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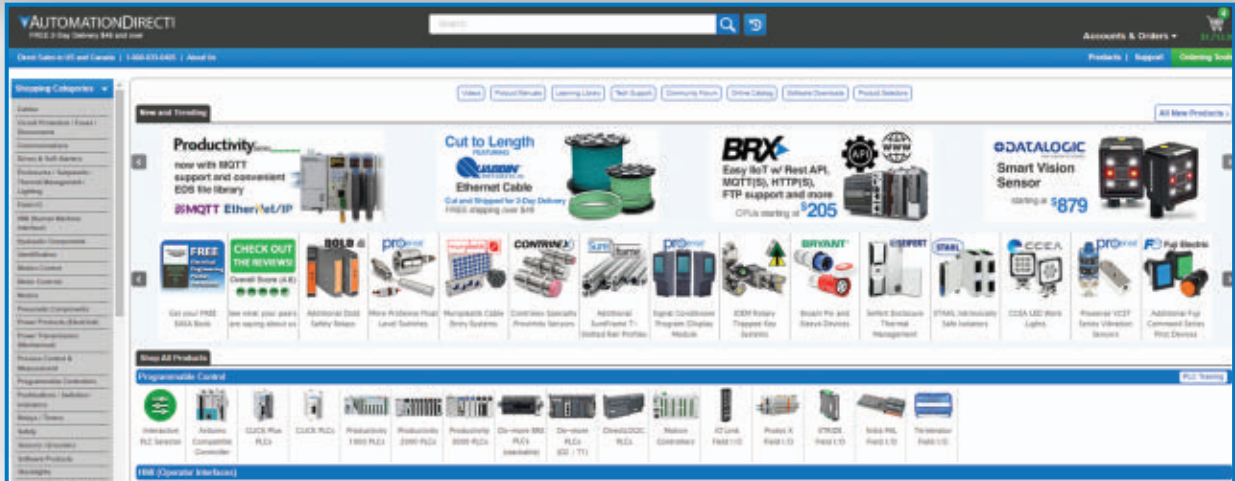
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Wireless technologies for Industrial Communication

A guide to the difference between WiFi, Bluetooth, Zigbee etc. and when the different standards should be used.



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22

FEATURES

26 TO RENT OR TO BUY?

A few perspectives on ownership of assets.

31 CYBER-ATTACKS HAVE BECOME COMMODITIZED BY RANSOMWARE-AS-A-SERVICE

(This is actually good news.)

DEPARTMENTS

07 EDITOR'S PAGE**08 INDUSTRY PERSPECTIVE****10 CONNECTIONS****18 TOOLBOX****28 EMERGING TECH: METAVERSE FOR MANUFACTURING****35 CASE STUDY: DIGITAL ICE CREAM****39 IDEAS EXCHANGE****42 SMART***

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EDITORIAL TEAM

CHRIS MCNAMARA EDITOR IN CHIEF
cmcnamara@endeavorb2b.com

LORI GOLDBERG EDITORIAL ASSISTANT
lgoldberg@endeavorb2b.com

DESIGN & PRODUCTION TEAM

JULIE WHITEY CREATIVE & OPS
jwhitey@endeavorb2b.com

ANETTA GAUTHIER SR PRODUCTION MANAGER
agauthier@endeavorb2b.com

MICHAEL ANNINO ART DIRECTOR
mannino@endeavorb2b.com

PUBLISHING TEAM

JEFF MYLIN PUBLISHER
jmylin@endeavorb2b.com (847) 533 9789

ADDISON PERKINS ASSOCIATE PUBLISHER
aperkins@endeavorb2b.com (205) 344-2548

DAVE FISHER SALES MANAGER
dfisher@endeavorb2b.com (508) 543-5172

GREG ZAMIN SALES MANAGER
gzamin@endeavorb2b.com (704) 256-5433

CORPORATE TEAM

CHRIS FERRELL CEO

JUNE GRIFFIN PRESIDENT

MARK ZADELL CFO

PATRICK RAINS COO

TRACY KANE CHIEF ADMINISTRATIVE
AND LEGAL OFFICER

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Forecasting the future from Florida



The ARC Forum held in February in Orlando, Florida proved, again, to be a great way to forecast trends in the industrial-automation space. Hot topics among presenters and gleaned from one-on-one interviews with subject-matter experts include the tremendous value in delivering democratized data to all stakeholders, enabling everyone with facilities to take action on data-derived insights; sustainability (of course), with the larger players touting their comprehensive carbon-capture programs and commitments to sustainability goals; and the mainstreaming of cloud computing among industrial enterprises of all sizes, in response to recognition of enhanced security, plunging costs and greater awareness of the benefits of cloud tactics.

A lot of buzzwords and promotion at this event, naturally, but also terrific perspectives on topics Smart Industry will prioritize in the coming months.

But first...Q1 2023.

Our cover feature in this issue highlights trends revealed in our latest Crystal Ball Report, in which dozens of thought-leaders looked to challenges and opportunities emerging in the immediate future of manufacturing. I invite you to explore their perspectives, and reach out to me if you think we missed anything.

Elsewhere in this magazine we consider the merits of renting vs. purchasing industrial assets. We continue to monitor the metaverse, where applications (and, perhaps, hype) continue to snowball. We examine where the smart factory exists within the larger smart-manufacturing strategy. As always, we provide an update on trends from the cybersecurity front. And we spotlight an ice-cream maker generating sweet results from a digital approach to dairy.

The closing Smart * column jumps off from impressions gleaned at that ARC Forum a few weeks back, an event that annually highlights the awesome diversity of concepts and mindsets within this Industry 4.0 space.

That diversity benefits and deepens the library of content within Smart Industry, of course. It certainly benefits the solution providers who scream from the rooftops how their tools can benefits users.

And that diversity of tools, techniques and technologies within the digitalization sphere benefits everybody else in this transforming space—regardless of vertical or size of enterprise, regardless of location or budget—taking their own journeys into our collective future.

The forecast was certainly sunny down in Florida.

Until we automate this column...



