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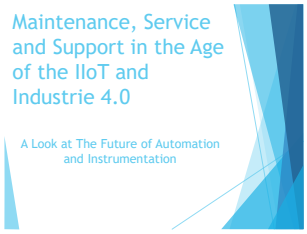
Inside this issue:

Service and Maintenance in the Age of the IIoT and Industrie 4.0



By Walt Boyes

This article is based on a speech I gave early in March for the Global Service Conference of Endress+Hauser in Madrid, Spain.

We are going to talk about the tsunami, the perfect storm, that is hitting manufacturing and automation. It has now been going on for about 10 years, and this storm will continue to cause serious eruptions in the industry for at least another ten. For shorthand, we are calling this new era the age of the Industrial Internet of Things, and Industrie 4.0.

I have a unique perspective as a writer, journalist, pundit and analyst. I am an ISA Life Fellow, and a Fellow of the Institute of Measurement and Control in the UK. My father went to work for Brown Instrument Co. in 1940-- that's now called Honeywell Process Solutions. I was brought up in the automation business, and I've spent the past 50 years doing nearly every job in automation, from factory and plant floor to product design, sales and marketing. I'm going to share that unique perspective with you.

To understand how the service business is going to be impacted by this giant tidal wave that is threatening to drown manufacturing and automation, we need to look at the future of the entire automation and instrumentation industry.

First, we are going to look at the automation markets to see where the cracks in the edifice are biggest, and which might cause the whole thing to come crashing down.

The market is changing– the changes are swift, destabilizing, and for companies that cannot change nimbly, the changes will be disastrous. The market is splitting. The Large Automation Vendors want to do business with only the Large End Users– that's where the money is. The smaller vendors are through getting packaged out– they are differentiating themselves madly.
The smaller end users are feeling left out… they can't get attention from the large vendors, and they don't have the engineering capacity to do it themselves. They want companies that can produce packages for them, but they aren't big enough to have the large vendors care about them. They are increasingly turning to the smaller vendors, and the control system integrators to do what the large vendors used to do for them.

The very large end users have been captives of the big automation companies for decades. "Sure, you can go to open bid, but if you do, we won't renew your service contracts." Did

The Fragmentation of Automation... (continued)

you ever think you'd hear a vendor actually do that?? Well it happened. I won't tell you who did it, and who they did it to. But the big end users have been restive for a long time.

Several years ago, ExxonMobil did a research project that estimated costs for rip-and-replace of their DCS systems, many of which are over 40 years old now. The estimates scared them so much that they decided that the answer was to go to The Open Group and get a vendor-neutral standard established for control systems.

I asked them what they would do when the big vendors said "No." All of the big vendors except ABB and Schneider have now said, "No," but the standard development work continues. Other large end users have joined in.

The competition to these systems is coming from outside the industry– from IBM, McKinsey, Tata Consulting, Oracle, and others. It is not about sensors, it is all about data, and there are companies far larger and better than the automation vendors who know all about data.

The large vendors are working very hard on their own, incompatible and proprietary, ways to implement the Industrial Internet of Things. ABB calls it Ability, Siemens calls it Mindshare, Yokogawa calls it Synaptic Automation…it is all very interesting, and unfortunately, probably none of it will survive terribly long.

The competition to these systems is coming from outside the industry– from IBM, McKinsey, Tata Consulting, Oracle, and others. It is not about sensors, it is all about data, and there are companies far larger and better than the automation vendors who know all about data.

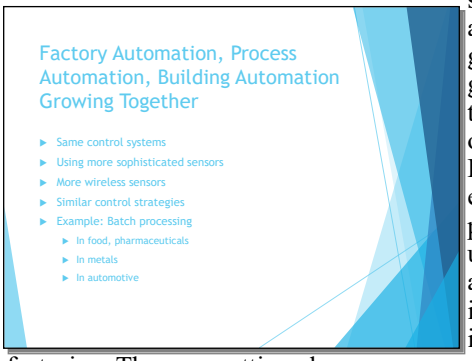
Many of the smaller vendors are quite nimble, and there are new vendors coming from outside the industry. There are new designs, promoted by the needs of the IIoT and Industrie 4.0, especially in sensors, which we will talk about in a few minutes.

There are new architectures for control systems. One of the companies that started in Silicon Valley is a company called Bedrock Automation. They have re-designed the field controller from the circuit board up. If you haven't seen what they have done, it's worth a look. There are no pins on the backplane. Each of the modules is cybersecure– even the power supply. And it is powerful enough to serve as a PLC, or a PAC, or as an RTU for a SCADA system– or for a DCS.
New software strategies are coming fast, too. Inductive Automation, for example, has an app store, where their integrators and customers can get their own apps tested and sold. In fact, the Ignition! product is very much like what the Open Process Automation standard is calling for, and ExxonMobil is looking at them as a potential supplier.

Years ago, we waited for the markets in China, India and the rest of Asia to "open up" and when they did, we found a lot of home-grown challengers, like Hollysys and Supcon. There are at least 25 manufacturers of magnetic flow meters in China alone. India is now growing faster than China, and their indigenous manufacturers are furiously building field devices, control systems and software. Even consulting services, like Tata are growing and global.

We are going to see more indigenous challenges as the third world achieves parity with the developed world.

