Say Goodbye to the Status Quo for Automation

By Paul Miller

Keywords

Overview
The 20th Annual ARC Industry Forum in Orlando, Florida kicked off this week with over 700 participants. Attendees represented 300 different companies and came from more than 25 countries around the globe. The keynote presentations all reflected the Forum theme, *Industry in Transition: Navigating the New Age of Innovation*, and served as a call to action for the automation industry.

Several common messages resonated throughout the initial keynotes. These included the message that transformative innovation is no longer an option; companies that fail to innovate effectively to meet business challenges will simply cease to exist. This applies to technology end users and technology suppliers alike. As we learned, while automation technology has seen only incremental innovation in recent years, that’s about to change; quickly and quite dramatically.

The presenters for this year’s opening keynote presentations included Andy Chatha, ARC’s founder and president; Sandy Vasser, Facilities I&E Manager at ExxonMobil Development; Don Bartusiak, Chief Engineer, Process Control from ExxonMobil Research & Engineering; and Michael Carroll, VP of Innovation & Operations Excellence at Georgia-Pacific. A lively roundtable discussion followed, with Peter Terwiesch, President, Process Automation Division at ABB; and Blake Moret, Senior VP, Control Products & Solutions at Rockwell Automation contributing their perspectives from the suppliers’ side.
We Can All Learn a Lot from Each Other

Andy Chatha kicked off his presentation by asking “first timers” to the Forum to raise their hands. Quite a few people in the large, but packed general session room at the Renaissance SeaWorld hotel did so; far more than we’d typically expect. Andy interpreted this as an indication of the increased interest in the topics covered at the Forum and curiosity about how owner-operators are approaching today’s potentially disruptive technologies. “Clearly, we can all learn from each other,” he observed. This point came up several times during the keynotes.

Move Toward Open Control Systems

Next, he brought the audience’s attention to the news release issued just last month announcing that ExxonMobil has awarded Lockheed Martin - a leading aerospace company - a contract to help develop a next-generation automation system for refining and chemical facilities. (See related ARC Insight.) Andy also mentioned that the entire ExxonMobil team was at the Forum along with at least one key person from Lockheed Martin.

According to the news release: ExxonMobil Research and Engineering Company (EMRE) has awarded Lockheed Martin a contract to serve as the systems integrator in the early stage development of a next-generation open and secure automation system for process industries. To support this significant fast-track initiative, Lockheed Martin held an Industry Day on January 26th to solicit requests for information (RFIs) from suppliers to encourage wider participation. ARC attended this eye-opening Industry Day event as well.

The news release goes on to explain: Working with Lockheed Martin, ExxonMobil’s goal is to design a new architecture that will control and optimize refining and chemical manufacturing facilities while enabling future equipment and information services such as preventative maintenance and fleet optimization. The design and implementation is based on architecture standards that will ensure modularity, interoperability, extensibility, reuse, portability, and scalability of the new system.

Andy mentioned that ARC agrees with ExxonMobil that the industry could certainly benefit from more open systems. “But why Lockheed Martin?” he asked rhetorically. “When you think about it, it really makes sense. Like a
process plant, an aircraft is very complicated (and just as mission-critical, we might add). “Our industry can learn a lot from the aerospace industry.”

Significantly, ExxonMobil plans to share the new open architecture and resulting products with the rest of the industry as a commercially available solution. Andy thanked ExxonMobil for starting this initiative toward open systems and encouraged all industry stakeholders, suppliers and end users alike, to participate.

**Digital Transformation of Industry Gaining Momentum**

Andy went on to explain that today’s proprietary systems do not provide a solid foundation for digital transformation. While most plants are highly automated, the level of automation has not changed significantly in three decades. “We believe the process industries are ripe for digital transformation. Most process plants are more than 20 years old. Installed automation and other assets are increasingly expensive to maintain, failure-prone, inefficient, susceptible to cyber attacks, and expensive to upgrade.”

At the same time, many new technologies are maturing. These include mobile devices, cloud applications, analytics, 3D visualization, additive manufacturing, wireless communication, robotics and drones, machine learning, and open platforms. According to Andy, “These technologies can help you transform your business.”

He pointed out that more industries are moving to open platforms and that ARC’s Collaborative Process Automation System (CPAS) model aligns well with ExxonMobil’s vision for the process industry. “However, IT/OT convergence is essential for digital transformation and our industry has to get IT and OT people to work together better.”

**Modular Software**

Software is key, according to Andy. Digital transformation is going to need so much software that no single company can provide all the pieces. We have to learn from other industries that are dealing with similar issues. “Today’s software systems are becoming so complex, you have to start designing software in small components or libraries that communicate in a standard way through software protocols.”
Andy explained that open systems will provide benefits to both users and suppliers. “Users will be able to buy the solutions they need from many different suppliers. Open systems will enable users to upgrade their systems more frequently. And since it’s very expensive to develop and bring new systems to market, open systems will lower the cost of doing business for suppliers.”