CHRIS MCNAMARA, EDITOR IN CHIEF
cmcnamara@endeavorb2b.com

The Evolving Value Of Industrial Ecosystems

The digital transformation of the industrial-automation sector is resulting in closer collaboration between companies with the shared goal of simplifying processes, improving customer service, increasing revenue, and enhancing visibility throughout the value chain. These partnerships are utilizing SaaS models, reworking go-to-market strategies, and leveraging technology to build ecosystems that outperform the status quo and boost market differentiation.

Smart Industry spoke with Anne Vondrak, Belden's senior director of partner ecosystem programs, to further explore the value of ecosystems in the industrial space.

Q: Describe ecosystems in the industrial space, and how they are changing in this era of digitalization.

A: It's really an evolution of technology partners. About 10 years ago, there was a big push for technology partners to team up with larger automation manufacturers to fill in those niche hardware areas. The niche players could bring things to market more quickly than the large players, and they could fill those gaps that customers required to fulfill their automation needs.

Q: Does that include service delivery for some of these solutions, as opposed to traditional OT or hardware approaches?

A: That's a big piece. As companies evolve, SaaS is becoming something that traditional hardware companies are embracing to ensure they're getting that annual recurring revenue.

Q: What about the value of partners in the industrial ecosystem?

A: The key to success is a bidirectional relationship. For example, small organizations teaming with large organizations benefit from the coverage and global capabilities



ANNE VONDRAK

Belden Senior Director of
Partner Ecosystem Programs
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of the larger organization. Large organizations benefit from the technology and the nimbleness of the smaller company. This close working relationship facilitates growth from a revenue standpoint and supports customers' needs by expanding their combined technology capabilities.

Q: How do you mitigate the inherent complexity?

A: Complexity must be transparent to the end customer. Part of that is vetting the go-to-market strategy to streamline customer engagement.

For example, joining support organizations so there is only one on the front end, or providing one phone number for customer support with calls handled behind the scenes by a separate company. Transactions can be minimized by having customers cut one PO to one organization, which is then handled on the back end between the two companies.

Q: What defines a good partner in these arrangements?

A: It depends on the needs of your organization. For companies entering new markets, it's great to have a partner that's well-known and respected in that space. Belden was known as a wire and cable company, but we've established ourselves as a solution-centric company—with data integrity at the core—by partnering with companies like hyperscalers and cloud-based organizations. Hyperscalers, meanwhile, can develop relationships in the OT space to boost their credibility.

Q: Can you explain the origin of “data on the wire” and why that's important?

A: If you don't have good data at the start of the input devices at the base

level of your plant, then you're not gathering good information to make critical business decisions. Likewise, if there's not a secure infrastructure, you're going to have breaches and questionable security within the structure of your data. You need good data at the inception. Say it's from your sensor information—as that feeds up through the structure, it's going to become valuable information that you can visualize and analyze, whether it's on-prem or in the cloud.

Q: What do you mean by good data coming off sensors at the machine level?

A: In other words, it's complete. For instance, with life sciences and air-gapped equipment, if you don't have visibility to the data that's coming from that equipment because it is air-gapped, then you're not going to be able to utilize it as a full scope of your operation and make the improvements that will impact the bottom line. With air-gapped solutions, it's about improving the infrastructure to the point, bringing it up to current standards with segmentation and switches and gateways so you can process different communication protocols and bring it all into one space—such as an edge device—so you can utilize that information higher in your architecture.

Q: Tell us more about the Ecosystem Program at Belden.

A: The program is predominantly focused on visualizing and analyzing information. Once it goes through the hierarchy of levels zero to three, you're able to operationalize and

orchestrate the data. That's where we team up with companies that have software capability to analyze and visualize the information that you've just collected from that plant floor to make decisions, whether it's for one plant or a combination of facilities. We look at key organizations with a great reputation in this space to see if they can be a niche in a particular region, focus on a particular industry, or be a global organization.

We are also unique because we're agnostic. Belden does not have a controller, which could have held us back previously. Organizations come to us because we can work with any of the large automation manufacturers. And with our acquisitions, such as ProSoft Technology and Hirschmann switches, we can take data and information from many different sources and convert those protocols into something that we can understand, and then utilize that data as a feed into one of our ecosystem partners to provide our customers with that comprehensive suite.

Q: Who are the ideal partners for the Ecosystem Program?

A: Companies such as hyperscalers, for example, as well as all the major cloud manufacturers—AWS, Microsoft, Google. We also partner with smaller organizations that provide niches for us, such as good data from weigh scales or vibration and condition monitoring for predictive maintenance.

Q: What most excites you in this space?

A: Over the last year I've worked with Belden's innovation team

on their edge offering, which is enticing to OT users because this space typically doesn't like to make changes, and the idea of introducing and losing control of their information to the cloud is somewhat off-putting. With an edge device, it keeps some of the control and decision-making in the OT space where they want it. Depending on the edge supplier, OT customers have flexibility in how they build their data stack and can maintain autonomy where appropriate on their data. Then they can take other information that would be more useful in other places in their facility and feed it to the appropriate consumers.

While it seems the OT space is going to adopt some of the IT practices, IT is not necessarily going to take OT into their space. I think we're seeing a big evolution in the OT space and the realm of management that they have.

As for what the industrial ecosystem might look like in 10 years, there's not only a convergence happening with typical IT/OT companies, but also the introduction of cloud organizations and telecoms. Cross-industry convergence will continue, but I also think there will be horizontal combinations where OT suppliers partner with other OT suppliers to broaden their scope and scale.

On a more micro level, the next step with software-based solutions is management, since most are subscription-based and require renewal. Service-centric companies can help reduce the overhead of managing SaaS or XaaS. There are going to be many different variations of it, so we'll need to partner with the right companies to simplify that for us. ■

AW-Lake flow monitors helping National Oceanographic and Atmospheric Administration measure ocean salt content

AW-Lake flow monitors helping National Oceanographic and Atmospheric Administration measure ocean salt content [photo]

AW-Lake is supplying flow monitors to the National Oceanographic and Atmospheric Administration (NOAA) for use on its research vessels as part of a process to measure the temperature and salt content of the world's oceans.

