HIGHLIGHTS FROM
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ABB
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ABB, HPE PARTNER WITH CUSTOMERS ON DIGITAL WORLD

By Jim Montague

A little help from your friends is always welcome, but when you’re trying to get by—and even thrive—in the fast-changing world of digitalization and Industry 4.0, help from friends like ABB and Hewlett Packard Enterprise (HPE) can make all the difference.

This was the message delivered by ABB CEO Ulrich Spiesshofer and HPE CEO Antonio Neri in their keynote addresses to a standing-room-only audience representative of the more than 10,000 attendees registered to attend the ABB Customer World 2019 conference in Houston.

After showing a video of ABB’s YuMi robot conducting Andrea Bocelli and the Lucca Symphony in Pisa, Italy, Spiesshofer reported, “Ten years ago, I’d have said this was impossible, but our technology combined with artificial intelligence is amazing; we taught YuMi to conduct this piece in just 17 hours.

“ABB has been a technology pioneer for all of its life, and this is another example of how we can help our customers write their own futures. In the 19th century, we helped bring electricity and motors to the world; in the 20th century, we were the first to bring industrial robots to North America in 1974; and now we’re enabling the 4th Industrial Revolution, helping our customers write their futures with solutions like ABB Ability, which was introduced two years ago and is rocking the automation world.”

HPE’s Neri added, “It’s incredible how everything all around us is being digitalized. Things are being securely connected from the edge to the cloud in new architectures that are allowing intelligence to be embedded everywhere. The future will be edge-centric, cloud-enabled and data-driven. Last year, we pledged the invest $4 billion over the next four years to develop these solutions.

“However, no one can develop all these solutions alone. We all need partners, which is why HPE has partnered with ABB. We’ve already made big strides. In fact, less than a year into our partnership we announced our joint hybrid IT solution.”

Active on all fronts

Spiesshofer added that ABB is further helping its customers shape their futures by maintaining its strong distributor relationships, and by preserving its pioneering technology leadership with active portfolio management, exemplified by its acquisition and integration in recent years of Thomas & Betts, Baldor Electric, B&R and others.

“However, we didn’t just go shopping,” he said. “We’re also now the leader in electric vehicle (EV) charging in...”
the U.S., and are partnering with HPE on data centers. We’ve invested $14 billion since 2010 on R&D and many other ways to help our customers. And since 2014, we’ve been focused on making each of our businesses the global leader or a close second in their fields.”

To further enhance its leadership in the accelerating digital industries, the company also announced three major initiatives characterizing “the new ABB” at the beginning of 2019, including:

- Focus on digital by divesting its power grids division to its partner Hitachi, which will complete assuming ownership by 2020. This division has $10 billion in annual revenues in a $90 billion global market, and offers high-voltage products, grid integration, grid automation and digitalization, and transformers.
- Simplify the ABB business model and structure with four streamlined, entrepreneurial business channels, all served by the ABB Ability platform. “We listened to our customers, who said we were often too complex and difficult to deal with, and have greatly simplified our structure with better customer focus, higher speed and fewer interfaces,” said Spiesshofer. As part of the restructuring, some 90% of the company’s former corporate functions are being distributed out into the four customer-facing businesses.
- Continue to advance the leadership position of the four remaining ABB businesses—electrification, industrial automation, motion, and robotics and discrete automation—each of which already ranks as global leader or strong number two in their respective domains.

“We’re well-positioned to help our customers succeed in Industry 4.0.”

AI aids automation

Spiesshofer reported that ABB and its customers will be assisted in their future-focused efforts by artificial intelligence (AI) as it begins to supplement classic industrial automation. “There are all kinds of opportunities for AI to help with effectiveness and safety, and our technologies are well-positioned to take the next step, whether it’s by enabling humans and robots to collaborate and make their companies more competitive, or by driving other positive labor changes,” he explained.

“The U.S. still only has 40,000 installed robots, so there’s a big opportunity to have them help with reshoring and bringing manufacturing back to the Americas,” Spiesshofer said. “Of course, AI can also help with mobility and the long-range EVs coming soon, which is how ABB will be writing the future again.”

Spiesshofer added the three pillars of the new ABB’s success include: unique and leading portfolio in the digital industries, its solutions-oriented business model, and pioneering innovation leadership. “As we’ve shaped our portfolio over the past 10 years, no other company can offer the combined electrification, automation, robotization and digitalization that we can,” he added. “This will
be very helpful to our customers as they do Industry 4.0 projects and operations.”

The backbone for many of these efforts will be ABB’s deep domain expertise and its ABB Ability common platform with specific capabilities, which can be deployed from devices, up through gateways, and onward to cloud-based platforms like Microsoft Azure. The cloud level will be aided by ABB’s cybersecurity, digital twin, app marketplace and inter-cloud capabilities.

- ABB Ability projects recently deployed include:
  - New EVgo fast-charging DC stations that use ABB Ability for 24/7 diagnostics and predictive maintenance, as well as supporting future long-range EVs;
  - Electric power utility Ameren in Illinois, which deployed ABB Ability’s Ellipse asset performance module (APM) in the course of a grid modernization project to increase power reliability for more than 1 million customers;
  - Oil and gas leader Equinor (formerly Statoil), which used ABB Ability to better integrate automation and collaborative operations, achieving 98% fewer manual steps and faster startup; and,
  - German automotive supplier Koki, which employed ABB Ability Connected Services to achieve 25% fewer downtime incidents and 60% faster recovery.

“Our ambition is to serve our customers in moving up the curve of applying digitalization technologies, making them more competitive, and driving their safety and productivity,” said Spiesshofer. “ABB Ability is the common platform that can help them, and AI will further democratize data to assist some of our customers that may not have as much expertise to apply these tools as other high-tech users.”

**Partnerships proliferate**

Spiesshofer also announced that ABB entered a global partnership with Dassault Systemes to enhance the software-based digital twins that customers are using to enhance their design and build operations, as well as accelerating their shift from mass production to mass customization. These tools will be used in smart factories and robotics, smart buildings and the process industries.

Similarly, the company’s partnership with HPE is enabling ABB to meet the needs of customers, who want the benefits of cloud-based computing, but don’t want to risk putting their systems on a public cloud. “This is why we found a partner in HPE that could implement onsite data centers,” added Spiesshofer. “It’s one of the ways we’re shaping ABB to be the technological leader in digitalization. And as your partner of choice in electrification, automation and digitalization, and we’re looking forward to living that future with you.”
ROBOTS, ‘DIRTY’ JOBS, AND THE FUTURE OF WORK

By Jim Montague

Work may change, but it’s not going away. Some retooling, education and collaboration are needed, as they always are when new technologies and methods arise, but we know what to do to solve these problems, explained the two “Future of Work” keynote speakers on the closing day of ABB Customer World 2019 in Houston.

“Adapting to new technologies helps the prosperity of companies and their communities, and is not a threat,” said Sami Atiya, global president of robotics and motion at ABB. “Productivity and flexibility are needed to meet the demands of customers, but they can also create new and better jobs.”

Atiya explained that protests against new technologies like robotics and machine learning (ML) are not new, but people don’t need to be worried because they often take decades to reach the mainstream. “I helped develop a robotic system with ML about 25 years ago, so I know there’s not a super race of robots that’s going to come and crush us,” said Atiya. “These are just new tools that we can learn to use. In fact, ABB introduced the first microprocessor-controlled robot in 1974, and it represented a significant advance because users could program it directly, instead of replacing cassettes.”

Atiya reported there are presently about 2.5 million robots in service worldwide, but 400,000 were deployed in the past year, which indicates just how quickly they’re gaining ground. ABB has pioneered safe-motion capabilities like its SafeMove2 software and YuMi inherently safe robot to make human interactions with robots far safer than just a few years ago.

“Customers are also asking us to make robots that are simpler to use,” he added. “It’s a huge driver for us. Now, users can even program our robots using a virtual reality (VR) headset, and we think this will help create more new and different types of jobs, and allow people with different types of education to bring value. Plus, we’re the only company in the world manufacturing robots in the U.S. at our new facility near Detroit in Michigan.”

Customization for consumers

Atiya added that robots and people must collaborate to meet the insatiable demands of consumers, who want everything from individually printed M&Ms to 200 different varieties of yogurt. “Machines that used to be asked to fill 100 bottles of beer per minute are being tasked with...
“Robots are coming, but the conversation about them has become pixilated and confused. Technical advances will displace and change jobs, but there are 7 million unfilled ones out there now. We just need to make a presentable case for them.”

Mike Rowe, former host of Discovery Channel’s “Dirty Jobs,” and presently CEO of mikeroweWorks.org, said during his keynote address with Sami Atiya, global president of robotics and motion at ABB.

Putting different types of beer in each bottle and a different label on each bottle, and do it at the same speed,” said Atiya. “This isn’t easy, but it is possible.” Previously, new technologies came from industry to consumers, he said, but now that’s reversed, and solutions are coming from the consumer side to industry.

For example, ABB recently worked with a customer that wanted to build a robot-aided production line in just sixteen weeks. This would normally be impossible, but Atiya reported that ABB was able to make it happen by simulating the line and its performance using its RobotStudio software.