For the past decade, factory automation, process automation, and building automation have been growing closer together. They really do use similar equipment, software and hardware. They use the same or similar control algorithms. They will grow more closely together as the IoT and the IIoT grow closer. In one of the last World Batch Forum conferences, batch processing papers were presented using the ISA88 standard in metals, in food, in pharmaceuticals, and in automotive manufacturing. They are getting closer.



So where do companies like E+H fit? Can you weather the storm? E+H is nearly unique. It is the world's only large manufacturer of field devices that does not produce control systems and has refused to do so for decades. Yet it is the largest manufacturer in the world of field devices used in process automation, if you don't count control valves.

This is both good news and bad news. E+H can be more nimble, more effective, and closer to the customers than many of the large vendors. Because it is a family-held company, it has the ability to be much more nimble than, say, Emerson, which is under great

Service and Maintenance… (continued)

tain and calibrate thousands of new sensors with the same staff we have now? Just changing batteries in wireless sensors is a huge, new job. And there won't be significant headcount increases.

We are going to be installing and servicing all those new sensors, even the ones that may not be in the plant directly. If you are doing service for the power grid, or a natural gas distribution system, or an oil pipeline, those sensors may be very remote, or in people's houses, or even underwater.
We are going to have to make it work.

There is an old joke that goes, "We the unwilling, let by the unqualified, have been doing the improbable for so long with so little, we now attempt to do the impossible with nothing!"

That is what the future of maintenance looks like, if we keep doing it the way we have. But we can't. It won't work. Just like the tsunami is overwhelming manufacturing and automation, it is doing so for service. Service at the MRO level at the end user must get smarter, more efficient.

Here's a five-point plan every automation vendor should be selling to every one of the end user customers.

1. Automate the asset management operation
2. Connect the existing HART and Profibus sensors to the asset management system
3. Automate the calibration system
4. Employ contractors, system integrators

Service as a service

And by providing service as a service, we can take some of their manpower burden away by providing it ourselves.

Which brings us down to you. What should the vendor service and support team be doing in the age of the Internet of Things?

Here are six things every service organization should be implementing immediately in order to survive the coming tidal wave:

VENDORS SHOULD BE SELLING:

1. Automate the asset management operation
2. Connect the existing HART and Profibus sensors to the asset management system
3. Automate the calibration system
4. Employ contractors, system integrators
5. Service as a service

Offer Service as a service.

Provide inexpensive high-quality service training to your customers as well as your own staff.

Offer remote service and maintenance monitoring.

Be able to provide cyber security enhancements for sensor networks.
Embed service personnel with your customers.

Not least, be able to provide universal service- any make any model sensor, valve, control system, motor control center.

Sure, competition for service will come from the other vendors, but a top-quality service organization will have strong relationships with as many control system integrators as possible, and will work with and train independent service and MRO organizations.

Remanufacturers need to be provided assistance and they will sell your products too.

There is no such thing as competition, really. The service pie is big enough and valuable enough that everyone will get some, but the real value is from the organizations who provide the very best service.

SERVICE ORGANIZATIONS SHOULD:

1. Offer Service as a service
2. Provide inexpensive high-quality service training to your customers as well as your own staff
3. Offer remote service and maintenance monitoring
4. Be able to provide cyber security enhancements for sensor networks
5. Embed service personnel with your customers
6. Not least, be able to provide universal service- any make any model sensor,

This service centric approach to your customers is a critical product feature for the next several decades.

Although most of the noise and flackery has been about new sensors and control systems the real interesting part to watch in the next decade will be the changes to maintenance and service needed to cope with the changes in sensors, system architecture and data collection and mining.

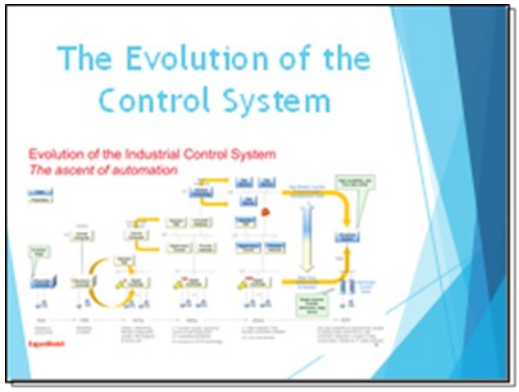
Buckle your seat belts, and keep your hands and feet inside the car. It is going to be a bumpy ride!

Service and Maintenance... (continued)

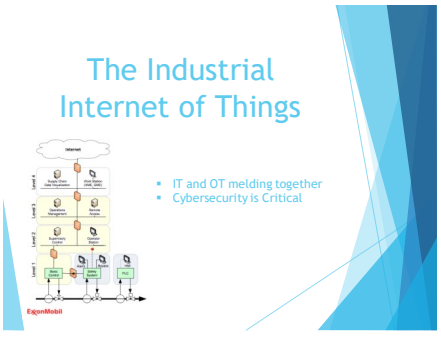
pressure from its stockholders to do something, anything, to improve profits. That's why Emerson tried and failed to buy Rockwell Automation.

E+H can more easily re-design sensors, change business models, and implement better and more efficient service offerings because it is family-owned and private. Among the German "mittelstadt" companies there are many of these family owned companies. So, E+H is not alone, simply the biggest.

Rockwell Automation is also nearly unique– they are the only large automation vendor that only produces control systems and motor controls. It is not an accident that Rockwell and E+H have grown close. It is also no accident that Bedrock Automation is imitating Rockwell—and in fact has hired many Rockwell alumni.