NOAA previously was unaware when pumps clogged while taking in salt water as part of its measuring process. Different types of sea plankton and natural sea water debris congested pumps, creating inaccurate sea-water readings.

An AW-Lake MX 9000 Panel Mount Process Monitor not only tracks the amount of sea water flowing into the pump, but integrates output into the ship's data-gathering computer. The monitor is calibrated to trigger an alarm on the ship if water-flow rate drops below a specific level.



"Whether it's out on the open ocean or the open road, our products are helping different industries measure and monitor flow rates," said AW-Lake General Manager Mark Iverson. "In many applications similar to NOAA, it's imperative that process operations run more smoothly and efficiently."

Ivalua launches Environmental Impact Center to reduce harm from supply chains

Ivalua announced the launch of its Environmental Impact Center (EIC), a solution that promises to enable organizations to measure and reduce their value chain (or Scope 3) emissions. By integrating the EIC's functionalities in their procurement practices, organizations can dramatically accelerate sustainability agendas with reliable emissions data for all the direct and indirect products and services they acquire and establish transparent reporting standards, per Ivalua.

Through Ivalua's EIC, emissions data can be imported from recognized third-party emissions data sources or directly from suppliers; the data is then combined with other information such as environmental risk scores, policies, published targets, or certifications. This data is accessible across Ivalua's Source-to-Pay solution to facilitate more sustainable procurement decisions within daily operations. As products are purchased within an organization, category managers can precisely track the year-to-date carbon emission trajectory for their purchases.

"Procurement and supply chain teams play a crucial role in reducing scope 3 emissions and contributing to corporate objectives around supply chain sustainability", said David Khuat-Duy, founder and CEO. "By combining relevant and reliable data with supplier collaboration capabilities, Ivalua will enable customers to make meaningful progress on their sustainability journeys."

"In contrast to other solutions, the EIC will allow procurement to build baseline estimates for products and categories where verifiable supplier data does not exist", said Pascal Bensoussan, chief product officer at Ivalua. "They can use these models to focus on high-emitting categories and products. They can then collaborate with suppliers to verify actual product emissions, define improvement plans to reduce emissions, and, ultimately, accurately track and report progress. EIC will aid our customers in establishing a more sustainable supply chain to reduce both greenwashing and green-guessing."

Warehouse technology targeted to Gen Z workforce

Lucas Systems announced its rollout of new technologies promising productivity, comfort and ease of use to a Gen Z warehouse workforce of the future. The technologies—built to serve the new “iGeneration” of workers born between 1997 and 2012—promise reduction of worker stress, a less physically-taxing work experience, and help for on-floor supervisors by providing the tools needed to be more agile.

New technologies include:

- An all-new supervisor-management console that provides leadership with a high degree of flexibility and agility to customize data, dashboards, and analytics specific to their operation and needs. Supervisors and managers can get actionable information in a way that’s easy to understand and use through fully-customizable consoles, per Lucas.
- Improvements in reducing worker travel. Lucas Systems new algorithms and machine-learning smarts help workers take up to 50% less steps inside the warehouse by showing them the optimal path to navigate. This is relief to physically-stressed on-floor workers as they can often walk 5-10 miles in just one day.
- Ability for on-floor workers to use the smallest wearables for scanning. Lucas Systems certified its voice-enabled optimization suite, Jennifer, to run on a Zebra WS50, the world’s smallest all-in-one Android enterprise-class wearable mobile computer.

These solutions and other insights around technology training, warehouse environments and new methods for division of labor resulted from Lucas Systems in-depth interviews with warehouse workers as well as a commissioned



study, polling 500 US warehouse workers nationwide. The research examined workers’ relationships with technology as well as their fears, expectations, and perceptions about their daily jobs.

Additional insights were released in Lucas Systems guide, *Competing for The Warehouse Workforce of the Future*, along with recommendations for attracting and retaining a future workforce with unique attitudes around loyalty, work-life balance and workplace satisfaction. One insight is that a majority of Gen Z workers (73%) say robots will help them achieve greater accuracy and speed in their jobs.

“These are all signs that tomorrow’s warehouses will need to operate differently than they do today,” said Lucas Systems CMO Ken Ramoutar. “Gen Z workers expect to use modern technologies like they use at home. Handheld and personalized, tech must be easy to use and must help them save time and mitigate exertion.”

ASI and SICK optimize and automate yard operations

ASI Logistics and SICK, Inc. announced the development of autonomous yard truck operations, touting that they have solved the issue of reversing into trailers autonomously. This is one of the final steps in completing fully autonomous yard operations. ASI Logistics utilized its robust Vehicle Automation Kit (VAK) and SICK’s industry-leading LiDAR to overcome this challenge.

“SICK recognizes that better autonomous vehicles are only possible with better sensor technologies,” said Aaron Rothmeyer, product manager at SICK USA. “As such, SICK is continually innovating its product portfolio to take advantage of the latest tools and ideas. Our substantial experience with optical devices shows up



in well-designed sensors all the way down to the component level. In addition, SICK is also heavily involved in the creation and updating of global safety standards, which is a critical step to ensuring autonomous vehicles' continued success."

As the truck reverses, the two LiDARs detect where the trailer's kingpin is and relay this information to the truck's VCU,

which commands the throttle, brakes, steering, and fifth wheel to continue to reverse safely into the trailer until a secure and safe connection to the kingpin is made. Once the connection is made, sensors indicate that the truck has a secure connection and is now ready for the robotic arm to attach the necessary glad-hands and continue with the rest of the move, per the partners.

Smart pricing engine for finishing service

HeyScottie announced the launch of its automatic pricing engine for manufacturers, which promises to reduce the RFQ process for finishing services from months to minutes, giving manufacturers the power to break free of "local only" finishing sources while saving time and money.

Using HeyScottie's automatic pricing engine, manufacturers can simply upload a CAD and say, "Go fetch" to immediately get a quote for the fastest and best value in finishing services anywhere in the United States, per its maker.