“We simplified and reduced the engineering needed because we didn’t have to build a prototype, and were able to get this project up and running in time,” he said. “These are just the kind of new and enriching jobs that robotics and digitalization can make possible. Ten years ago, it would takes months of training for a worker to assemble a car door, but today they can use a VR headset to learn and perform these jobs more quickly. Our U.S. robotics facility is bringing these kinds of training to our staff, too.”

**Essential enthusiasm**

Beyond reassuring people that automation won’t eliminate jobs, even though it may alter them and require workers to learn new skills, Atiya concluded that it’s important for companies and people to get enthusiastic about these new professional opportunities. “Global competition is forcing everyone to get involved with robotics and other new technologies, but they really can result in new and exciting jobs,” added Atiya.

The second keynoter, Mike Rowe, former host of “Dirty Jobs” on the Discovery Channel, and presently CEO of mikeroweWorks.org, added that, “At a time when we’ve never been more connected by technology, we’ve also never been more disconnected from what matters most.”

During the 2008-09 recession, there was close to 10% unemployment, but still 2.5 million good jobs that no one was excited about, Rowe said. In the years since, the number has grown to 7 million unfilled jobs. “About 75% of these don’t require college, just training. This situation isn’t a skills gap. It’s a will gap.”

As a result, Rowe proposed that we as a society need to change the attitude that all students should go do college four a four-year degree, and that they’ve settled for some kind of consolation prize or “got stuck in manufacturing” if they don’t go to college.

“The path to prosperity usually begins with a skill,” said Rowe. “Robots are coming, but the conversation about them has become pixilated and confused. Technical advances will displace and change jobs, but there are 7 million unfilled ones out there now. We just need to make a presentable case for them.”
ABB ABILITY TO ENABLE AUTONOMOUS FUTURE

By Chris McNamara

At the last ABB Customer World event—way back in 2017—ABB Chief Digital Officer Guido Jouret announced the launch of ABB Ability, a solution architecture and platform that combines hardware and software elements with enhanced connectivity. The success of that launch was evident to any ABB Customer World 2019 attendees who strolled the exhibit floor, where some 100 solutions employing ABB Ability were on display, from gas-detecting drone devices to submergeable well scanners to robotics performing tasks at blurring speed.

Since that 2017 launch, ABB has enjoyed a 60% increase in digital engagements aligned with 185% more digital customers. Use cases with artificial intelligence and augmented/virtual-reality solutions have blossomed. Cybersecurity has been enhanced at every level. Customers are enjoying enhanced flexibility, greater interoperability among their systems, boosted intelligence and extensibility with access to additional tools.

Overseeing these efforts like a proud poppa is Jouret, who works with teams cutting across all industry sectors. In fact, one of his stated missions is removing silos within the company, enabling ABB Ability projects to scale not only within their original verticals but also across the portfolio—from electrification to industrial automation, motion to robotics and discrete automation. “Digital helps us create and deliver more value to you,” he explained to a room packed full of ABB customers from a diverse range of fields. Heads nodded with approval.

The ABB Ability platform “scales like nobody's business,” he said, eliciting chuckles. Once applied to, say, a powertrain, it can then be rolled out to tens of thousands of similar pieces of hardware, all sending data to the cloud, enabling it to be accessed by any authorized individual with a phone in his or her hand.

Jouret admitted that the 2017 launch of ABB Ability lacked a key enabling component—the digital twin. He proudly informed the audience that they have addressed that issue, partnering with Dassault Systèmes to develop digital twins that learn, and acquire domain expertise via artificial intelligence. “The key is going from automation to autonomy,” Jouret summarized. “The goal is helping you become a leader in digital industry through the help of autonomous operations.”

ABB’s adoption of digital has been enthusiastically received. Jouret described how his team now commonly

“The key is going from automation to autonomy.” ABB’s Guido Jouret outlined the company’s vision for ABB Ability as digital enabler of next-generation systems that will leverage technologies such as artificial intelligence to create adaptive systems that can operate without routine human intervention.
receives requests for information, rather than RFPs. They are getting invited to discussions earlier in the process by companies exploring inefficiencies in their supply chains or plant processes. “And when we engage earlier we have better conversations with the CEO or the head of the supply chain,” Jouret noted. “The conversation is about the potential to create hundreds of millions of dollars in value.” (While talking dollars, Jouret noted that ABB has invested some $300 million in Customer Innovation Centers around the world that facilitate these conversations about all that can be accomplished.)

ABB has a strong history in operations. That has been apparent throughout this conference. But the new digital approach heralded by ABB Ability enables ABB to interject earlier, deeper into customers’ plant and product lifecycles. And as customers’ needs change, the ABB Ability Marketplace—an online store for applications—enables customers to customize their tools when new skills must be added to systems. Your robot needs voice-activation? Sure—which language?

**Keys to differentiation**
Jouret repeatedly touched on the system-wide approach essential to and enabled by ABB Ability. He used the analogy of the nervous system that controls functions of muscle and bone. Rather than digitizing components or just certain elements, the mindset is to pull back and apply solutions strategically to the full body, the full industrial operation. The brain sending smart signals to the elements that implement actions.

In systems engineering speak, these “architectural control points” broaden the scope to unlock the full potential of digital. “The brain that coordinates and optimizes the rest of the system. That is key to our strategy. And not just the pieces of hardware but also the brains at the edge,” Jouret said.

New capabilities enabled by ABB Ability are not only timely, according to the speaker, they might also be critical to millions of global citizens. Jouret referenced the exploding global population and the skyrocketing demand for energy, food and clean water. “Creating a whole new way to feed the world, a planet of over 9 billion people in the next couple of decades,” he said. “We have a massive challenge ahead of us and that is why we need to move with speed to embrace digitalization and autonomous operations.”

That speed and agility and scalability comes courtesy of a smart, strategic, whole-system-focused digital approach. “As we shift toward these new ways of working, we need dramatically more people as well as automation to make those shifts happen,” Jouret proclaimed.

“The robots are coming,” he added. “And just in time.”
ROBOTICS, AI PROJECTS HIGHLIGHT ABB R&D EFFORTS

Research and development has long been a cornerstone of ABB’s business model, but research projects often don’t get much visibility until they are announced as fully-baked products. The Innovation Lab at this year’s ABB Customer World in Houston offered a glimpse into some of the projects the company’s Corporate Research Center in Raleigh, NC, has been working on.

It comes as no surprise that this year’s sampling was heavy on robotics and machine smarts. Robotic and artificial intelligence (AI) applications are proliferating rapidly as the cost of component technologies continues to decline.

Case in point: the Rover, a six-wheeled autonomous vehicle (pictured) with two sensor pods capable of performing a variety of tasks. The rover itself can operate in either remote control mode or completely autonomously, and the sensor pods can be equipped with any number of different instruments depending on the application.

The unit on display in the Technology & Solutions Center was outfitted with laser scanners and video cameras that could be used, for example, to map the interior of underground mines without human intervention. The rover is capable of navigating over and around obstacles, as demonstrated on a small obstacle course on the show floor.

Robots are increasingly used for inspection applications in remote areas, and ABB has developed such a device to monitor the miles-long conveyor belts used in the mining industry. The robot has been dubbed “rail runner” because it moves along a rail attached to the conveyor. Lasers and various imaging sensors inspect the rollers to identify potential failures before they occur. This represents a major improvement as it obviates the need for human inspectors and ensures continuity of operations.

Also on display in the Innovation Lab were voice-controlled field devices, a “smart” camera capable of reading warning placards on shipping containers, and a simplified programming language called Coblox that allows even untrained workers to rapidly program industrial robots to do basic tasks. The exhibit featured an ABB YuMi dual-arm robot that visitors can program, and demonstrates the potential for robotics to be democratized across a much wider range of applications.

These projects represent just a fraction of the work going on at ABB’s Raleigh lab, one of seven major R&D centers around the world. If past is precedent, we may find one or more of them in ABB’s product lineup in the coming years.
SELECT I/O SWEETENS SOUR GAS PROJECT

By Jim Montague

Not all natural gas is created equal, and removing unhelpful and toxic elements at Wapiti’s sour gas facility in northern Alberta, Canada, requires specialized equipment and controls. Because cleaning H2S, propane, butane and other impurities is mission-critical for the plant and worrisome for its operators and manager, Wapiti recently got a much-needed boost from an upgrade by system integrator Blackrock Automation with ABB’s Select I/O and System 800xA automation platform.

The facility processes about 200 million cubic feet of sour gas per day, and was seeking a single I/O solution and standard, remote cabinet approach, which could enable hardware on site sooner and keep pace with its aggressive schedule. Overall, the project included 27 Select I/O remote cabinets for service in the plant’s -40°C and Class I, Div. 2 environment; System 800xA control system with 2,300 Select I/O and 300 S800 control-related I/O; and 16 Allen-Bradley PLC packages connected via PLC Connect. The project also featured motor-control-center (MCC) communications with more than 40 Multilin relays and variable-frequency drives (VFDs) via Profinet.

“It was -42°C when we started up, but there were no equipment problems. The whole project’s mechanical and electrical systems worked well, and we came in two months early and under budget,” said Galen Wilton, senior system integrator at Blackrock. “Startup took just two days to selling gas, and the client was so proud that they announced it on the local radio.” Wilton was part of a panel discussion about Blackrock and Wapiti’s upgrade at ABB Customer World 2019 in Houston.