In conclusion, he made the following recommendations for owner-operators going forward:

- Be both customer-centric and demand-driven
- Ensure collaboration
- Have strong IT and OT engineering resources
- Embrace open and secure software platforms
- Seek opportunities for transformation

**Think Differently**

Picking up where Andy left off, ExxonMobil’s Sandy Vasser explained that “Think Differently” is his upstream organization’s new mantra. “This even applies for proven processes. It’s no longer sufficient for us to just solve a problem; we must be able to solve in the most efficient manner possible.”

**Automation Challenges**

According to Mr. Vasser, historical automation-related challenges for capital projects include the numerous dependencies on other disciplines, forcing sequential work execution; late-stage design changes; and highly customized, highly engineered designs.

Recent challenges faced by ExxonMobil (and other many other owner-operators) include having to deal with multiple EPCs and fabrication yards located around the globe, equipment that is supplied from around the globe, and parallel activities to satisfy project schedules. There is repetitive recycle of design right up until startup and extensive hardware changes throughout execution. Many changes must be implemented in the field, when the cost of change is greatest. Automation is always on the critical path and we experience execution and project uncertainty, longer schedules, and higher costs. As a result, project costs are going up while
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He believes that current reactive cybersecurity approaches are not sustainable and that it doesn’t make sense to continue using the same alarm management approaches for greenfield sites that the company uses for its brownfield sites. He also wants to do away with the need to have to create custom graphics. “For one project, we had to create 1,400 custom graphics for our operators and this took way too much time.”

**New Approach Needed**
Vasser went on to provide an overview of the desired characteristics of the new approach. These include more standard solutions and reduced customization; reduced complexity due to simplified designs; reduced component counts and number of different systems; ability to take full advantage of installed automation assets; reduced number of dependencies;
reduced number of (and simplified) interfaces; fewer and/or more automated processes; and automatically generated documentation.

Vasser also provided a list of key automation pursuits and enablers, which largely echoed the company’s “It Just Happens” initiative to speed and reduce the cost of project delivery that he presented at last year’s Orlando Forum:

- Smart configurable I/O in standard cabinets or field junction boxes
- Virtualization for both run-time and engineering applications
- “DICED” (Auto-Detect, Auto-Interrogate, Auto-Configure, Auto-Enable, Auto-Document) I/O for both HART and non-HART devices
- SIS logic solver directly programmed using translated cause & effects
- Seamless integration between automation and electrical
- Use of smart I/O to replace MCC control wiring
- Standard assembly to convert multiple discrete signals to a single analog signal
- Simplified package interface solution
- Wireless field instruments
- Increased use of DC power

Mr. Vasser concluded his presentation with a quote attributed to Albert Einstein: *We cannot solve our problems with the same thinking we used when we created them.*

**ExxonMobil’s Vision**

The next keynote was Don Bartusiak from ExxonMobil Research & Engineering. “Andy asked me to share ExxonMobil’s downstream vision for an open architecture control system and our partnership with Lockheed Martin,” he said. “I’d like to present the big picture here. The problem we’re trying to solve is, ‘How can we take the cost out of our process control projects; particularly for greenfield operations?’ There’s a finite time window of opportunity to do so,” he explained.

**What’s Wrong with the Status Quo?**

“So what’s wrong with the status quo?” he asked rhetorically. “In a nutshell, it’s too expensive for us to upgrade our process control systems and we’re just not getting enough value from them. Most of the recent enhancements we’ve made were for level 3 applications that
reside above the control systems.” ARC has observed that ExxonMobil is not alone in this trend. Mr. Bartusiak also noted that a significant percentage of ExxonMobil Refining and Chemical’s control systems will face obsolescence over the next decade, which ARC research indicates applies to many other companies as well.

Getting right to the point, he said, “So why not simply replace these systems with a state-of-the-art DCS?” He gave five reasons:

- The high cost of “technology refresh” limits access to leading edge performance
- It’s too expensive to integrate third-party components
- There’s limited liquidity in the application market and a lack of sophisticated development tools
- Solutions come bundled, versus best-in-class
- Rather than being built in and intrinsic; the current security model is bolted on

**A New Approach**

To find solutions, ExxonMobil “looked outside our little world,” Bartusiak explained. “We saw opportunities for improvement through open architectures and virtualization; not just for engineering, but also to provide new ways for process control. We saw a constructive revolution taking place in the defense avionics industry by transitioning from a proprietary ‘stovepipe’ model to fully open and interoperable, standards-based system architecture. We saw IoT and wireless changing management expectations, with questions such as, ‘Why do we even need control systems anymore?’ And we’re seeing new solutions for the security challenge, with new security models emerging to enable more secure data flow between the operational technology layer and IT/cloud layers.”

He presented his organization’s vision for standards-based, open, secure, and interoperable control systems that:

- Promote innovation and value creation
- Effortlessly integrate best-in-class components
- Afford access to leading-edge capability and performance
- Preserve the asset owner’s application software
- Significantly lower the cost of future replacement
- Employ an adaptive intrinsic security model

Bartusiak emphasized that this vision for open automation was applicable for both brownfield and greenfield facilities; was consistent with ExxonMobil Upstream’s “It Just Happens,” vision; would involve no compromises in safety, security, or availability; and most importantly, the goal is to create a commercially available system (rather than one just limited to ExxonMobil) that would be applicable to all current DCS markets.

