure 4 shows "Ethernet-APL", a concept of future possibilities that will be realized as newer devices are released to the market. The Advanced Physical Layer for Ethernet combines benefits of simple and robust 2-wire technology with benefits of Ethernet, enabling top-performance and seamless data access in the field of process plants—even in explosion hazardous areas. Classes will be offered on Industry 4.0 subjects, with more being developed in the coming months and years.

In the *InTech Digital* article "Ethernet Reaches Down to Field Devices", Endress+Hauser's Marketing Manager Industrial Communication, Benedikt Spielman discusses the vision for Ethernet-APL. "The advantages of Ethernet-APL will be noticeable in all life-cycle phases of a plant: from simplified engineering … to simple two-wire installation with less manual effort and reduced susceptibility to errors, to efficient maintenance," said Benedikt. "Particularly in the context of Industry 4.0, Ethernet APL ensures the connectivity that is necessary for digitalization."

Summary

IIoT and digitalization can be challenging to understand, especially in plants that aren't taking advantage of the digital capabilities of instruments they've been using since the

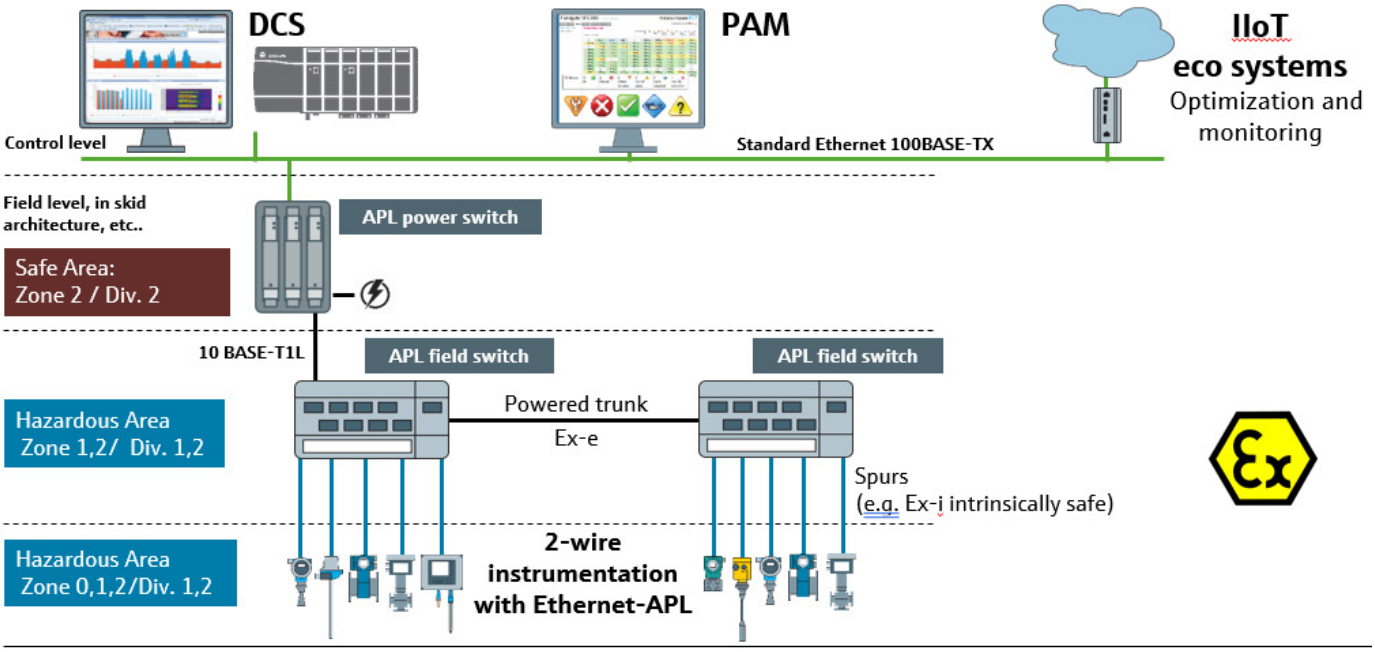

Figure 4: New IEEE 802.3cg standard and the next generation of plant networking and communications, such as the Ethernet Advanced Physical Layer, will be on full display at training facilities for hands-on learning at a PTU.

1980s. However, there are modern training classes readily available from most instrument manufacturers where they teach about advanced instrumentation, such as self-calibrating RTDs. Modern instruments provide the “things” in the IIoT, and instrument training will acquaint engineers and technicians with these instruments and how they work, enabling them with the skills and knowledge to bring the benefits of digitalization into the field.

If you would like to find out more about new IIoT training offerings from Endress+Hauser, visit eh.digital/IIoTtraining_us.

About the Author

Jerry Spindler is the APTD Certified Customer Training Manager at Endress+Hauser since 2012. Previous positions at Endress+Hauser were in product marketing and business development. Spindler has an MBA in product management and advertising, and a BS in electronics and mechanical technology.