Hardware and software design decoupled

Select I/O was developed to meet the needs of users just like Wapiti, reported Robert Norberg, I/O systems global product manager, ABB. “Traditional, controller-centric I/O solutions promote an inflexible, serial, sequential project execution model in which project tasks depend on each other, resist changes and cause change orders and delays,” he said. “The result of process automation being on the critical path is large cost overruns and late delivery on large capital projects.

“This is why System 800xA’s Select I/O, S800 on Ethernet, and xStream Engineering are so useful to these applications. They can minimize the impact of late changes; decouple project tasks, so they can be done

“We came in two months early and under budget.” System integrators Galen Wilton (with microphone) and Kyle Hyland (right), both of Blackrock Automation, led a panel discussion about how they upgraded process controls at the Wapiti sour gas plant in Northern Alberta by using ABB Select I/O and System 800x controls, which were further explained by ABB’s Robert Norberg (far left) and Brad MacDonald (left).
in parallel; and reduce testing efforts needed as well as required footprints,” explained Norberg.

“When projects plan to execute, the date everyone usually wants to know is the design-freeze day,” said Brad MacDonald, product marketing manager, ABB. “With Select I/O, they don’t have to worry about it anymore. Now, they roughly determine how many I/O are needed, but don’t have to care what type because Select I/O’s common template can connect to so many different devices.

“In Blackrock’s case, the design started with 1,200 I/O, but ended with 2,400 I/O because of added pipes and other devices,” said MacDonald. “In the past, this would mean huge and costly change orders, but now they can simply order extra I/O as needed and expand to accommodate them. What’s so cool about splitting design engineering off from cabinet assembly and installation is that it finally takes automation off the critical path.”

**Architecture and network**
Wapiti’s remote I/O cabinets were designed in Fall 2017, configured in February 2018, built in April-May 2018 and installed and wired in July-October 2018, which included client factory acceptance testing (FAT) of configuration in August-September 2018. I/O loop checks and commissioning were done in late 2018, and production began in January 2019, said Wilton.

“The customer compared I/O solutions from Emerson, Honeywell, and ABB and was most impressed with ABB—it was an easy selection for them,” said Kyle Hyland, senior system integrator, Blackrock.

The control and network architecture at Wapiti includes two virtual servers, two servers working as historians, four operator stations, three engineering stations, links via PLC Connect to EtherNet/IP and two PM891 controllers in two S800 cabinets networked with Modbus and Profibus for remote MCCs. “We installed 27 remote I/O cabinets each with six module terminal units (MTUs) and 96 I/O per cabinet,” explained Wilton. “We also had fully redundant power and heaters to comply with our Class I, Div. 2 design. The virtual servers meant we could set up and test at Blackrock’s office in Calgary, and staging there and running the whole project in simulation was a big help. We also liked using System 800xA because its combined software package for functions like PLCs and HMIs meant we didn’t have to implement them separately.”

Hyland added, “System 800xA can also show trends, and give users all the data they like to see. Plus, we can just drop in new software objects, and they’ll quickly show trend data.”

Wilton agreed that System 800xA was easy to learn with a little coaching from ABB. “It was especially nice to have software-based controllers that we could test, and they’re also allowing us to make adjustments, add features and even use them for training,” said Wilton. “As a result, we were also able to field-test all the cabinets in just two or three hours. Select I/O also saved a lot on cable by allowing us to use more flexible switching devices between panels and reassign them as needed. As a result, most changes were no longer about asking for money, but were about new ways to save money.”

MacDonald added, “Select I/O and System 800xA can save users 30-40% on the cost of projects by eliminating much of the engineering and cabling that was previously required.”
When asked what effect digitalization will have on industry, a panel of seasoned experts offered differing yet complementary perspectives on what aspects of the future the increasingly rapid adoption of digital technologies will most transform. The panel addressed a luncheon gathering of attendees at ABB Customer World 2019 in Houston.

For Michael Wiebe, chief operations officer at packaging and processing equipment maker Krones, the biggest driver of artificial intelligence (AI) and machine learning adoption is total cost of ownership (TCO). “Machines and lines are becoming faster, and overall complexity is increasing,” he said. “Our connected lines today include sensors, a cloud connection and a dashboard—and the more data that is collected, the better our watchdog becomes. These connected line tools are more proactive, and that keeps the TCO in check.”

At oil & gas supermajor BP, the primary aim is to use the digital information to supply more energy while maintaining or reducing carbon levels. “We’re aiming to hold our own greenhouse gases emissions flat,” explained Richard Mortimer, vice president of engineering, global products, BP. “ABB is playing a big role as a partner with us for improving system performance, allowing us to produce more energy without increasing emissions,” Mortimer said. “Looking ahead to 2040, the most potential for us to reduce carbon is in the transportation sector,” he added. Better lubricants, for example, can allow an aging fleet of traditional, internal combustion vehicles to perform better while emitting fewer greenhouse gases.

Digitalization has also changed the way engineers collaborate, explained Peter Terwiesch, president, industrial automation, ABB. Cloud-based engineering brings people with skills and expertise together from around the world. Configurable I/O and digital marshalling of systems are also changing business models. “It allows us to first build the hardware and then the add software that runs on it,” said Terwiesch. “Suddenly we can accelerate the schedule and decouple these two and bring them together at the end.”

BP’s Mortimer agreed: “[ABB’s] Select I/O is a massive transformation—it allows us to put the configurable
I/O in the field and separate software development from hardware,” he said. “Hats off to ExxonMobil; they were the people who drove this from a customer perspective.”

And when it comes to industrial operations, ABB is on the journey with its customers, from collaborative to autonomous. “In the North Sea, we enabled the commissioning of new wells with 98% less human intervention,” explained Terwiesch. This eliminates the mistakes that people can make and adds new levels of customer value. Many people ask what digitalization is, but ABB’s chief technology officer, Guido Jouret, argued the more relevant question would be “What is digital for me?” Digitalization can be at the foundation of shared solutions that address specific problems. “No one of us is as smart as all of us. If you want to go far, go together,” said Jouret.

The employee crunch
In the United States, employee retirement means 3.5 million manufacturing jobs will soon need to be filled, said Morten Wierod, group senior vice president, drives, at ABB. “We need more skilled workers for more industrial jobs,” he said. “Industry, education and government need to work together,” said Wiebe. “The public, who are the parents, play a role. A primary opportunity right now is improving the quantity of graduates in STEM [science, technology, engineering and math] fields. Industry is sometimes bottlenecked by the lack of STEM graduates. We also wish we had more students coming into the technical college straight out of high school. Parents want their kids to go through a four-year university program.”

Wiebe proposed a two-phase program designed to funnel more high-school graduates into technical programs. Phase I would usher them into two years of a technical program followed by a three-year apprenticeship. In Phase II, the individual would continue on for two years in a university, with credits transferred from the previous two-year program, and then another three-year apprenticeship. This 10-year plan addresses the pain points of employers, educators and parents, explained Wiebe.

Jouret addressed the broader concern of robots or AI replacing human workers in autonomous-operation environments. Autonomy may no longer need a human in the loop, but it still requires a “human on the loop,” he explained. An example of “on the loop” would be the captain of an autonomous vessel. “People still need to be available for those times when the AI cannot make the right decision,” said Jouret. “The robots are coming, and they’re just in time.”

In the United States, renewable energy is only 20% right now, added Jouret. Within the next 30 years, two-thirds of humanity will be living in cities, and there’s not enough land to grow the food to support them. “We need hydroponic systems,” he said. “We need to re-jigger the way we get water to people. We’ll need to do all of this with automation. We always create more jobs. All around the world there are hundreds of thousands of people doing jobs called search engine optimizers.” No one could have even predicted that job would have existed 30 years ago.
FOR CHEMICAL MAKERS, EACH DIGITAL JOURNEY IS ITS OWN

By Chris McNamara

There’s a funny facet to digital transformations—they’re all different. Sure, the motivations to adopt elements of Industry 4.0 might be similar and the desired outcomes are often the same, but the path to get there is unique for each enterprise that recognizes the value in digitalization and decides to jump in.

That unique approach to each project—though often critical to success—is what makes digital-transformation journeys daunting. And it makes those who serve as guides on those journeys crucial to the process.

Three such guides gathered for a panel discussion at ABB Customer World 2019: Luiz Melo, senior process automation specialist, Dow Chemical; Dawn James, industry solutions manager-Americas, Microsoft; and, Dr. Zied Ouertani, global digital lead, chemicals, ABB. The trio shared their collective insights under the theme of “Enabling more informed business decisions through digitally integrated operations in chemicals.”

“We’ve come a long way with control systems and plant historians all the way to connected devices,” began panel moderator John Oyen, business development manager with ABB, who focused the discussion on interpreting data patterns for predicting rare events in chemical operations and learning how to support maintenance operations by detecting anomalies. In short: gaining an understanding of what the future digital plant could look like. “How are we dealing with all of this data,” he asked the experts beside him. “And how do you see this tech evolving?”

This panel has experience—40 years at Dow, 20 years at Microsoft, combined decades at ABB—long enough that all recalled (with zero wistfulness) the old days of paper data charts and manual analysis.

From data to decisions

“Today we collect data from every device at high speed,” beamed Melo, citing that 90% of all data in history has been collected in just the past two years. “This is an explosion and we are all looking for technology to help us turn this data into information, then get our operators and engineers to properly use it to make decisions.”