"When I was a manufacturer myself, I saw the process take weeks, even months, because there was no price transparency—and the only options were local," said HeyScottie Founder and CEO Rhonda Dibachi. "I created HeyScottie and the automatic pricing engine so that manufacturers can take advantage of advances in artificial intelligence and cloud computing to gain access to finishing services anywhere in the country and get a reliable quote in seconds."

Energy efficiency in auto racing?!

ABB will this year integrate its ABB Ability OPTIMAX energy-management software solution into the ABB FIA Formula E World Championship, with the goal of maximizing the energy efficiency of the racing series' at-track operations.

Season 9 of the all-electric racing series, of which ABB is the official charging partner, begins in mid January in Mexico City, where ABB Ability OPTIMAX will be used in a live racing environment. Following successful trials during Season 8, ABB Ability OPTIMAX will enable the championship's engineers to monitor and analyze total race-specific energy output, helping drive more efficient processes.

Up to 14 metering boxes will be located at host venues, collecting data on how much electrical power (kilowatts) is being used by teams and other race partners and how

much electricity (kilowatt hours) is consumed over any given time period. This information will be relayed back to race control via the Microsoft Azure cloud. Total consumption across entire E-Prix sites will also be monitored, encompassing operations including the TV broadcast suite, E-Village fan zone, media center, catering facilities, the paddock and the teams' pit garages.

Daniela Lužanin, head of the ABB Formula E partnership, said, "For ABB, the partnership with Formula E has always been more than a race, it is a testbed for innovative technologies, and we aim to continue to bring more of our solutions to the series. Energy efficiency is key to reducing emissions and meeting sustainability targets and ABB Ability OPTIMAX will be fully implemented this season to help improve this within the Championship."

Powering the evolution of remote assets

Extended-life batteries are essential to remote wireless devices utilized throughout the IIoT, providing a major cost benefit by reducing or eliminating the need for battery replacements. That's according to Tadiran Batteries' Sol Jacobs, who adds that the use of an ultra-long-life battery can translate into significant cost savings for remote wireless applications by

eliminating the labor expenses related to battery replacement, which invariably exceeds the cost of the battery itself.

This money-saving benefit is especially important for wireless devices deployed in remote or hostile locations where battery access can be highly cost-prohibitive and sometimes impossible.



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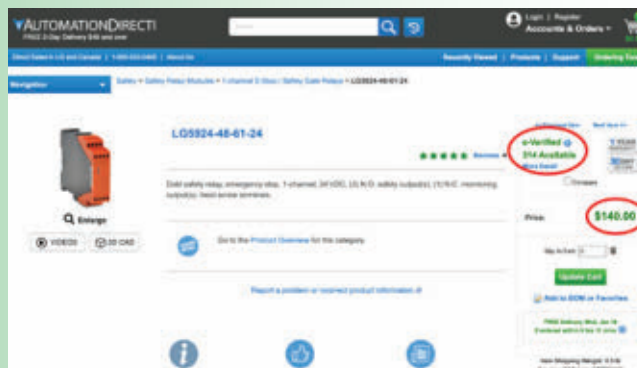
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The use of battery-powered remote wireless devices has exploded to encompass everything from system control and data automation (SCADA) to automated process control, AI on the edge, M2M, machine learning, and other technologies.

Battery-powered devices monitor everything from structural stress to environmental quality, tank level and flow monitoring, energy usage, asset tracking, as well as enabling remote actuation and shut-off using two-way wireless communications.

Ultra-long-life lithium batteries are serving to increase system reliability, ensure continuous data flow, and reduce

long-term maintenance costs, support AI-enabled predictive maintenance programs, and more.

IIoT-connected devices utilize two-way wireless communications, Jacobs added, which demands specialized power-management solutions. These devices must be engineered to conserve energy by employing a variety of energy-saving techniques, including the use of a low-power communications protocol (WirelessHART, ZigBee, LoRa, etc.), low-power chipsets, and proprietary techniques designed to minimize energy consumption when the device is in "active" mode.

Luna Rossa Prada Pirelli adopts Siemens Xcelerator-as-a-Service for America's Cup yacht design

Siemens Digital Industries Software announced that the Luna Rossa Prada Pirelli America's Cup team is using the Siemens Xcelerator portfolio of software and services to design, simulate and optimize its racing yacht for the forthcoming America's Cup challenge.

"The Siemens Xcelerator-as-a-Service portfolio provides critical tools to Luna Rossa Prada Pirelli that allow the team to design, analyze and evaluate all aspects of the boat's hydraulics and fluid-dynamic performance," said Matteo Ledri, head of CFD, Luna Rossa Prada Pirelli Team. "Using Siemens' software, the hull, foils, rudder and sails can be analyzed as part of the digital twin, to understand how each surface responds to the changes in the project parameters, thus speeding up our work."

The hull, foils, rudder and sails are designed and analyzed virtually using Simcenter STAR CCM+ software to understand how sails, hull and the complex hydrodynamics of the hydrofoil respond to the changes in the project parameters. Simcenter Amesim software is used to simulate all on-board hydraulic lines and optimize performance, an essential aspect given that on-board hydraulic power for the aerial parts of the boat is generated by four cyclors using pedal power.

Luna Rossa Prada Pirelli is also taking advantage of Xcelerator Share, the cloud-based collaboration capability in Siemens Xcelerator as a Service, to effectively manage increased design complexity, improve manufacturing repeatability across the growing number of parts undergoing thousands of engineering changes per year, both in and out of racing season. In the highly competitive America's Cup environment, these advanced shape description capabilities and high-fidelity CFD simulations of an extreme class of sailing boats allow the team to meet their needs on the



timetables demanded by global racing competitions, the partners say.

Siemens Xcelerator as a Service enables a high degree of automation, so the Luna Rossa Prada Pirelli team can fully leverage the power of modern high-performance computing (HPC) clusters, running thousands of simulations per day to quickly explore the characteristics of new designs in different environmental conditions. In addition, Siemens provides a dedicated support service to assist the team in extracting the maximum value out of their investment. The agreement also includes Siemens' NX software, which Luna Rossa Prada Pirelli licensed to start evaluating its potential with a view to its future introduction.