**A system of systems ...**

[Diagram of system of systems]

**ExxonMobil’s Open System Architecture Vision**
(Source: ExxonMobil)

**Why Lockheed Martin?**

Next, Bartusiak addressed the obvious question of why ExxonMobil decided to work with Lockheed Martin, a name rarely heard in the process control world, to supplement its internal resources for this critically important initiative. He explained that when the company looked around, it found the work of the Open Group Future Airborne Capability Environment (FACE) Consortium very appealing. Lockheed Martin is a founding member of this joint government-industry consortium.
According to the FACE website, the consortium was formed in 2010 as a government and industry partnership to define an open avionics environment for all military airborne platform types. The FACE Technical Standard is the open avionics standard for making military computing operations more robust, interoperable, portable and secure. The standard enables developers to create and deploy a wide catalog of applications for use across the entire spectrum of military aviation systems through a common operating environment. The latest edition of the standard further promotes application interoperability and portability with enhanced requirements for exchanging data among FACE components and emphasis on defining common language requirements for the standard.

Obviously, Bartusiak and the rest of the ExxonMobil team realized that a similar approach could be extremely beneficial for the process control industry. In addition to its deep familiarity with FACE; Lockheed Martin had extensive expertise designing and implementing real-time, high-availability, deterministic open systems. Late in 2015, ExxonMobil awarded Lockheed Martin the contract to serve as the systems integrator for early stage development.

**Next Steps**

Commenting on the recent Industry Day event that Lockheed Martin and ExxonMobil held to test the industry’s appetite for this type of solution, Bartusiak said, “We pulled off the Industry Day event two days after a major snowstorm buried the Washington, D.C. area; but the vast majority of interested parties still managed to attend. We received far more qualifying questions than we anticipated and it will take some time to respond to all of them.” According to Bartusiak, the next step is to solicit interest and support from other prospective users.

This was a good part of the company’s reason for presenting its motivation and vision and articulating the opportunities at the ARC Forum. ExxonMobil invites other owner-operators that are interested in learning more about the initiative to contact them.

“We plan to build a lab prototype in 2016,” he said. “Beyond 2016, we would like to see a technically ready solution in 2018 and a fit-for-purpose system in 2019.”
Innovation Involves More than Just Technology

Upon stepping up to the podium following Mr. Bartusiak’s presentation, Michael Carroll, VP of Innovation & Operations Excellence at Georgia-Pacific, commented, “If you’re not doing this in ten years, you won’t be doing anything.” Mr. Carroll’s keynote addressed the key challenges to successful innovation.

According to Mr. Carroll, innovation requires both decision and your participation. To illustrate this, he conveyed that half of his kindergarten classmates from his tiny (and apparently extremely depressed) Midwestern home town of Knockemstiff, Ohio, have already died; many due to poor decisions. “We are a product of our past decisions. Innovation requires you to both make a decision and participate,” he said.

“As humans, we create most of our own obstacles,” which includes losing the vibrant imaginations most of us had as youngsters. “Never break the first law of imagination: Don’t let what you know become the enemy of what you might learn. Everything that you heard Andy and Don say here is right, but don’t let lack of imagination get in your way. The problem is us; so what are we going to do about it?” To avoid killing innovation dead in its tracks, Mr. Carroll recommended that we:

- Don’t try to convince people that they are wrong
- Don’t say it can’t be done
- Don’t come to null decisions, and
- Don’t fail to celebrate your mistakes, since every time you fail, you learn something

After tossing out some simple questions based on “what and if?”, Carroll presented the five simple rules from his 30+ years of innovation experience:

- The most rewarding innovations are preceded by a trip through the wilderness of anxiety
- The people on the bus count for much more than where they sit on the bus
- The people you pal around with and the people you go into the wilderness with are rarely the same
- It will be hard, there will be stress, and if you succeed you will never be the same!
• Innovators are to the status quo as jet planes are to paper planes. Treat them like it! (All organizations are bureaucracies - they thrive on the status quo.)

In summary, Carroll said, “Innovation in large organizations is really hard because it is going to affect everyone, possibly in an uncontrollable manner.”

**Recommendations**

ARC recommends that all participants in the process industries open their respective minds to the potential benefits offered by the innovative new approaches presented during these keynote addresses as well as the large number of other sessions presented at this week’s 2016 ARC Industry Forum. We’ll host related sessions at the upcoming ARC Forums in Europe, India, and Japan. While a large number of significant technical, commercial, organizational, and human hurdles will have to be overcome, ARC believes that if owner-operators, technology suppliers, and other industry participants work together openly and honestly, these new approaches will succeed and everyone will ultimately benefit.

Clearly, the status quo is about to change and your company’s future success could very well depend on getting on board sooner, rather than later.

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