Decisions. Smart decisions, particularly, were at the heart of this discussion. From the business leaders making
strategic decisions related to digitalization down to the guys on the plant floor working alongside the technology.

James stressed the importance of reverse-engineering digital strategies after first—very clearly—determining what problem the customer wants to solve. “Unless you know what you want out of an initiative, you’re going to waste a lot of time,” she explained, having herself slogged through many of these wastes of time. “There is no turnkey solution. But there is a sweet spot between the business needs and how tech can enable it.”

Likewise, workforces must make the decision to fully adopt these digital efforts for a transformation to succeed. The panelists agreed on the criticality of engaged workers to implement smart components. People driving—and activating—technology, rather than the other way around.

A question from the audience about worker acceptance of digital monitoring prompted a lively discussion about that hot topic. James explained that, particularly among younger workers, there is an acknowledgement of the benefits of being a “sensored worker” and a willingness to participate.

Don’t go it alone
That is just one shift among many in this digital era. Is it difficult to keep up with this rapid change? For sure, all agreed. And as ABB’s Ouertani noted, digitalization is a continuous, ongoing process in which value can be achieved at every step.

These representatives of ABB business partners—Microsoft, Dow—agreed with their ABB counterparts that professional partnerships and integrations with others’ applications are necessary to tackle the complexity inherent in digital initiatives. Third-party tools are often required; outsider perspective frequently provides fresh insights needed to solve problems.

Partnerships. Processes. Patience. These themes ran throughout the discussion.

Trying to digitalize an entire enterprise at once, all agreed, is usually too high a hurdle. Melo stressed the need to communicate to clients that their digital transformation will take time. These efforts are complex. They involve many players and moving parts. It is as much an adaptation, he explained, as a transformation or revolution.

And Ouertani reminded the Customer World audience of the unique nature of each digitalization project. He detailed a recent project in which his team aggregated more than 1,000 recent digital-transformation case studies to determine which were candidates for, potentially, scaling out for wider application in new verticals with different businesses. In short—which of these thousand bespoke projects could be repurposed.

At the end of the exploratory project, just 20 were deemed suited for such re-use.
When analytical measurements move from the lab and into the field, they often bring with them a range of special requirements. From environmentally controlled shelters to custom sample conditioning systems and supporting utilities, ensuring their accurate and reliable performance is anything but out-of-the-box. So, next time you need a specialist with expertise in the analytical systems integration niche, who ya gonna call?

ABB wants it to be them. And at this year’s ABB Customer World event in Houston, the company is for the first time showcasing the capabilities of its analytical systems integration unit, a group that has quietly built the company’s in-house integration services capability over the past several years.

ABB has experimented with a range of delivery models for its process analyzers, including third-party integrators, according to Jeff Sexton, general manager of the Houston-based analytical systems integration unit within ABB’s Measurement & Analytics group. “But we’ve found that taking on those integration tasks ourselves gives us better control over the solution that is ultimately delivered, and it gives the end user or EPC firm a single point of contact and accountability.”

Plus, since most end-user and engineering firms don’t live and breathe analyzer integration, they can focus on other tasks with the assurance that ABB will deliver a fully tested, turnkey solution, Sexton says. Indeed, on the exhibit floor at ABB Customer World, attendees could tour a sample analyzer shelter outfitted with ABB process gas chromatographs, analyzers for continuous emissions monitoring (CEM), sample conditioning and other supporting systems.

“These sheds are factory built and tested here in Houston to our customers’ standards,” added Earl “Butch” Dailey, analytical system sales manager, Measurement & Analytics. And while the unit focuses on ABB analytical instrumentation, it can also integrate analyzers from other suppliers.
Of the onshore sector of the oil and gas industry, the wellhead is probably the least developed segment in terms of digitalization. This has been due to the difficulty in providing the communications bandwidth required to transmit data from remote locations.

Historically, onshore operators, particularly at the wellhead, have tried to drive their operations by looking through the rearview mirror—basing decisions on data typically 30 days old, manually collected during routine inspections by a large dedicated task force. With crude prices expected to remain in the $40 to $60 range, this approach is simply no longer viable.

Digitalization offers companies an opportunity to integrate and optimize the entire value chain, including certain less time-critical applications at the wellhead. Onshore operators embracing digitalization are more likely to be able to rapidly pinpoint the best performing assets and identify problem areas. Remote visibility into equipment on the well pad, for example, can decrease the time field operators spend driving between wells to do maintenance checks as they prioritize routes based on real need and potential upside. This saves cost but, even more importantly, improves safety.

Digitalization can also ensure any actions taken are optimal for a given well’s set of conditions since analytics and cloud computing can help local and/or remote production specialists better assess what is going on and thus choose the best solution based on the available data.

ABB Ability Wellhead Manager, introduced this year at ABB Customer World, allows both large operators and small start-ups to gather information about their onshore upstream assets. The system is cloud-based, so operators can gain insights about their production assets anywhere in the world. Remote workers can connect in real-time—supporting enhanced teamwork and productivity.

By providing immediate access to data, alarms and call-out notifications, ABB Ability Wellhead Manager allows operators to proactively prevent issues, predict productivity and easily scale up or down as necessary. It also connects production assets with field-based personnel and production specialists, enabling remote teams to work together more effectively. The system supports better decision-making, with field production data digitally gathered and visualized using a progressive web application.

In the past, the scale of capital investment required to create a suitable communications infrastructure was
particularly prohibitive. ABB Ability Wellhead Manager offers SCADA software as a service such that analytics are run in the cloud and, instead of heavy upfront capital costs, smaller companies can pay a more manageable monthly subscription.

“Operators, whether larger producers or start-ups, can focus their attention on the most inefficient sites, viewing and analyzing historical performance and making business decisions that will improve production, cut costs and maximize efficiencies,” says Darren Schultz, director of ABB SCADA Oil and Gas.

The potential upside of digitalization for onshore producers is substantial. The World Economic Forum, in collaboration with Accenture, suggests that the upstream O&G sector could see $600 billion in value created between 2016 to 2025, with 90% of that total expected to come through advanced analytics and the optimization of drilling and production operations. ABB Ability Wellhead Manager is a prime example of the tools that will allow onshore operators to realize these gains.
ABB ABILITY STRENGTHENS INDUSTRIAL SOLUTIONS

By Mike Bacidore

We’ve all heard the term “solution” thrown around. But what does it mean? Is it a liquid? Is it the answer to a math equation? Is it the knight in shining armor that eliminates a crippling problem?

In the context of the ABB portfolio, a “solution” includes hardware, software and networking, explained Guido Jouret, chief digital officer at ABB, who gave the final summary presentation of an expansive tour of the Technology and Solution Center at this year’s ABB Customer World in Houston. The ABB Ability platform, in particular, is the unified, cross-industry digital offering that extends from devices at the edge and to the cloud, he explained. Those devices, systems, services and platforms enable ABB customers to know more and do more in a collaborative environment.

“Some of the software can run on the device. Some of the software can run on a gateway. And some of the software can run in the cloud,” Jouret explained. “We build software that takes advantage of the Microsoft Azure platform. Dassault Systemes is our partner for digital twin. And IBM is our partner for AI.”

All of this software requires secure connectivity as well. “On the factory floor, there are many good reasons to be concerned,” explained Jouret, who emphasized the way ABB has addressed cybersecurity concerns with ABB Ability, from secure cloud connectivity to devices with root trust established at the silicon level.

“No matter where a manufacturer’s intelligence lies, it can become part of the solution,” Jouret said. Other specific examples of those products and that intelligence were evident at other booths throughout the Technology & Solutions Center.

Project engineering re-imagined

“We’ve re-imagined and redesigned projects,” said Tilak Pinnamaneni, sales director, North America, oil, gas and chemicals, at ABB. “With the advent of Select I/O, we disconnect the hardware and software engineering. You don’t need marshalling; you don’t need any planning beyond an approximate I/O count.”

System 800xA 6.1 provides innovations to the DCS architecture and introduces technologies that shorten timescales for project execution, reduce the impact of late changes and enhance the scalability of the system. This is achieved by the introduction of new Ethernet I/O solutions, additional controllers and a series of engineering tools such as an...
The flexible I/O solutions and engineering workflow change the way projects are delivered in the future. The system can deliver cost savings on capital projects, and tasks can be done in parallel, allowing users to make late changes more easily.

Robotic, services and power offerings extended
Another recently introduced product, ABB’s OmniCore robot controller family, offers broad motion control options and tailored solutions for the connected Factory of the Future. “OmniCore controllers reduce the footprint by 40%,” said Charlie Miller, key account manager at ABB Robotics, who also pointed out the advantages of RobotStudio’s Virtual Meeting Room, in which multiple people in different countries can meet in a virtual environment.

Thomas Duffy, global data center commercial executive at ABB, shared solutions for critical power, which are for those loads that can never go without power. “We monitor, purify and communicate the status of the power,” he explained. “We use PLCs for the logic in redundancy mode. And lithium ion batteries have now made their way into our industry.”

Services also are an important part of the ABB Ability offerings. “We use digital to deliver those services,” said Jim Crowl, country service manager for the United States, ABB. “And we use robots to deliver them, too. Our submersible robot can drop into a tank and inspect it without draining it. We also can send a robot to crawl through the stators and windings of motors. We can estimate the lifecycle of the motor and prescribe maintenance. We have sensors monitoring equipment and sending real-time information up to the cloud.”