"The team's selection of Siemens Xcelerator as a Service is another proof point that organizations at the bleeding edge of innovation are using our solutions to bring their ideas to life," said Franco Megali, vice president and CEO Italy, Israel and Greece, Siemens Digital Industries Software. "Whether that's teams competing in the world's most extreme sailing races or building a more sustainable future, pioneers are choosing our solutions." ■

Seeq announces Process Health Solution at 2023 ARC Forum

Seeq Corporation announced the Seeq Process Health Solution for advanced process monitoring and diagnostics at the 2023 ARC Industry Forum. This innovative solution leverages advanced analytics and machine learning to address high value, complex process manufacturing challenges related to production, quality and optimization, per its maker.

The Seeq Process Health Solution, which includes Seeq ML, a no-code multivariate pattern-learning and diagnostic technology, promises to empower organizations to monitor complex manufacturing processes and optimize key-performance indicators in near real time for batch and continuous processes.



With the Process Health Solution, users can leverage their domain expertise and process knowledge, without any prior machine learning experience, to improve their discovery, detection and diagnosis of process performance issues, notes Seeq.

The new solution extends current capabilities for connecting data, teams and insights across a spectrum of analytics and machine learning.

Engineers and process experts benefit from accessing Seeq ML add-on capabilities and multivariate

visualizations from within Seeq's advanced-analytics platform, they claim. Templated solution workflows also enable teams to quickly identify issues and root causes and accelerate improvements in process performance.

"Placing advanced multivariate, machine learning capabilities directly in the hands of frontline process experts and decisions makers aligns perfectly with the Seeq machine-learning strategy," said Mark Derbecker, chief product officer at Seeq. "Providing the Process Health Solution within the Seeq self-service, advanced analytics platform will enable organizations to gain insights and take transformational actions within hours."

TRUMPF's TruBend Center 7020

TRUMPF is unveiling a fully automatic panel-bending machine for the North American market. Designed to process complex parts quickly and efficiently, the new TruBend Center 7020 can bend parts with side lengths of up to 13.8 inches. The machine can also handle material thicknesses of up to 0.15 inches in aluminum, 0.12 inches in steel, and 0.08 inches in stainless steel, extending over the entire bending length.

"No other panel-bending machine on the market can offer this level of performance when it comes to box height and material thickness," explained TRUMPF Inc. Head of Smart Factory Applications and Automated Bending Franziska Maschowski. "As a solution provider for the sheet-metal process chain, TRUMPF now offers another machine that gives users a



real competitive edge. Companies can now harness the benefits of panel bending for more parts than ever before—producing complex geometries, saving time, and getting high quality results."

The machine also achieves impressively high productivity, per its maker. Compared to a manual press brake, the new TruBend 7020 works up to

80% faster, depending on the specific part and bending operations involved. Panel-bending technology is particularly suitable for fabricating complex parts with radius bends, short side lengths, and narrow profiles. It produces these types of parts more efficiently and at a higher level of quality than traditional die bending.

Faster bending with the TruBend Center 7020 owes its short cycle time to a new rotary part manipulator, which can move the part even closer to the bending line. In many cases, this reduces the cycle time by eliminating the need to reposition the grippers during processing. TRUMPF engineers also designed the machine to be as open and accessible as possible. Workers can load and unload the machine from the side without having to lean into the interior, reducing time and backaches.

Emerson's Ovation Green dedicated renewable power technology and software

Emerson has combined its power expertise and renewable energy capabilities into the Ovation Green portfolio to help power-generation companies meet the needs of customers navigating the transition to green-energy generation and storage. By uniting the recently acquired Mita-Teknik software and technology with its own Ovation automation platform, Emerson has created a new extension of its power-based control architecture, they claim. The resulting portfolio focuses on the emerging clean-energy market to provide simplified renewables automation to help power producers build and scale sustainable operations.

While some existing systems can provide layers of connectivity between very specific assets, the Ovation Green portfolio will deliver a single set of purpose-built software and solutions that supports different technologies in one standardized, intuitive system, per Emerson.



"Countries around the globe are focused on transitioning to a clean energy economy in the coming decades, and while green energy is a simple concept everyone understands, the road to implementation is not always clear," said Bob Yeager, president of Emerson's power and water solutions. "With the Ovation Green portfolio, our software, support and solutions are unified in one system from a single trusted provider to help power producers more quickly, easily and reliably manage their renewable electricity operations."

Full access to real-time and historical operations information empowers owners and operators with greater visibility and control of all renewable assets across the enterprise. Through an integrated portfolio of data-driven asset control and management solutions, Ovation Green technologies provide secure, standardized access to data, independent of equipment manufacturer or system type, across a single or multiple sites.

By gathering, collating and contextualizing vast amounts of data created by renewable generation and storage assets, Emerson's Ovation Green portfolio provides a clear view of renewable operations in a seamless space, per its maker, which adds that the portfolio will empower actionable intelligence from a unified platform to drive faster, more-informed decisions to increase availability and production while reducing operations and maintenance costs.

AGILOX's new ODM robot

AGILOX North America is adding an autonomous dolly mover to its range of intelligent transport systems controlled by its proprietary X-Swarm intelligence. AGILOX boasts that it is targeting a new area of applications: the transport of small-load carriers.

AGILOX is expanding its autonomous mobile robots (AMRs) range with the new Omnidirectional Dolly Mover AGILOX ODM, which can accept loads with a maximum weight of 300 kg / 661 lbs. to a maximum lifting height of 250 mm / 10 inches and transport them to their destination. The intelligent AMR concept based on the AGILOX X-SWARM technology



opens up new areas of applications and other industry segments where small-load carriers (such as totes) are

widely used, especially in the electronics and pharmaceutical industries, its maker notes.

The AGILOX ODM is a true autonomous mobile robot—the compact vehicle travels autonomously and navigates freely on the production floor or in the warehouse, ensuring in-house material flow.