This helpful chart from ExxonMobil shows a timeline of the development and changes of automation and control systems, from pneumatic systems to fully developed DCS systems. As the controllers became more and more industrial computers, the systems of importance became the sensors and the software systems. This flattened out the Purdue Pyramid.. What is important now, is the sensors and the software.

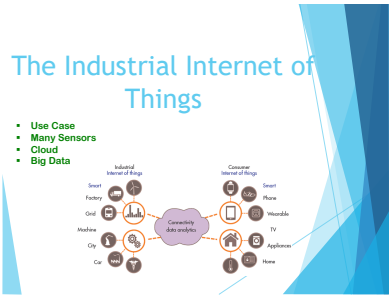


The IIoT and Industrie 4.0 require huge numbers of new sensors. To use the Big Data software, you have to have big data– lots of it.

This is what a 21st century control system will look like, again according to ExxonMobil. There will be many more sensors than we use now, measuring variables we don't measure now, and even virtual sensors measuring computed Process Variables.

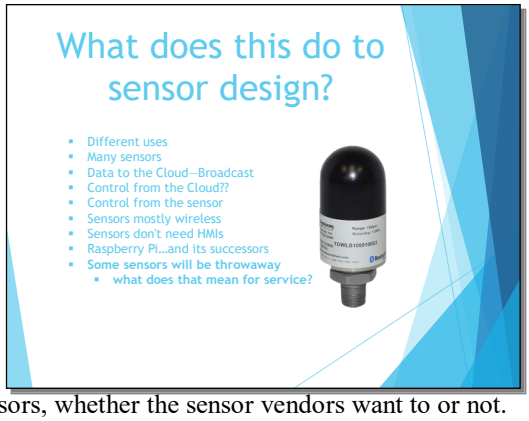
We are going to see simplification of the architecture, as IT systems and OT systems become one.

Here's what the Industrial Internet of Things looks like, interfaced with the larger, commercial Internet of Things. It is all about connectivity, or is it? It is actually about data quality.



We said that there were going to be huge changes in sensors. With the number of sensors going up by the thousands, for historians, other data, asset management systems, simulation nd modeling… as well as sensors for the control system, we re going to need lots of sensors. And they are going to have to be smarter, and capable of local control in the sensor itself.

This does a lot to sensor design. The sensor in the picture is a pressure transmitter– it is Bluetooth Low Energy- BLE- and it sells for around 100 Euros.



We will see much less expensive sensors, whether the sensor vendors want to or not. If they don't, there will be new vendors coming from outside the

Service and Maintenance… (continued)

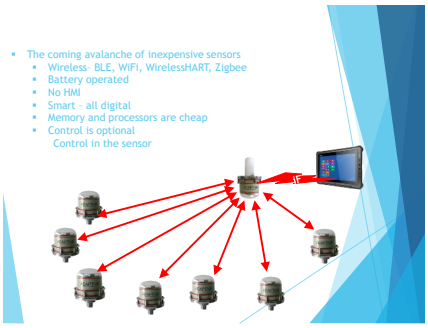
automation industry…medical device sensor manufacturers, aerospace and automotive sensor manufacturers, and people like Digi and Cypress Semiconductor will enter the automation market.

Sensors don't need HMIs– a smartphone or tablet is a far better HMI than a four line by twenty character LCD could ever be.

And controllers may get simpler and more homegrown– look at Raspberry PI and its successors.

When sensors are disposable, what happens to service?

Here's an example of a design for inexpensive wireless sensors. They are wireless, and can be BLE, WiFi, WirelessHART, Zigbee…Note that the individual sensors are battery operated, there's no local HMI, they are all smart and all digital.



Because memory and processors are cheap, these sensors each have 64 Gigabytes of memory – they can store every reading, all the calibration values, and even video and manuals.

They even are powerful enough to do control in the sensor,
So here are some takeaways about sensors and field devices.
Of course, the same thing is going to happen to online analyzers too, with new and simpler designs, better sample cells, and the same design requirements as simple sensors.

Like most things, Big Data is a control loop. To get the best data, you have to have lots of sensors with lots of process variables. To make the process more effective, you have to have big data analysis.

Smart sensors are the key to Big Data– but we have already learned that you can't just throw sensor data into a bit bucket and stir. You must have real process knowledge and experience to use the data that Big Data brings you.

Cyber attacks, including the one on the US power grid recently, are getting more targeted and more insidious. We know that safety systems can be disabled by hackers. We know that individual sensors can be hacked and their data falsified.

In order to implement the IIoT and Industrie 4.0, we will have to add thousands of new sensors..each adding a new attack vector. We need to devise methods of making each sensor and device cyber secure.

And we need to maintain that security level at all times… or we will be the ones in the dark.

And while all this is going on, we're still having arguments over definitions with the IT-centric cyber security professionals. For example, what is an "edge device?" To an OT professional, an edge device is a field device, a sensor or a final control element like a valve or other direct control device. To an IT professional, an edge device is that part of the network that interfaces with the field devices. This is a dangerous argument to be having this late in the day.