ABB Ability’s integrated services are a treasure trove of data, explained Scott McKay, vice president, business unit manager, energy, at ABB. “Our distributed control system is the same platform for electrical control,” he said. “Customers can realize 30% savings from integrated solutions.”

Finally, the ABB Ability mobile gas leak detection system has taken wing. Literally. Previously available on vehicles that could be driven around at 50 mph to detect methane leaks, the system has been condensed to fit in a box small enough to be carried through the air by a drone. It’s another example of liberating data that exists in hard-to-reach places, added Peter Bradley, measurement and analytics global marketing and sales manager at ABB. “We’re finding ways to make that data available.”
DRONE TAKES GAS-LEAK DETECTION TO NEW HEIGHTS

By Chris McNamara

The original method of hydrocarbon gas-leak detection was almost comically simplistic—and dangerous to boot. You walk around holding a flame and when it flares, you know you’re on to something.

The newest method, as displayed on the exhibit floor at ABB Customer World 2019, is bit more...well...elevated. The ABB Ability mobile gas-leak detection system can now be mounted on a drone and flown into areas with suspected gas leaks such as along natural gas pipelines. In real time, the 3-kg device (the size of a large shoe box) sends data to operators about gas levels at parts-per-billion granularity.

The tool boosts safety for gas-industry personnel, protects industry assets and the environment, and ultimately saves revenue as it speeds the fixes of leaks. Win. Win. Win.

And anything related to drones is inherently cool, a fact proven by the crowds that hovered around the drone display here in Houston.

This new solution also requires fewer man-hours to implement and costs less to operate as it covers wide, hard-to-reach areas. It uses patented cavity-enhanced absorption spectroscopy to detect methane and ethane with a sensitivity more than 1,000 times higher than conventional leak-detection tools. The analyzers extreme sensitivity enables operators to quickly identify potential methane emissions at a greater distance while flying, a feat not practical with other sensor technologies.

And to avoid false readings, it can distinguish between biogenic methane, manure and shallow coal and oil deposits, from thermogenic methane from natural gas.

ABB’s analysis software automatically processes the collected methane, ethane, GPS and wind data to create simple reports that can be used to quickly identify areas in the pipeline network with potential leaks. And via the ABB Ability cloud-storage tool, this device enables quick and efficient distribution of data and reports to all stakeholders anywhere in the world. Authorized users can view the progress of flights in real-time as well as review and act on processed leak reports.

Latest evolution in mobile leak-detection

The product represents an evolution in high-sensitivity leak detection. Previous ABB-produced gas-leak-detection tools were handheld or installed in the back of trucks. The modern iteration—carried like an eagle clutching a prized salmon—is an improvement in all respects.
“This is smaller than we’ve ever built. It’s as sensitive as we’ve ever built,” said Douglas Baer, global product-line manager with ABB. “It’s high-speed. Very specific. We can make measurements at 5-Hz—that’s 0.2 seconds per data point. Even though you’re flying around at 20 mph, you’re hitting and reporting data points.”

As for simplicity of use, Baer surmises that the detector is easier to operate than flying the drone itself. “Within minutes you have a plot of all the different concentrations on a map,” boasts Baer, who stresses the cloud-connectivity component, which enables this data can be immediately shared with the full team of, say, first responders during an emergency or pipeline-maintenance crews. “That element enables crews to triage resources—figure out where the biggest leaks are and fix those first.”

These tools are currently being put into play with utilities around the nation. Baer and his team recently conducted a new round of tests in Dubai. And in March 2018, ABB was one of six companies invited by the Environmental Defense Fund and Stanford University to represent the drone sector in the controlled-testing phase of the Mobile Monitoring Challenge, a competition to advance mobile methane-monitoring technologies at oil and natural gas facilities.

The product-line manager envisions, in the very near future, fleets of these devices working in tandem with vehicle-mounted systems, synching all data with all devices and all team members to generate one unified data file with unprecedented insight and accuracy. Gas leaks don’t stand a chance.

This new solution also requires fewer man-hours to implement and costs less to operate, and uses patented cavity-enhanced absorption spectroscopy to detect methane and ethane with a sensitivity more than 1,000 times higher than conventional leak-detection tools.

“Within minutes you have a plot of all the different concentrations on a map,” explained Douglas Baer, global product-line manager with ABB.
ENdERGY FUTURE BRIGHTENS WITH DIGITAL ASSIST

By Jim Montague

Ironically, it takes a lot of energy to consider all of the world’s energy problems and potential solutions, so it likely helped that “The Future of Energy” panel discussion was held over lunch at this year’s ABB Customer World in Houston.

“The global demand for safe, reliable energy is projected to grow by 25% by 2040, but even as the need becomes more critical, there are more affordable, digital technologies that can help provide it,” said Rob Massoudi, group VP for digital transformation, ABB, who moderated the panel. “On the commercial and industrial sides, our relationship with energy is changing from volume to value.”

Google powers up

No doubt one of the biggest users of power for digitalization is Google, which regularly consumes 2.4 gigawatts (GW) with 80% going to data centers. “Last year, we consumed more energy than San Francisco, but even though we must have abundant power, we’re also committed to making certain it’s renewable, comes from a diverse mixture, and is carbon neutral,” explained Joe Kava, VP of global data centers, Google. “This is why we recently signed 38 renewable energy contracts with a total capacity of 3.5 GW. We upped the ante. We also stated last year that we don’t just want to buy renewable power, but we also want to get all our energy 24/7 from renewable sources.”

To reduce its energy load, Kava added that Google has been deploying advanced artificial intelligence (AI) to manage the loads at 18 global campuses worldwide.

Utilities go consumer

Similar to Google’s experience, CenterPoint Energy reports it’s also taking lessons from increasingly digitalized and consumer-driven environments. “CenterPoint’s technical operations group performs about 3 billion transactions per year, so we’re going from the usual operations technology (OT) approach to a more information technology (IT) model, and going from thinking of ourselves as operating an energy grid to running an ‘energy Internet,’” said Gary Hayes, CIO and VP of information technology at CenterPoint Energy.
“Consumers want their lives to include energy as a service, such as seeing connections easily or viewing battery efficiencies, while others want service providers to take care of it, so they don’t have to think about it.”

Hayes added CenterPoint’s long history as an electric utility will enable it to transition to serving today’s newly empowered, digital customers. “Making the cake still requires energy and voltage, so we know that what we’ve done over the past 100 years can be combined with the digital component,” added Hayes. “We think our history helps us understand how to orchestrate the future to give our customers the plug-and-play services they need for success.”

Charles McConnell, executive director, Carbon Management and Energy Sustainability, University of Houston, added that, “Utilities are still making megawatts and getting paid, but there can be overhangs when they have too much capacity when they don’t need it, or too little capacity when they do. Prices and costs are important, but the public is still best served when power is reliable.”

**Worldwide experiences**

“As a global player, we’re seeing these energy trends revolutionize industries and communities worldwide in the same ways. They’re happening on different stages, but they’re all hitting on the same curve, said Claudio Facchin, president of ABB’s Power Grid division. “They all include the emergence of renewables, more distributed energy generation footprints, new digital consumers like Google and other changing use patterns. However, what’s remained the same is that they all still need reliable power.

“The good news is that technology innovations, including ABB solutions, can support existing energy infrastructures, as well as manage the increased complexity as it comes along. This can be done with strengthened infrastructure and increased capacity, and also with micro-edge technologies, increasingly efficient battery storage, and demand-response devices and software. However, the overall solution that enables all these other solutions is collaboration by all the parties involved, including everyone from the utilities to the consumers themselves.”
In the fall of 2018, ABB ushered in a new era in temperature measurement with the launch in Europe of NiTemp, a non-invasive temperature sensor that offers a simpler and safer way of measuring process temperatures.

Temperature measurement in the process industries is classically carried out by inserting a temperature sensor into a thermowell that intrudes into the pipe or vessel where the temperature is to be measured. But the NiTemp, being shown for the first time in North America at ABB Customer World 2019 in Houston, accurately measures temperature without the need to shut down, drill a hole, or install a thermowell.

The device is designed for surface measurement and eliminates the need for a thermowell, avoiding process intrusion altogether. This greatly increases safety in large part because high pressure can be dangerous when replacing a traditional sensor—even more so when a volatile or caustic product is being produced. There is also no need to shut down for installation and service, which means improved plant availability and up to 75% reduction in installed costs.

NiTemp features an innovative double sensor architecture and specially developed calculation algorithm that greatly enhance safety and reduce installation costs without sacrificing measurement quality. ABB developed NiTemp with direct testing and feedback from key customers in the oil and gas, chemical, and food and beverage industries. It features proven components and the common ABB look and feel, making commissioning and handling easy.

NiTemp’s use with liquid media with low viscosity, high thermal conductivity and/or turbulent flow in metal pipes is particularly advantageous. Other applications where the sensor’s non-intrusive nature is particularly compelling include processes with hazardous media, special hygiene requirements and/or stringent cleaning requirements, high pressures with high bending loads and abrasive media.