It uses an omnidirectional drive concept that enables it to travel transversely into rack aisles and turn on the spot, allowing it to maneuver in tight spaces. The lithium iron phosphate (LiFePO4) accumulator ensures short charge times and long operating cycles, per AGILOX.

ABB RobotStudio takes to the cloud enabling real-time collaboration

ABB's new RobotStudio Cloud promises to enable individuals and teams to collaborate in real-time on robot cell designs from anywhere in the world, on any device. New features, such as automatic version control, increase transparency and productivity across teams, per ABB. The software's simplified interfaces and intuitive navigation enable users of all skill levels to work on robotic projects, claims its maker.

"At ABB Robotics, we continue to develop innovative and flexible solutions to help businesses overcome challenges, respond to changing customer needs and thrive in an age of increasing digitalization," said Marc Segura, president of ABB Robotics division. "New web-based tools like RobotStudio Cloud bring a new level of agility and flexibility to manufacturers in how they plan and design their robotic automation solutions. Offering a simplified user experience,



RobotStudio Cloud helps to increase collaboration and reduce complexity, enabling both novices and experts to push the boundaries of robotics programming."

The new and enhanced cloud-based RobotStudio software can help companies program robots more collaboratively while cutting the time, cost and disruption associated with physical testing and commissioning.

Now system integrators and engineering teams can collaborate in

real-time to design, develop and enhance robotic automation solutions.

New features in RobotStudio Cloud include version control, which allows users to keep track of changes and have full transparency of any amendments. With complete knowledge of who edited the program and when they did it, developers can cut the time needed to resolve errors and performance issues, notes ABB.

Incorporating RobotStudio's cloud-based virtual controllers, developers have a rapid and powerful robot-simulation tool to tune and test programs.

By producing an exact digital twin, the virtual controllers give developers complete confidence that—once installed in the real world—the robot will move as precisely as in the simulation, touts ABB. This enables fine-tuning and optimization that can help minimize waste and mitigate problems when production begins.

Ultimation details smart-conveyer trends

Material-handling needs are changing as manufacturers and distributors look for ways to keep up with the growth of e-commerce and reduce their environmental impact, according to Ultimation Industries. Faster throughput, increased automation and more efficient use of energy and space are some of the factors that are influencing conveyor system designs in 2023, they note.

"Over the past year, we've seen an increase in requests from manufacturers for flexible material-handling

solutions that allow them to scale quickly and reduce energy consumption...without requiring major capital expenditures," said Kali Crescent, general manager for Ultimation. "We expect those trends to continue—and even accelerate—into 2023 and beyond."

Crescent pointed to five growing trends in the conveyor industry:

- Moving more with less energy. Increasingly, companies are looking for every opportunity to reduce their energy consump-

tion. An unexpected place to find savings is in material-handling systems. Conveyors equipped with motorized driven roller (MDR) systems are an energy-efficient alternative to legacy systems. MDRs operate with 24-volt DC power and only use electricity when they are actively moving cargo. Crescent said a typical five-foot chain-driven live roller (CDLR) conveyor system using approximately 0.75kWh of energy for operation could save up to 81% in



energy usage by replacing it with a same-size MDR system. MDRs are also quiet and can handle a multitude of products such as packages, tote bins, pallets, tires, cartons and more.

- **Building up.** Companies that need to scale up fast don't have time to wait for building expansions or the acquisition of additional square footage. Better utilization of vertical space in a warehouse or manufacturing facility through lifters and overhead conveyor systems is an affordable, effective solution that can be deployed relatively quickly. Lifters can help manufacturers and distributors move totes, cartons and pallets from one level to another with carriers designed to handle multiple load weights and sizes. In vertical farming applications, overhead style material handling systems can help with all-important space optimization.
- **Squeezing it in.** Seasonal volume increases, unexpected spikes in demand and even sustained high order levels put pressure on manufacturers and distributors to get more mileage out of their exist-

ing floor space. For temporary or seasonal situations, flexible and expandable conveyors are an inexpensive investment that can be set up quickly during high volume months. Flexible conveyors can quickly form lines or curves to get materials where they need to be, and easily stored away when they're not needed. A more permanent option is the addition of fixed, curved conveyors to an existing material handling system. Curves can be used in ascending or descending applications to help minimize the footprint within a multi-tier warehouse.

- **Addressing the need for speed.** Higher throughput requirements are driving many manufacturers to explore conveyor options that reach faster speeds without compromising product or people safety. Some industries are taking a page from the airlines' playbook by incorporating Interroll Portec systems that move more than 4 billion pieces of luggage annually. The speed and durability of

Portec systems make them ideal for demanding material handling environments, such as distribution centers, parcel handling operations, food/wine/beverage facilities and vertical farms.

- **Automating processes.** The shortage of workers, coupled with the growing adoption of Industry 4.0 technologies, means many manufacturers and distributors are turning to automated systems and robotics to meet productivity requirements. Material-handling operations are no exception. Systems that integrate with radio frequency identification (RFID) and other technologies provide greater efficiency and improve accuracy, per Crescent. Autonomous mobile robots (AMR) or warehouse robots are a good option for manufacturers and distributors of all sizes who need to transfer loads within their facilities quickly and without reconfiguring production lines or factory footprints. They can be deployed wherever and whenever needed, interfacing with existing conveyor systems and providing flexibility as volumes change. ▣

BY CHRIS MCNAMARA,
SMART INDUSTRY EDITOR IN CHIEF

SMARTS, GUTS & TECHNOLOGY

A formula for overcoming
challenges and forecasting wins in
the modern industrial arena.

"The main issue with predictions about emerging technology is separating futuristic, hypothetical concepts (that might never come to fruition) from those that are now in practice," said Kevin Finnan, advisor, market intelligence and strategy, Yokogawa.

He's right. This digitalization-of-manufacturing space is a buzzy one...trends emerge and peter out quickly...so it can be tough to differentiate which emerging tools or techniques are worthwhile, and which ones are merely shiny new objects that their makers want us all to embrace.

The wisest industrial thought leaders, like those included in the 2023 Smart Industry Crystal Ball Report, temper their substantial enthusiasm for all of this Industry 4.0 stuff with a grounded realism. Just because something might work, doesn't mean that it will work.