That real process knowledge and experience, that cybersecurity awareness only comes from active and well trained automation professionals.
But we aren't getting new blood and this is a real problem. One thing we need to do is to see that operators and maintenance workers are treated as the professionals they really are. We need to provide real automation education for anyone that wants a job. We are going to need everyone we can get. This is why many automation companies already support FIRST Robotics, and why Rockwell and Emerson have started their own training schools.

Now you've seen the picture of the future of automation– it is not bleak, but it is going to be difficult for the next decade or so. Now we're going to talk about the future of maintenance, service and support.

Many companies want to treat their control systems like piping or tanks or stamping machinery– pay for it once and run it to destruction. Of course we know that automation systems can't work like that. But maintenance intervals are getting longer, and existing instruments and analyzers and control valves are getting older. Higher quality standards have pushed calibration requirements to greater frequency, and still, many companies have their maintenance and operations data in big silos and usually on paper where it often is used as a doorstop rather than an effective information tool.

And then there's all those new sensors and analyzers from the Industrial Internet of Things. How can we manage to main-

Brasil Muddles Around

By David W. Spitzer, PE

Brasil has been muddling along since the last update about a year ago. The first arrests in the Petrobras scandal (now in its 50th phase) coincided with Brasil entering into a recession four years ago (March 2014). The effects were exacerbated by Petrobras (Brasil's largest company) withholding payment to suppliers for months which severely hampered many engineering companies who (all of a sudden) could not make payroll and/or pay their expenses. A general idea of the extent and scope of the investigation can be appreciated by a quick visit to http://infograficos.oglobo.globo.com/brasil/lava-jato-personagens.html. The INSIDER believes that the scandals show no signs of ending anytime soon. This has had a significant effect on the economy. While Brasil nominally has the 8th largest GDP in the world, its growth has stumbled since the global economic catastrophe of 2008.

The resultant distress resulted in mass layoffs and less industrial spending by the then-reduced engineering staffs. Anecdotally, many companies' orders were off as much as 40-60 percent. Some suppliers and engineering houses closed their doors but almost all exhibited significant financial stress in the early years. Various foreign companies with direct offices and/or manufacturing in Brasil have either scaled back their Brasilian operations or left Brasil entirely.

The Brasilian economy appeared to have bottomed when it grew about one percent in 2017 after falling over three percent in both 2015 and 2016. The INSIDER suggests that the two to three percent GDP growth currently predicted for 2018 is optimistic --- especially since Petrobras reduced its expenditures as a result of recent losses. That said, the industrial sector may exhibit reasonable growth because some projects delayed since 2014 (especially maintenance and upgrades) may not be delayed much longer.

Despite calls for impeachment, President Temer is still in office after the opposition could not muster the required votes for removal. He entered office saying that he would not seek re-election later this year but subsequent actions and statements suggest otherwise --- despite his extremely low popularity. The (defiant) president of the lower house of the legislature has been in jail for well over a year. The ex-governor of the State of Rio de Janeiro was sentenced to over 50 years in prison but still has over 10 additional corruption cases pending that could bring the total to well over 100 years.

Many in Brasil are anxiously waiting to find out whether ex-President Lula will be put in prison. Lula was convicted and sentenced to approximately 9 years in jail for corruption associated with an oceanfront triplex apartment. After the conviction, Lula spoke about running for President again --- (ironically) despite having signed a law prohibiting convicted persons from holding high offices. Lula's conviction was doubly appealed --- Lula asserting innocence and the prosecutor asserting that the sentence was too short. The unanimous appeals court decision upheld the conviction and raised the sentence to over 12 years. Lula is still free pursuing a limited appeal but he could be jailed at any time. Party members now seem to accept that Lula may go to prison but insist that it may only be for a few days. The INSIDER opines that Lula will likely be locked up and stay for a good while. By the way, Lula still has other corruption cases pending so he could rack up additional time.

The good news remains unchanged --- the Brazilian democracy is strong and the political processes are working as prescribed by the constitution. The current state of Brazilian politics and the economy do not bode well for instrumentation sales in the short to medium term but it appears that a "new normal" has been reached. Corruption has been ingrained in the culture for decades (if not centuries) so current anti-corruption efforts (if ultimately successful) should put the country in a better position to grow in the future. It seems to the INSIDER that it will take a while for Brasil to work through its problems.

In the early 2000s, Brasil was part of a growing economic sphere called BRIC. The economies of India and China have continued to grow, and their contribution to the world automation markets have grown exponentially. Because of corruption and political infighting, the growth of the automation markets in Brasil and Russia, the first two of the BRIC countries, has simply not kept pace with the rest of the world. This is especially sad for Brasil, considering that it produced the first global automation company in South America, Politics and corruption destroyed that company, not international competition.

David W. Spitzer is a Professional Engineer and ISA Life Fellow in "recognition of contributions to flow measurement and variable speed drives for process control." With over 35 years of industrial experience, he wrote more than 10 textbooks and has taught numerous training seminars internationally. David was a Director of Weed Instrument (1995-1997) and is currently on the Editorial Advisory Boards of Intech and Flow Control magazines, and serves on various ASME committees for the measurement of fluid flow. David was awarded a BSEE with Honors (University of Connecticut) and an MSEE in Optimal Control (University of Illinois). David speaks fluent Portuguese. He is a partner in Spitzer and Boyes LLC, a technology consulting firm, which owns the INSIDER.