NiTemp has global approvals for explosion protection up to zone 0, is suitable for different media and pipe diameters, and can be used in all areas of the process industries, utilities and municipalities. NiTemp is scheduled for launch in North America later this year.
The panel discussion “What’s Driving the Energy Future for Oil and Gas” touched on—of all things—coal.
Specifically, the failure of the coal industry a few decades back to innovate and stay competitive. “The coal industry lobbied for a political solution to avoid innovation,” explained panelist Charles McConnell, executive director of carbon management and energy sustainability with the University of Houston. “That experience was not lost on energy companies of today.”
The energy companies of today were represented on this ABB Customer World panel by Greg Leveille, chief technology officer with ConocoPhillips. Rounding out the panel were Håvard Devold, group vice president, digital lead with ABB; and moderator Troy Hobson, ABB group account manager, both of whom have partnered on projects with oil and gas customers.
Hobson summed up the focus of this session right at the start. “This is about how we can help oil and gas develop winning strategies,” he said.
They’re already on a winning streak, according to Leveille, who labeled the current state of oil & gas as an unprecedented boon. “Big transformation is underway—it has been amazing. The way we manage oil and gas is changing.”
That change is being driven by digital. (Sound familiar?) With shifting customer demands and a growing global population that increasingly requires energy, the need to develop smart, safe, sensible solutions is paramount. But balance—long understood in the energy world—remains a sticking point. Hobson shared a slide that illustrated the three elements of energy production: accessibility, affordability, and sustainability.

**Innovation to the fore**
All three facets must be satisfied. All three challenges must be overcome, simultaneously. These concepts wove through this Tuesday-morning discussion. Hobson challenged his panel, “How can innovation help us meet these three demands?”
Leveille referenced innovative efforts in hydrocarbon extraction. He touched on data analytics enabling hydraulic fracturing and horizontal drilling. He boasted of efficiencies leading to higher production and lower costs and a positive forecast for the industry, in light of well-publicized concerns.
“Major energy companies are very concerned about carbon emissions,” stressed McConnell, who repeatedly opined that those companies are the best solution to solving problems in this field, in tandem with policy-makers.
universities and technology providers, such as ABB, that are developing the tools to approach problems more intelligently. “Energy companies are essential to the equation,” he said.

The three panelists agreed that a new mindset is necessary to consider carbon management as not just a cost, not just a drag on your company, but rather an accretive for companies. How can carbon dioxide be used rather than just controlled? How can it even be monetized?

Creative leaders will embrace this challenge and flip the equation, McConnell envisioned, while lowering their carbon footprint and producing more energy.

Addressing inefficiencies
Hobson inquired of the panel some modern, digital-driven solutions to traditional inefficiencies that plague the production of oil and gas. Devold noted that some 40% of upstream operations costs are maintenance-related. “This is a lot!” he chuckled. “But half of that is preventable.”

Leveille provided examples in the drilling space, where modern, low-cost sensors and advanced abilities to manage data are slashing drilling times. “Analytics allow us to see past the basics of our operations and make larger improvements,” he said. “We’re not just talking about a few data scientists working on the biggest problems. At ConocoPhillips we’re educating the entire workforce.”

Leveille stated that half of ConocoPhillips employees currently perform some data analytics in their roles. Soon all will. “That should dramatically improve our performance,” he predicted, adding that his team works with universities to boost their data-analytics educational programs, ensuring that, for example, control engineers are ready to dive into analytics on the first day of work.

There are challenges, of course. Public opinion of this work is loud, passionate and informed. “Investment funds won’t put money in fossil-fuel projects that are somehow considered evil,” said McConnell. “But at our university we have embraced that fossil fuels—especially oil and gas—are going to be part of the future.”

Partnerships with enterprises such as ABB enable oil-and-gas providers to develop, implement and optimize smart efforts. Take, for example, the problem of costly in-pipe flow sensors. A new approach is strapping inexpensive sensors to the outside of pipes. Said Leveille, “A little technology and a little AI can change how you run your business.”

“The challenge is convening all of the important players and figuring out their roles,” said McConnell, who envisions that once domestic bodies craft a template for efficient, data-driven carbon management, it can be repurposed in Shanghai, Mumbai or Africa. “It can be used in all of the major energy centers. We can create solutions here to solve problems there.”

“There are unique opportunities to bring in new technologies and try out new concepts,” echoed Leveille. “Our work with ABB is enabling new solutions to old problems.”

With shifting customer demands and a growing global population that increasingly requires energy, the need to develop smart, safe, sensible solutions for oil & gas facilities is paramount.
FIELD INFORMATION MANAGER FIRST TO LEVERAGE FDI

By Mike Bacidore

For decades now, the process industries’ vast installed base of field instruments have come equipped with onboard microprocessors and digital communication links. But a variety of communication protocols and integration standards has made communicating with and managing those instruments—which for data access, commissioning, maintenance or other troubleshooting task—an often cumbersome chore.

But a new tool from ABB called the Field Information Manager promises to deliver a new level of efficiency to field device management and integration, according to Neil Shah, global product manager, fieldbus & asset optimization, ABB, who spoke at ABB Customer World 2019 in Houston.

“These software tools must be easy to install, use and maintain,” he explained. “Users need tools that are robust enough and yet simple enough. They must also be flexible, accommodating standalone operation in the field or integration with host control systems.”

Importantly, Field Information Manager leverages FDI technology, a key standard that unifies device drivers, configuration tools, diagnostics and documentation regardless of operating system. It supports both legacy device descriptions and new FDI packages, meaning one tool for both existing and new devices.

“There are, give or take, 120 instrumentation vendors,” said Shah. “But we are the first with a fully FDI-compliant tool. It installs quickly on Windows tablets and workstations, scans, identifies and enables access to devices within 5 minutes. It’s efficient, productive and features an innovative graphical user interface. And it enables easy and efficient bulk device configuration of HART and Profibus devices.”

FDI promises easy maintenance

Of the various integration technologies, the power of FDI is easiest to maintain. “Don’t compromise anymore,” recommended Shah, by relying on older methodologies such as DTM (Device Type Managers) and EDD (Electronic Device Descriptors).

“DTM-based tools require the DTMs to be installed on each node. DTMs are OS-dependent software components and need to be maintained over the system lifecycle. On the other hand, tools that support only EDD offer very

“We need to develop tools that are robust enough and yet simple enough.” ABB’s Neil Shah shared the latest innovations for managing field instrument data at this year’s ABB Customer World in Houston.
limited functionality, specifically when diagnostic data analysis is key for the future.

“Field Information Manager is based on FDI, which uses device packages and benefits from the simplicity of EDDs, as well as offers graphic capabilities of DTMs. The device packages are not installed but are just loaded in the machine, added Shah. “Field Information Manager also supports user interface plugin (UIP), which enables graphic-rich features like DTM,” said Shah. “And it comes with generic device packages that can be used with any HART device. Additionally, it supports legacy HART devices. But our main concern was ease of use and navigation.”

Traditional tools often take many clicks to navigate, added Shah. “Users must remember the menus where a certain parameter is located,” he said. “Field Information Manager, with its patented high-performance user interface, allows the user to access device menus at a touch. The device menu options can be accessed always in the same way, irrespective of the device make and model.”

The device-driver online repository also streamlines efficiency. “How many times have you had to look online for a device driver?” asked Shah. “Sometimes it’s in the middle of the night. I know how painful it is. The device-driver online repository helps to locate and download the right device driver and eliminates trial and error.”

Of course, the Field Information Manager is part of ABB Ability and its remote monitoring and collaborative advantages. “Sensor-to-cloud connectivity and dash-boarding are opening up huge opportunities,” said Shah. “Sensor-to-cloud connectivity enables easy and quick analysis of asset data. Digitalization of sensor data can help companies to reduce operating expenses and more importantly avoid unplanned shutdowns. Field Information Manager comes with an OPC UA server that connects to ABB Ability. Sensor configuration and diagnostic data are available without any additional configuration effort. This opens opportunities, such as remote service, remote verification, fleet reporting and analysis of sensor/actuator diagnostics.”
BEST PRACTICES FOR SUCCESSFUL PROJECT DELIVERY

By Chris McNamara

It was a weird, engaging little game.

During the ABB Customer World 2019 panel discussion “Innovation in Project Execution Strategies,” VP of Engineering with BP’s Global Projects Organization Richard Mortimer displayed photos of a half dozen different electrical plugs, from the two-pronged models familiar to Americans to bizarro models that looked like they came from some alternate reality.

Mortimer challenged the audience to name the country of origin of each plug. Most guesses were wrong, even for those models that were the official, standard electrical plug for large parts of the planet.

The point? Customization causes confusion. Standards are oftentimes ridiculous. We must all simplify our approaches to the basic elements of manufacturing.

This panel agreed that that process of simplification starts at the start of projects, when execution strategies are developed and resources and partners are marshalled. The BP VP was joined on this panel by David Barnes, ABB industry network leader for oil and gas, and Sandy Vasser, retired IC&E manager with ExxonMobil. The trio shared horror stories of unnecessary project complexity and shared solutions to clean up the messes endemic to megaprojects in the world of oil and gas.

The trio recalled a period in the late 1990s when technology was evolving rapidly—open-system concepts, digital tools becoming more available—yet across industry, the collective success rate at predicting costs, overruns and completion dates, especially for the growing number of megaprojects, continued to suffer.

Continued project delivery difficulties were not warmly received by the C-suite—or even fully understood by the rank and file. Vasser joked that a KPI with his team was how often he had to meet with executives to explain change-orders, budget overruns and delays. To address these issues once and for all, ExxonMobil Development Company set about collecting best practices from past projects and the larger industry, then developing training programs and procedures around those learnings.