Highlighted here are some of the predictions from the report for 2023, a year that is now well underway, with some prognostications already proving prescient and others already being exposed as calculated misses. Making predic-

tions in any field of business is tough. Making predictions during transformations requires smarts and guts.

TREND: SMART PATHS TOWARD SUSTAINABILITY

No topic is as pressing as sustainable manufacturing, both in the need to adopt more sustainable processes and the desire to balance sustainable practices with profitable ones. Here is perspective from thought-leaders:

"As the industrial sector faces this pivotal moment, intersecting priorities of safety, productivity and sustainability are forcing a crossroads between 'the ways things have always been done' and the tech-powered vision of tomorrow. Critical to realizing the promise of digital transformation, the shift to boundless automation will be significantly more interoperable, extensible and scalable than past technology trends." Peter Zornio, Emerson chief technology officer

"In 2023, it will be important to have a strong data-management strategy that can help prove sustainability commitments are being met and show measurable progress over time.

Capital-intensive industries have a critical role to play in addressing the dual challenge of meeting the increasing demand for resources from a rapidly growing population in a profitable and sustainable manner. With the right data-management strategy, they'll be able to harness huge amounts of data to become more efficient and make progress toward sustainability goals." Nicole Rennalls, AspenTech vice president and general manager of AIoT

"We see the energy usage of complex manual and automated processes being measured at a granular level by digital tools focused on performance and efficiency to drive sustainability. This is due to continued progress in connectivity at the edge and successful efforts to accelerate IIoT adoption. This connectivity, paired with the increasing appetite for business and operational intelligence, will enhance the ability to narrow down where energy is being lost and the causes of downtime, which will provide a better understanding of the overall efficiency and contribute to asset-management strategies that enable us to achieve sustainability goals." Mauricio Casares, Schneider Electric smart factory improvement manager

"While sustainability and profitability were once at odds, with the continued adoption of digital initiatives in 2023 and beyond, industries will soon realize the two are more intertwined than ever before.

In past years, organizations have struggled to achieve sustainability gains because they lacked the means to track progress without a method of measurement. Reporting was retrospective and infrequent, hampered by time-consuming manual calculations, visualizations and validations performed in spreadsheets. Without a method to quantify outcomes and ROI, sustainability initiatives were rarely allocated the required resources to be successful.

Moving into the new year, organizations will turn to digital solutions that enable them to tap into a valuable asset already at their disposal—time series data—to drive measurable impact.

The adoption of advanced analytics platforms that aggregate disparate data sets and empower analytics in near real time will improve the efficiency and impact of existing operations. This will lead to increasingly proactive production systems that help preemptively identify and mitigate emissions events. Furthermore, the ability to certify sustainability credentials of individual facilities, product lines, and product deliveries will create opportunities for differentiation and competitive advantage." Morgan Bowling, Seeq industry principal

TREND: SHARPER ASSET PREDICTIONS

Predictive tactics that were considered futuristic just a few years ago are now mainstream. Even the smallest manufacturing shops are relying on smart predictive-maintenance

programs to optimize performance of their assets. And this will only continue to snowball, as early efforts validate scaled campaigns. Here is perspective from thought-leaders:

"Within the next five to ten years, the predictive component of asset-performance management (APM) is poised for transformative disruption. Strategies to close gaps and build an enduring, world-class solution will resolve the predictive side of APM and link with the maintenance side. New technology will enable quicker, easier procurement and encompass APM, energy-emissions monitoring, and fuel optimization. Advanced APM will be deployed in a fraction of the cost." Rahul Chillar, Honeywell chief product officer

"In 2023, the manufacturing landscape will see some of the most profound changes in planning, maintenance and distribution of manufacturing materials because of the advancements with digital-twin technology. Developments in digital-twin modeling have presented businesses with new ways to remain efficient in the development process, eliminating unplanned shutdowns by minimizing the main causes of operator mishap in manufacturing or in buildings. The manufacturing industry's greatest digitization benefit comes from seeing the end product visualized in real time." Manish Kumar, EVP of digital energy at Schneider Electric

"Companies will continue to rely on outsourced expertise for the implementation and ongoing maintenance of digitalized systems in 2023. Without the current manpower or resources to implement and maintain increasingly advanced systems, it has become necessary to outsource to third-party services and integrators. Another approach is allowing data to be stored off premise in the cloud. By allowing data to move off premise into third-party platforms, companies create an extension of their team, gaining specialized expertise and leveraging resources without driving up their head count." Heath Stephens, Hargrove Controls + Automation P.E. digitalization leader

TREND: STEADYING OUR SUPPLY CHAINS

While the headline-grabbing supply-chain crises have subsided (for now), many of us still struggle with getting the materials we need and distributing the products we make. Smart solutions are proving effective at mitigating supply-chain disruptions, for those that implement them properly. Here is perspective from thought-leaders:

"We are looking forward to better, more predictive supply chains that can anticipate what customer demand cycles will be, as well as anticipating what likely supply-chain risks will be and ways to overcome them. Advances in AI and machine learning move quickly, and we believe that supply chains will benefit from these developments in a very significant way in the coming years." Diego Pantoja-Navajas, vice president, AWS Supply Chain, Amazon Web Services

"AI-enabled processes will streamline supply chains, increase efficiency by orders of magnitude, improve safety, and enhance product quality while reducing costs, latency and downtime across diverse, distributed manufacturing environments." Gerard Andrews, NVIDIA senior product-marketing manager

"I can attest that the new talent coming into the supply-chain industry is nothing short of amazing. But there is big competition for this talent; organizations need to make sure they set the right culture and working environment to successfully attract it." Bart De Muynck, project44 CIO

"In 2023, industrial-grade, IoT-enabled cloud manufacturing will redefine the supply chain, building in resilience at every stage as shortages of truck drivers, rising fuel prices, and finite raw materials continue to play their part in ongoing disruptions." Andrew Burton, IFS industry director for manufacturing