Nick Denbow: Plant Control and the Internet

Plant Control Systems and the Internet
By Nick Denbow

The following is my personal view of the business planning quandary faced by the major automation companies, first expressed in a Comment page published by Technews.co.za in the South African Journal of Instrumentation and Control, SAIC, March 2018 issue (and reprinted here by permission):

It is a common saying that the pace of technology change accelerates with time: although possibly as the observers get older, they become set in their ways, and cannot keep up.

This is certainly true, in my experience: I am getting older, set in my ways, and struggle to keep up. However:

It is not only the pace of such changes, but the speed at which the changes are spread across the 'world market', that makes new technologies so rapidly applied and, sometimes, profitable. In consumer markets, the effect is most evident, with the spread of mobile phones and mobile computing: possibly this would all not have come to pass without the availability of the Internet fueling the spread of information.

But for automation, and industrial sensors, has the technology change been rapid? I believe it has, and believe it is now accelerating ever faster, taking advantage of the advances made to meet the demands of other users.

But for automation, and industrial sensors, has the technology change been rapid? I believe it has, and believe it is now accelerating ever faster, taking advantage of the advances made to meet the demands of other users.

This has been evident, and mentioned in these columns, in referring to wireless sensors, batteries for self-powered devices, and self-power from solar or vibration or heat energy. There are many more developments that should be included in that list.

The problem for Automation companies

But how are the major sensor and automation companies driving this growth into their businesses using advances in technology: what are they researching?

Where are they investing to get a business advantage? I think that their business planners are having a difficult time at the moment.

Around ten years ago, the big new technology coming to the fore was wireless communication from battery powered sensors.

Wireless Pressure Transmitter

The large automation companies, like Emerson and Honeywell, invested heavily into this technology, and there was the inevitable confrontation between two rival systems – WirelessHART and ISA100.

The automation marketplace thrives on such confrontations, for example the spat between Foundation Fieldbus and Profibus. It happens in other markets too; think of Blu-Ray and standard DVDs, PAL and NTSC TV systems etc.

Automation companies also bought into the long-established, relatively dormant and slow market of condition monitoring systems, by acquiring the companies quoted to be 'active' in the field, who had the 'black art' knowledge of industrial condition monitoring.

Other perceived growth areas

After the wireless investments blossomed, the Internet was looming, and everyone believed they had to take advantage of the data that could be collected, and networked.

Certainly Emerson and ABB went heavily into power network control systems, but ABB had major product availability and systems installation capability in the power industry and has made real progress.

Emerson eventually sold out of this network power business, but retains the Ovation DCS used for thermal power station control on site.

Automation companies also bought into the long-established, relatively dormant and slow market of condition monitoring systems, by acquiring the companies quoted to be 'active' in the field, who had the 'black art' knowledge of industrial condition monitoring.

Nick Denbow: Plant Control and the Internet…(continued)

Personal experience, back in the '70s, has taught me what a hard sell and difficult market even the simpler condition monitors offer, monitoring bearing wear etc, and that hardly suits the major project potential that might be of interest to big contractors. Complex systems, such as those applied to turbines in power stations, did offer potential, but needed real specialist back-up.

Additionally, the people in the business, such as Schaeffler perhaps (once again the product suppliers with the customer base), slowly developed their own bearing monitoring systems, ranging from portable hand-held units to bigger wired/wireless systems – these are the ones that I believe will succeed in this market.

Anderson's complete steam trap solution

An alternative approach adopted was based on wireless technology developments, which needed a central monitoring system, the ultimate goal for the automation guys. Sensors for steam trap monitoring were designed by majors such as Emerson, to expand their plant control systems into condition monitoring for the plant engineers.

Sure enough, after a slower start, steam trap companies such as Anderson (US) and Spirax Sarco (UK) developed their own systems, and had the market entry with the customers using their traps.

The opposite approach was adopted by Yokogawa, which is the pioneer of ISA100 industrial wireless systems. They created alliances with people like Bently Nevada, the bearing condition monitoring sensor people, and with Spirax Sarco on steam traps. Maybe this was to be able to reverse sell them the back-up products and technology for wireless systems, or maybe to hope for the potential of a plant monitoring control system supply.

The answer deduced above is stick to what you know and what you are known for.

Software systems

Most of the automation majors have alliances with the large software and computing companies, like Cisco and HP.

The current approach seems to be to use these alliances to piggy-back a 24/7 plant monitoring system using the Internet, supplied as a service across the world.

Again, I believe the companies with the product on the ground, the stuff that needs monitoring, will be the major players. Here it looks like GE, monitoring its own brands of refrigeration compressors, large pumps and gas turbines at power stations and offshore etc. are best placed.

The future

The quandary is where the Internet will help the industrial control systems and sensor suppliers expand their businesses in the future.

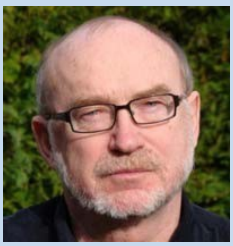
The answer deduced above is stick to what you know and what you are known for.

The irony is that the major with the best potential now is Rockwell Automation, with its systems based around Ethernet communications, interfacing with anything, plus their onsite Ethernet hardware, with control systems already configured to deal with such varied inputs.

Maybe this was why Emerson made an abortive take-over offer for Rockwell late last year.

The potential has also been seen by Profibus, who are pushing forwards with their Profinet, and where they go, Siemens will always be in the background.