The result? “It wasn’t as easy as we thought,” Vasser admitted. Project complexity is a tough nut to crack. “The problem was the procedures and design practices we’d created decades ago when projects were smaller, less complex, more local. Those practices just didn’t work anymore.”

“It’s about getting back to basics, removing the gross inefficiencies that have come into this industry.” BP’s Richard Mortimer (standing) together with ABB’s David Barnes (left) and Sandy Vasser (center), retired of ExxonMobil, discussed ongoing efforts to streamline project execution by rooting out unnecessary customization and embracing new technologies and work processes.
So, they took aim at the status quo, creating an initiative titled “It Just Happens,” with the mission of killing practices deemed obsolete and automating, automating, automating.

Getting suppliers on board was key—explaining to them the pain points and challenging them to create new project-delivery methodologies and products. Vasser provided as an example ABB’s Select I/O offering and xStream collaborative engineering environment that were created partly in response to this initiative. These new technologies, together with new work processes, have been key to severing the design dependencies between automation hardware and software that led to delays. “It took automation engineering off the critical path,” Vasser said.

Success stories like that are hard won. “The inertia in most product organizations and the resistance to the full use of new technology would amaze you,” said Mortimer. “Human resistance is a great hurdle.”

That pushback, though, can also uncover inefficiencies. Vasser noted how young employees routinely questioned seasoned colleagues about ExxonMobil processes. Why do we do it like this? Is that process really necessary?

“It made us realize that we didn’t need to do some of the things we had been doing,” he explained.

Changing what has become the norm
All three panelists lamented how in massive endeavors in the oil and gas space, busted budgets and missed deadlines were...are...far too commonplace. The fix is more than just tinkering with execution plans. “It requires thinking completely differently about the process,” said Vasser, as his fellow panelists nodded in agreement. “All of a sudden it clicked that technology could solve these problems.”

Simplifying the ordering process. Cleaning up the way hardware is stored during projects. Convincing suppliers to accept standards with no wiggle room for unnecessary customization.

After his slide illustrating the ridiculous collection of electrical plugs, Mortimer touched on JIP33, a joint-industry program that presents a new, standardized process for procuring equipment. He detailed a recent meeting of the CEOs of the major oil/gas companies focused solely on JIP33. “They realize the importance of this issue and the need to do something better,” he said with hope in his voice.

“It’s about getting back to basics,” Mortimer continued. “Removing the gross inefficiencies that have come into this industry. It’s remarkably difficult.”

Echoed Vasser, “It gets back to defining what problems continue to exist and what inefficiencies remain in organizations and operations, then identifying solutions, a lot of which are digital. We’ve gotten too accustomed to customization.”
ABB BRINGS SAFETY, EFFICIENCY TO FIELD OPS 4.0

By Mike Bacidore

The future of artificial intelligence (AI) may not be in the cloud or in the control room, but out on the plant floor. Indeed, a new pilot technology dubbed Field Operator 4.0 was demonstrated at this week’s ABB Customer World 2019 in Houston. The sneak preview gave attendees the opportunity to experience two mobile worker interfaces prior to release, anticipated near the end of the year.

“Field Operator 4.0 is designed to improve the efficiency and safety of field operators,” said Dave Funderburg, global technology manager, ABB. Both a tablet version and a hands-free HoloLens version will be released simultaneously. “It reduces the need for interaction with operators in the control room, and it removes manual entry because you can enter data from the interface,” explained Funderburg.

In addition to saving time and simplifying workflows, the software can identify devices and locations to ensure that an operator isn’t conducting the right task in the wrong context, a relatively common error, said Funderburg. “You follow the right procedure, but you’re at the wrong device,” he explained. “But with Field Operator 4.0 you can verify and document that you’re at the right location before and after. A lot of major safety events occur because of miscues like this—someone at the wrong device or who didn’t lock it out and tag it out properly.”

The customers piloting Field Operator 4.0 are in the oil-and-gas and chemical industries, but Funderburg also foresees applications in pharmaceutical, as well as food and beverage. “Any industry using manual entry out in the field is a good candidate,” he said.

Tablet interface or hands-free option
Data can be entered on the commercial off-the-shelf, hardened industrial tablet in Class I, Div. 1, or Zone 1 areas, or a hands-free option is available with HoloLens. “But that technology is currently lagging for hazardous environments,” explained Funderburg, who anticipates updated hardware that should be a better fit. For now, the current version of HoloLens is relevant for a training environment.

“The mobile device and HoloLens connect in real-time to a back-end server,” said Funderburg. “The system will scale based on the number of concurrent users, which will vary based on plant size. We will support initial installation and setup, and we’ll work with the client to create their procedures. We support commissioning and training, also,

“Any industry using manual data entry out in the field is a good candidate for Field Operator 4.0.” ABB’s Dave Funderburg (center) demonstrated the new technology to our intrepid author (right) at ABB Customer World 2019 in Houston.
so they can create content, such as the values of the pumps and motors and valves. The tool is meant to be user-configurable.”

As the system launches and data begins to accumulate, Field Operator 4.0 will work toward developing artificial intelligence. “We’re starting to build this into it, so it has a digital assistant,” explained Funderburg. “The field operator will be able to talk to the system and ask for information about the pressures and levels, or it will be able to alert you if there are alarms in the area.”

The system also will be able to offer advice as you’re beginning a step—for example, giving a warning that the particular step should be done with caution because it’s the one when most field personnel make an error in the process.

“We’re prototyping those concepts along three tracks: prescriptive AI, procedural KPIs, plus alarms and safety,” Funderburg said. “There are different sophistications to each one.”

Data can be entered into Field Operator 4.0 on a commercial off-the-shelf, hardened industrial tablet in Class I, Div. 1, or Zone 1 areas, or a hands-free option is available with HoloLens, which was on display at ABB Customer World 2019.
DIGITAL WELLHEAD MAY JUST NEED NEW PROTOCOL

By Mike Bacidore

The future is built on digital. And the tools are already in place to digitalize your upstream operations, even with conventional wellheads. All you might need is the right connectivity. The information value chain starts with measurement and sensor data that is sent to controllers and on to a SCADA system for diagnostics and analysis. Wireless connectivity can then enable analytics in ABB Ability and the move toward autonomous operations.

“The intention of ABB Ability is to create a digital platform to help you be autonomous,” explained Giulia Seikel, ABB product manager, field-mounted flow computers and RTUs, who spoke at ABB Customer World 2019 in Houston. “We are ready to do more digitalization of the wellhead. We just have to ensure that we have connectivity and the right protocol. It’s not a huge investment. Everything is already out there.”

At today’s typical wellhead, you already have instrumentation and a center point of control as well as connectivity with SCADA and enterprise systems, explained Seikel, “but limitations do exist.” The analytics available depend on what data is being collected, and polling protocols mean new data requests and simulations are not necessarily supported. “It’s not bad,” said Seikel. “It’s just that a further level of control is needed.”

Cloud connectivity and computing promise to fill in these gaps, Seikel said. ABB’s Measurement & Analysis division, for example, is moving to event-driven protocols, noted Seikel. “And because data access is via a true API, or application programming interface, every time there are changes, you will see the information in real time.”

The MQTT protocol in particular is appropriate for the digital oilfield because of its client/broker configuration using a publish/subscribe pattern and adjustable topics. “On a well pad, you need to know what’s happening when it happens,” explained Seikel. “This is why we are implementing MQTT in our RTUs. You only transfer data when there are changes, but you don’t have to wait for the next polling cycle.” In this configuration, many systems can subscribe to the same topic, but not all systems will need the same data.”

“We are ready to do more digitalization of the wellhead. We just have to ensure that we have connectivity and the right protocol.” ABB’s Giulia Seikel explained how equipping the company’s RTUs with the MQTT protocol will allow new levels of wellhead digitalization for the company’s oil and gas customers.
Some plants subscribe to a “fit and forget” philosophy of instrument maintenance: plant personnel install devices then never touch them again. Not for maintenance. Not for monitoring. Not for nothing. It’s a bad way to run a facility, of course. But the tools displayed in an interactive conference room at this year’s ABB Customer World are intended to make maintenance so easy that regular checkups happen, well, regularly.

The ABB Ability solutions featured included:

- **Condition-monitoring tools** that enable scheduled, remote product-health checks.
- **Dynamic QR-code technology** to evaluate product health, with data delivered directly to users’ devices via a mobile app.
- **ABB Ability Verification software** to check instrumentation. This offering includes hardware component for applications with legacy equipment that lack diagnostic elements.
- **Two self-service tools**, including a video-based app to enable next-gen troubleshooting of devices and AR/VR apps to guide workers through complicated tasks without extensive training. The latter described as a “de-skilling maintenance support tool” that would enable, say, a crewman on a ship at sea to perform a complicated repair with no prior experience.

A common thread with all these tools is simplifying industrial processes. “The simpler the process, the more everyone using the machines can participate in the process,” said Miguel Graves, analytics field service and training manager with ABB. “You don’t always have to have the expert solving the problems.”

Graves and his colleague Dave Lincoln, ABB measurement & analytics digital lead, showcased the ease-of-use of these products by inviting lecture attendees to test out each of the tools, stepping into the boots of the workers who will use them in the working world. With zero training and little guidance, all were easy to operate.