Nick Denbow spent thirty years as a UK-based process instrumentation marketing manager, and then changed sides – becoming a freelance editor and starting Processing-talk.com. Avoiding retirement, he published the INSIDER automation newsletter for 5 years, and then acted as their European correspondent. He is now a freelance Automation and Control reporter and newsletter publisher, with a blog on www.nickdenbow.com



Joe Weiss' Next Paper, and Getting to the "Why" of Indegy's Poll

The Gap in ICS Cyber Security and Safety– Level 0,1 Devices
Joe Weiss, PE, CRISC, CISM
Applied Control Solutions, LLC
Juan Lopez, PhD
Oak Ridge National Laboratory

Joe Weiss and Juan Lopez are presenting an important paper at ICSJWG in Albuquerque NM in April. Here's the abstract:

Industrial Control Systems are realizing tremendous growth and integration of technology-enabled solutions to improve system performance, reduce costs related to both operational and life-cycle maintenance, reduce environmental impact, improve the fidelity and accuracy of measurements and monitoring, integrate renewable energy and associated energy resources, and improve overall system reliability and safety. Recent cyberattacks highlight the fragility and increased attack surface of industrial control systems as a consequence of technology outgrowth. Endpoint physical process components--otherwise known as Purdue Reference Model Level 0, 1 devices--are process sensors, actuators, and drives. They are the initial input to all controllers and HMIs and are the actuated devices that safely and reliably control industrial processes. These endpoint devices lack the capability to provide cyber security features or authentication. However, upstream network monitoring systems assume that process sensors provide secure, authenticated input and that final control elements will function as designed. An ISA99 working group has determined that cyber security of Level 0,1 devices and process safety are not adequately addressed in the IEC62443 standards. This recognized gap confounds the problem across multiple ISA standards including Alarm Management, Fieldbus, Control Valves, Nuclear Plant and Fossil Plant Instrumentation and Control (I&C), Process Safety, Wireless Sensors, and Intelligent Device Management. This presentation will focus on the crosscutting issues discovered by the ISA99 working group with regard to level 0,1 cyber security shortfalls and discuss the potential consequences to nuclear and industrial safety with an emphasis on selected real-world cases.

The importance of this paper is hard to exaggerate. Is this a vulnerability or a systemic failure of design?

Indegy Poll Reveals More than 50% of Critical Infrastructure Operators Believe they are Susceptible to Security Threats

Most Planning to Increase Spending to Close the Gap

Indegy recently revealed that nearly 60 percent of executives at critical infrastructure operators polled in a recent survey said they lack appropriate controls to protect their environments from security threats. As expected, nearly half of all respondents indicated their organizations plan to increase spending for industrial control system (ICS) security measures in the next 12-24 months.

"We have been tracking the escalation in cyber threat activity specifically targeting critical infrastructures for some time," says Barak Perelman, CEO of Indegy. "As the recent joint DHS/FBI CERT Technical Alert illustrates, adversaries have compromised facilities across the US to conduct reconnaissance and likely develop "Red Button" capability for future attacks."

Lack of Visibility and Control Cited

While organizations have made significant investments to secure their IT infrastructures, they have not fully addressed threats to operational technology (OT) environments. The recent Indegy poll of nearly 100 executives from various critical infrastructure organizations underscores the lack of preparedness in key sectors including energy, utilities and manufacturing. Among the key findings, 35% of respondents said they have little visibility into the current state of security within their environment, while 23% reported they have no visibility. 63% claimed that insider threats and misconfigurations are the biggest security risks they currently face, and 57% said they are not confident that their organization, and other infrastructure companies, are in control of OT security

Meanwhile, 44% of respondents indicated an increase in ICS spending was planned in the next 12 to 24 months, with 29% reporting they were not sure.

The INSIDER wants to know why it is that we are still debating this nonsense, and why the executives still aren't petrified, terrified enough to do something substantial about this. The INSIDER asked Spitzer and Boyes LLC's Research Director, Joy Ward, what that might mean.
"Basically," she said, "when you are looking at behavior that you don't understand, you are either not asking the right questions, or you aren't seeing the issue correctly. Nobody is doing any qualitative research and getting to the bottom of why these poll results are what they are. Until you know the answer to 'Why?' you won't understand how to change the situation."

The Accountants Are Coming! The Accountants Are Coming!, by Joy Ward

Fans of American history and poetry know similar words from *The Midnight Ride of Paul Revere*, a poem many American school children had to memorize when I was growing up. Okay, that was quite a few years back but the sentiments hold true now when looking at trends affecting the automation industry.

As I sat listening to various companies pitch their best and brightest ideas recently I began to see a shadow across all the new, shiny inventions and especially future sensors. It has been widely reported that sensors are becoming more and more used across manufacturing and other industries. For this to happen sensors must become less expensive and perhaps more disposable. If either of these are true then there is one other change to the sensor industry. They will become cheaper. That leads to what some would consider to be a very negative effect — more accountant involvement in the sensor industry as a whole.

American industry is littered with the rotted-out cadavers of industries that have been eaten away, bit by bit, by the ravaging locusts of accountancy.

Accountants live by the religion of cutting costs, no matter the ultimate costs to companies, brands or products. The bottom line is how cheaply can things be made, bought or installed.

Of course, accountants are necessary in normal business interactions. The problem arises when accountants take over the process. When they do gain the upper hand, accountants run roughshod over the standards of quality and all brand awareness and support. This happens because more and more pressure is put on cutting expenses rather than building innovation or reaching new heights.