“Customers understand the end result— they want the right information from a high-level point of view,” explained Graves. “They want things fixed and fixed fast.

ABB’s Miguel Graves guides our author in using the company’s latest digital maintenance tools for instrumentation. Turns out, they’re so easy, even a journalist can use them.
That is their expectation. And from our end, it’s all about instructing the customer in following this process.”

Tools fit for the new generation of workers

Exactly how customers follow processes is morphing in this digital era. “We recognize that the workforce is changing,” said Lincoln. “The new generation—the YouTubers—are not interested in reading manuals or spending a lot of time going through data. For people in their 20s who are running these facilities, the iPhone is their natural tool.”

Likewise, the digital concepts at play here are not as foreign to digital natives as they would be to older colleagues. Artificial reality. Virtual reality. Swiping away from Instagram on your phone to check the pressure within a pipe. A fully functional computer in the pocket of your jeans.

Lincoln detailed the market factors driving the development and adoption of digital tools like these—increased global competition, a limited talent pool and aging workforce, stricter regulations, heightened cyber-threats, and intense pressure on CAPEX and OPEX. He identified clients’ needs in this arena—measurements made easier, lower cost of measurements, enhanced accuracy and greater security.

Fairly common concerns. Uncommon solutions. You wouldn’t be too far off in labeling some of these new tools “toys.” Graves finds the artificial-reality tools the most appealing…the most likely to be enthusiastically received by young workers who should be—must be—the ones adopting these tools if they are to be fully implemented in the modern facility. Lincoln, for his part, clearly enjoyed tinkering with the verification program.

And that attractiveness is by design; adoption of new tools is always a concern. How do we get our personnel to learn to use this stuff?

The key, according to Graves and Lincoln, is highlighting the benefits to the user and the larger enterprise. Enhanced productivity. A reduction in the level of onsite skills needed. Fewer (expensive) feet on the ground. “The people who maintain flowmeters are aware of how much these tools are needed,” Lincoln said. “And, particularly if it’s an industry with a lot of regulation, the customers are very happy to have these tools.”
THREE INGREDIENTS NEEDED FOR SMART OPERATIONS

By Mike Bacidore

Smart operations means doing less and getting more by leveraging technology, began Matilda Steiner, product line manager, ABB, in her presentation at ABB Customer World 2019 in Houston. She and her colleague Piotr Powroznik, technical product manager, explained the three ingredients needed to achieve smart operations using the ABB Ability Manufacturing Operations Management (MOM) software suite.

The three ingredients needed to achieve smart operations, Steiner said, are analytics, people and synchronization:

• Data to supercharge continuous improvements, optimization and responsiveness;
• Empowered knowledge workers to apply intelligence and human ingenuity; and,
• Connectivity to synchronize and orchestrate the different entities that are involved.

Analytics are the first ingredient. “Analytics have different flavors,” explained Steiner. “Analytics unleash productivity. Identify where you have problems or variations, and then discover opportunities to avoid issues and capture hidden value. We want to aggregate and find best practices at the enterprise level. On the plant side, we want improvement through deeper insights into performance. And, at the line level, we can drill down even deeper.”

Start by collecting data and visualizing it in a dashboard. “What is new, compared to a few years ago?” asked Steiner. Once you can visualize that in the dashboard, then add more data and intelligence to discover previously unknown relationships between certain materials, assets or schedules, she said.

“Correlate the data or apply machine-learning algorithms to predict outcomes,” added Steiner. “Select the best batch—the golden batch—that you can compare with other batches. Compare parameters, durations and trend data across different batches. Find what factors contribute to making it the perfect batch. Then, we can answer questions we didn’t know to ask in the first place.”

Empowered knowledge workers

The second ingredient, people, is what’s needed to improve the processes. “This is where MOM comes into play,” said Steiner. “An empowered knowledge worker turns analytical insights into concrete plans of action. Then test, roll out and sustain.” Human error is the main contributor to primary and secondary plant incidents, she added.

“Mitigate those risks by making the right information available and empowering people to act. We can
also introduce workflows to enforce operating procedures and continuously train and develop skills and awareness. MOM includes a Virtual Trainer that can be used to train these people.

Orchestration and synchronization comprise the third ingredient for smart operations. “Comprehensive workflow ensures consistent order execution,” explained Steiner. “Virtual representation of the physical execution combined with utilization of mobile technology introduces efficiencies and new error-reducing measures.”

The MOM software suite coordinates and synchronizes procedures to increase efficiency and traceability. When an order comes down, for example, MOM tells the robot to pick up a part and take it to the next step. “Sometimes it’s the orchestration of the robotics, and sometimes it’s also the traceability,” explained Steiner.

The new release of Manufacturing Operations Management creates a new user experience for operations management applications, explained ABB’s Piotr Powroznik. “The new web-client framework is a responsive design with great functionality,” he explained. “You link it with the cloud in a granular way.”

With the new release, integrated process-historian and MES (manufacturing execution system) apps are available in one portfolio, enabling data aggregation and correlation.

“Apps are designed for self-service and collaboration,” said Powroznik. “And no IT knowledge is required to prepare your workplace.”

Data can be stored and analyzed on-prem, in the cloud, or in a hybrid configuration. “The new MOM framework improves client usability and user experience. There’s a new common web-client framework across all MOM applications. It’s available on Windows, iOS and Android, and there’s support for Edge, Chrome and Safari. You can take your notifications with you on your mobile device.”

“You can bring live data from the historian and the process to live, mobile dashboards,” said Powroznik. “There are many other dashboards, but none of them can bring in historian data together with operational data.”

Using machine and sensor data with MOM/MES data, information becomes insight for reporting and analytics. “You can find answers to all sorts of questions having to do with capacity utilization, OEE, mean time between failure, cycle time, load vs. capacity and production traceability,” explained Powroznik.
AUTONOMY PROMISES NEW FRONTIERS OF EFFICIENCY

By Jim Montague

It was inevitable that automation would lead to autonomy, but it’s still unnerving when it happens—like mom and dad worrying when the kids leave the nest. In this case, two videos of a self-docking ship and a self-directed, deep-sea diving vessels led off the “Journey toward Autonomous Industrial Operations” panel discussion at this year’s ABB Customer World in Houston.

Plus, just like those parents, automation and IT providers like ABB and Hewlett Packard Enterprise want to make sure their end users have the essential data they need to run their processes successfully, regardless of how much they’re automated or autonomous.

“In a more autonomous world, we need to understand why [these systems] are going onto the factory floor, and how we can provide the continuous analytics and greater collaboration they need,” said Håkon Berg, technology development manager, ABB, who added that achieving more autonomy means developing:

• Flexible technology stacks using containerized software like Docker, integrating speech recognition, and including SMEs in software development.
• Continuous delivery of code for faster interactions, which can eliminate long product development cycles, perform DevOps that ease application deployment, and enable software to “feel the pain” of plant-floor problems and address its problems more effectively.
• Platform integration by accessing and integrated data.

Data fuels autonomy

“Whether we’re talking about autonomous vehicles or other kinds of autonomy, they all need huge amounts of data and some kind of open cloud for support,” added Matthias Roese, chief technologist, Hewlett Packard Enterprise. “This can be complex, such as the car manufacturer we worked with that had to integrate data from 160 vendors on its assembly line, and began using some autonomous functions to avoid doing maintenance earlier or later than needed.

“In a more autonomous world, we need to understand why [these systems] are going onto the factory floor, and how we can provide the continuous analytics and greater collaboration they need.” ABB’s Håkon Berg, together with colleague David Funderburg and HPE’s Matthias Roese discussed what will be needed for manufacturing systems to move from simple automation to greater autonomy.
“There’s a lot of fear that AI is going to run the world,” said David Funderberg, technology manager, chemicals and refining, ABB. “However, when you go and listen to users, and understand their use cases, you can see how AI can greatly assist them. Give them guidance via devices like HoloLens, help get them to a safe area if needed, and estimate how long tasks will take and what materials are needed to complete them.”

“This can be hard to achieve because, even as some operations become more autonomous, many users still expect to see someone in a blue collar looking at what they’re doing. We’re also working on a self-healing grid that can show when substations are going up or down, and coordinate power production as they come back up. For example, where it used to take local utilities in Houston three or four days to recover after hurricanes a few years ago, some of the available software apps will soon allow them to recover in just four hours.”

**Fight fear, follow consumers**

Despite the potential benefits, many people remain afraid of artificial intelligence (AI), and the panel agreed these attitudes must be confronted. “There’s a lot of fear that AI is going to run the world,” said David Funderberg, technology manager, chemicals and refining, ABB. “However, when you go and listen to users, and understand their use cases, you can see how AI can greatly assist them. Give them guidance via devices like HoloLens, help get them to a safe area if needed, and estimate how long tasks will take and what materials are needed to complete them. This isn’t closing the loop on control and allowing totally autonomous operations.”

Berg added, “One way we’re seeking to develop industrial autonomy is by catching up to consumer markets. We’re trying to take tools like Alexa and others on the consumer side, and see how they can be reused on the manufacturing side. For example, we’re investigating if SMEs can use voice-directed digital assistance to talk to production systems. We’re starting small and finding ways to make small steps, but others will come and this will grow and grow.”

Hewlett Packard’s Roese concluded, “Because these are big challenges, they’ll need a team play to meet them happen. No one company can do it on their own, which is why we appreciate our partnership with ABB.”