Where a company that previously had been known for innovative breakthroughs becomes the subject of overly activated accountant control, the company finds it harder and harder to reach new accomplishments and heights. they instead become replicators of earlier technology as they feed on their previous glories to satisfy accountant appetites for increased profits, even if those profits come at the expense of the company's soul.

Why is this negative? American industry is littered with the rotted-out cadavers of industries that have been eaten away, bit by bit, by the ravaging locusts of accountancy. Because the history of *The Reckoning* by the late David Halberstam, tells the story of how Detroit lost almost everything to a much smaller and much less intimidating Japanese automotive industry. As you read through the book it becomes increasingly apparent that Japan did not wrest automotive leadership from Detroit by dint of open battle. Instead, Detroit lost the battle by their own hubris and uncontrolled accountants. Instead of focusing on the future and quality, Detroit automakers sat on their laurels and accountants pushed harder and harder for cost cuts. In the end, Detroit automakers lost their edge and their brands.

Accountant control is anathema to good brand health. Brands are built on a number of factors, none of which include costs. Every time a company starts touting "low cost" it has become the quick slippage to cost competition, commoditization and non-existent customer loyalty. Why be loyal to a product or company when the only thing to commend it is price? No reason at all.

All of these factors combine to urge you to beware the oncoming accountants as sensors become less expensive, more ubiquitous and new players enter the fray. Giving in to the siren call of cost cutting to gain a momentary market edge is short sighted. Instead, uncover the strength of your brand and stretch for higher quality and innovation. These are the ways to reach long-term corporate strength and presence.

Joy Ward is Research Director for Spitzer and Boyes LLC, the publishers of the INSIDER. If you want to know more about the human face of automation, techno-trauma, and how in-depth research really works, and how it can help you discover the Motivators and Barriers you need to understand to maximize your successful sales and marketing strategies, contact her at joyward@sbcglobal.net or +1 -314-283-5251.

THE WAY I SEE IT
Editorial

Some More About Those Pesky Standards...

Whenever we talk about applying consensus universal standards in manufacturing and automation, we always talk about the benefits to accrue to the end users and the engineering firms and system integrators who serve them.

There are, of course, many benefits. The Open Automation standards propose to provide significant cost reductions in design, implementation, operations and future expansion of automation systems. The INSIDER has long supported the goals of the open automation standards efforts.

When the standards are supported by the major vendors, these benefits can be very powerful and effective. The analog 4-20 mADC standard, for example, is ubiquitous, as are the Profibus/Profinet and HART/WirelessHART standards. Foundation fieldbus, too, has had significant support from major vendors, especially Emerson Automation Solutions, and has found user bases in places like India, where the Reliance Jamnagar Refinery Complex has the largest Foundation fieldbus system ever installed.

This is not an evil attempt to lure unwary customers and trap them into being captive customers, although several end users have tried over the years to make that claim.

But vendor participation can also produce problems. Honeywell (later joined by Yokogawa) forced the adoption of the ISA100 Wireless Standard, which was deliberately designed to be incompatible with the already existing WirelessHART standard. This set back the adoption of industrial wireless systems in automation by approximately 10 years.

The same thing seems to be shaping up with the Open Automation standards effort. Most of the large automation vendors are not prepared to comply with the proposed standard.

This brings us to the other side of open standards and consensus standards.

Here's an unpleasant fact. Vendor R&D efforts are designed to produce systems that a) produce high additional revenue for the vendor, and b) produce enough new features and benefits for the end user that they will purchase the new products or systems. This is the way it works. To deny this fact is to deny the source of all the advances in automation systems since the 1920s.

It is not likely that Honeywell or Yokogawa would have spent the R&D money to develop the DCS, or Emerson to develop the DeltaV, which was the first "modern DCS." To this day, Siemens, Rockwell, and Schneider produce incompatible PLC systems.

This is not an evil attempt to lure unwary customers and trap them into being captive customers, although several end users have tried over the years to make that claim. The vendors need to produce revenue to provide growth, stockholder appreciation, and additional contribution to R&D, so that they can begin the cycle again.

This is not a plea for the end of consensus standards, nor for the end of the open automation standard effort. This is just a suggestion that we need to consider the entire effect of producing vendor neutral automation standards on the ability of the industry to adapt to new processes and procedures.

Comments? Talk to me!
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Read my Original Soundoff!! Blog:
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Rajabahadur V. Arcot: Reshaping of the automation industry is happening

Manufacturing companies' need to become more efficient and productive, their enhanced expectations from their investments in plant control systems and enterprise solutions, rapid & promising technological developments, and the willingness of technology suppliers to adopt alternate financing and business models, such as "platform as a service" are providing space for some innovative companies to creatively enter the industrial control systems market. Companies, such as Inductive Automation, Opto 22, and Bedrock Automation, are proactively offering new ways to architect modular and non-monolithic industrial control systems. With everything to gain and not much to lose, these companies with industrial software, input/output & interface products, and cyber-secure automation platform background, are aggressively pursuing their objectives by seizing opportunities and leveraging the technological developments.

Companies, such as Inductive Automation, Opto 22, and Bedrock Automation, are proactively offering new ways to architect modular and non-monolithic industrial control systems.

On the other hand, traditional automation suppliers, such as ABB, Emerson and others, while proclaiming their strong commitment to leverage emerging technologies to meet industry needs, are understandably more cautious. These companies derive their strength from their deep domain knowledge, vast installed base, and automation expertise - things necessary to be successful as suppliers of industrial control systems. They, while relying more on proprietary hardware, software, protocols, & architecture and less on open standards, differentiated their offerings by focusing on comprehensively meeting specific industry requirements and by becoming providers of total operational technology solutions, such as DCS, PLC, HMI, and SCADA. In all fairness, it must be stated that stringent reliability, availability, determinism, and long-lifecycle requirements of control systems dictated such an approach. Thus anecdotally, we find automation market segmented into continuous & batch process and discrete; and further divided into electric power, oil & gas, food and beverage, drugs and pharmaceuticals, automotive, machinery, and such others even within the broad segmentation. Typically, traditional automation suppliers, by focusing on meeting the requirements of these segments and their adjacencies, have carved out a leadership position for themselves.

The new entrants are more agile, information and communication technology savvy, willing to take risks and adopt new ways of doing business, and have a clear understanding of the challenges of gaining the confidence of industrial customers by weaning them away to think differently. They seem to understand the customers' current preferences and their evolving needs and expectations, the competitive offerings in the marketplace & their prices, features, architecture, and such others. More importantly, they are willing to disrupt the existing order of things and seem to be communicating their value proposition that resonates well with manufacturing companies' articulations. They are the driving force behind the reshaping of the automation industry.

The strategies of traditional automation players to retain their leadership position in future in the industrial control system's market differ significantly from the new entrants' approaches. While, the former category of players are building partnership agreements with technology companies, such as Microsoft, IBM, and others, the later players are collaborating more closely among themselves and creating an ecosystem to support their efforts. For exam-

Rajabahadur V. Arcot: Evaluate technology's potential from manufacturing industry's perspectives (continued...)

ple, ABB has entered into agreements with IBM and Microsoft. Last year, ABB announced that it will cooperate with IBM so as to combine its control system offerings, which gathers information from machinery, with IBM's expertise in artificial intelligence and the two companies will jointly develop and sell new products. ABB also has a strategic agreement with Microsoft so that it can "leverage Microsoft's Azure services, such as Azure IoT Suite and Cortana Intelligence Suite" so that it can to capitalize on insights gathered at every level from device, to system, to enterprise, to cloud." GE has announced its decision to operate its software and services including Predix Application Platform in Amazon Web Services and Microsoft Azure public cloud data centers. Similar decision has been taken by Emerson to work with Microsoft to expand its Industrial IoT applications by integrating Microsoft IoT offerings, including cloud-based Azure IoT Suite and smart device-driven Windows 10 IoT. Leveraging the power of cloud computing and big data analytics are emerging as the areas of focus of traditional automation suppliers.

On the other hand new entrants, who see a window of opportunity to enter the automation market, by disrupting the existing business model and redesigning the automation architecture, are focusing on leveraging the power of edge computing,

On the other hand new entrants, who see a window of opportunity to enter the automation market, by disrupting the existing business model and redesigning the automation architecture, are focusing on leveraging the power of edge computing, potential of internet, web & mobile devices to connect and communicate, open standards, and such others. Inductive Automation, an industrial software company, since the time it announced to the automation world its flagship product *Ignition*, an Integrated HMI, SCADA, and MES Software Platform that is web-based, open modular, and scalable, has been keeping the industry abuzz regularly with new product releases. The company's *Ignition Edge* is designed for embedding power in OEM devices at the edge of the network. The company has opted to sell the software by the server; a unique licensing and business model, with one license giving users of HMI, SCADA, and MES unlimited number of tags, clients and connections. The company recently launched *Ignition Onboard Program*. Under this program, device manufacturers embed *Ignition* and *Ignition Edge* software in the devices they manufacture. It also runs a third-party *Module Partner Program* that lets third-party software providers to create modules for the *Ignition* platform in their area of specialized expertise.

Opto 22 recently introduced *groov EPIC* (edge programmable industrial controller) system that combines I/O, control, data processing and visualization into one at the edge-of-network industrial system. The company's news release says that the new embedded capabilities of *groov EPIC* are made possible through forging of close partnerships with technology providers, Inductive Automation and Cirrus Link Solutions, and are part of the Ignition Edge Onboard program.

While Inductive Automation, Opto 22 and similar other companies are leveraging internet, web and open source based industrial control system architecture, Bedrock Automation is pursuing the path of building from ground up control systems that are cyber secure. Ensuring security of such open standards-based architectures is critical and Bedrock has chosen to address the security concerns for industrial systems. The company's automation platform called *OSA*, Open Secure Automation, is designed for this purpose.

These and other such companies are treading a new path that has the potential to reshape the automation industry. There is the required synergy and their progress will be watched with interest both by the end-user fraternity and traditional automation players. We have to wait for the story to unfold to tell whether some of new entrants will emerge ultimate winners, enter the big league, and reshape the automation industry; or they will fade way as initiators of change at best, or at worst, as distractors.

Rajabahadur Arcot is an Independent Industry Analyst and Business Consultant, and Director Asia Operations for Spitzer and Boyes LLC **with 40 years of senior management experience. He was responsible for ARC Advisory Group in India. Contact him at rajabahadurav@gmail.com**