TREND: OVERCOMING WORKFORCE CHALLENGES WITH ENHANCED AUTOMATION

Amid all of the amazing technological developments, this fact remains: the human workforce is the most critical asset within an industrial enterprise. And while smart devices flourish, maintaining the people needed to realize gains with that technology continues to befuddle some manufacturers. Here is perspective from thought-leaders:

"Although investment in plant and equipment and automation has been the trend for many years, the pandemic-related labor shortage will continue to drive accelerated automation and investment in new manufacturing equipment, ERP systems, and robotics in 2023. Increased automation is likely to drive productivity but also lead to uncertainty of anomalies. One quick win is to prioritize more data and advanced analytics capabilities that help make more-informed decisions and mitigate the risks associated with unexpected disruptions or failures. For example, a leading commercial truck manufacturer uses a hybrid data platform to collect, consolidate and analyze sensor data in real time. The platform includes integrated machine learning and advanced analytics that help them automatically detect engine problems early and predict maintenance requirements. Using more data and advanced analytics has helped them reduce fleet downtime by more than 30%." Louisa Lu, senior industry marketing manager at Cloudera

"This democratization of intelligent automation and process-excellence skills will be driven by concentrated efforts on training, enablement, and certification at different levels of employees, resulting in more pervasive adoption of human-machine workforce models." Vinay Mummigatti, executive vice president of strategy and customer success at Skan AI

"Manufacturers must reassess their digitization processes. Leaders should set top-down mandates, adopt

cutting-edge technology tools, train their workforce and measure progress toward a smart-manufacturing end state." Grace Nam, strategic solutions manager with Laserfiche

"Human intelligence (HI). An HI approach enables businesses to maximize existing infrastructure, face talent constraints and pursue deeper business intelligence and data-driven decision making. Notable benefits of HI include empowering executives to solve complex issues through analytics and optimization with near real-time data, leveraging AI for more robust and accurate insights alongside human workers, and introducing new tech roles where humans facilitate training AI solutions for ongoing applications. In 2023, HI solutions will become ingrained throughout business processes across industries as AI takes on a co-pilot role, equipping employees to deliver better and insightful work." Artem Kroupenev, vice president of strategy at Augury

"Every year, a greater percentage of the manufacturing workforce is 'born digital,' meaning workers who have never known a world without constantly connected devices. This familiarity with digital assets naturally results in greater adoption of technology, in fact it has opening the door for a new term: the new-collar worker—one that is looking forward to implementing new technologies in their day to day." Charlie Neagoy, senior vice president of customer success at Librestream

"A collaborative, people-centered approach to digital transformation takes this one step further by providing a central digitized knowledge bank for all levels of plant personnel to access. This can spark inventive ideas that lead to improved efficiencies or cost-saving ideas and set them in motion—truly leading to resilience with an united manufacturing team." Andreas Eschbach, CEO at Shiftconnector

WHAT THE REST OF THE YEAR HAS IN STORE FOR US

"2023 will be a year of achievement," proclaimed Bob McIlvride, Skkynet director of communications, with confident enthusiasm. "Companies large and small are recognizing the inherent limitations of traditional approaches and protocols to achieve secure, robust data communications on large-scale deployments. Instead, they are favoring a secure-by-design approach. For the coming year, we will continue to see fewer abandoned pilots and more successful digital-transformation projects."

For many of us, this is proving true as we wrap Q1 of the new year. Others among us continue to struggle with the challenges detailed above.

The formula that is fueling those successes, and that is required to meet those stubborn challenges, is technology (of course) complemented with plenty of smarts and even more guts. ■

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TO RENT OR TO BUY?

A FEW PERSPECTIVES ON OWNERSHIP OF ASSETS

NEW MINDSETS WITH INDUSTRIAL TOOL AND TECHNIQUE OWNERSHIP

By Heath Stephens, P.E., digitalization leader at Hargrove Controls & Automation

From the way we order a pizza to the way we operate facilities, companies in all industries are taking advantage of the Internet of Things (IoT). The manufacturing industry is no different in its efforts, and in our current climate, success depends on one's ability to adapt and embrace the advances of Industry 4.0.

There are many emerging trends in digitalization that could help you overcome obstacles, mitigate current risks, and bring longevity to your manufacturing company. Let's explore a few...

Companies will continue to rely on outsourced expertise for the implementation and ongoing maintenance of digitalized systems. Without the current manpower or resources to implement and maintain increasingly advanced systems, it has become necessary to outsource to third-party services and integrators.

While granting remote access through screenshare technology (Teams, Zoom, etc.) is sufficient for a quick fix or few hours of support, longer-term support requires other strategies. One method is to issue company laptops to select

outside partners; this is cumbersome to manage as the number and use cases for third-party access grows. Virtual Desktop (Citrix, Azure VDI, etc.), VPN, and cloud-gateway devices are the more efficient way to implement remote access for most scenarios. The usage of cloud-hosted services gives contractors 24/7 remote access to assist in times of emergency and provide support of equipment, AI tools, and other applications to analyze quality and reliability.

Another approach is allowing data to be stored in the cloud. By allowing data to move into third-party platforms, companies create an extension of their team, gaining specialized expertise and leveraging resources without driving up their head count.

As with all shifts in data technology—whether the data is housed off-premises or internally with outside vendors having access—risks are inherent. Security is of utmost importance. Before you implement outsourcing, ensure firewall and security protocols are in place. Set standards and expectations for contractors so they are only allowed to do what they have been asked to do and nothing more.

Actively monitor access in real time and log activities so you know what is going on in your system. It is good to "build a moat around your castle" and only lower the drawbridge for those you trust.

RENTAL COMPANIES CAN MAXIMIZE ASSETS AND INCREASE OUTPUT OF THE RENTAL LIFECYCLE

By Matt Danna, senior director of product strategy at ServiceMax

The United States has seen a tremendous oil and gas production surge in 2022. The US rig count is currently up by 271 rigs compared to the same time last year, and Texas has added thousands of oil-field service jobs in the previous few months, but oil producers are facing constraints, including the inability to secure materials amid rising competition for fleets and equipment during this production boom.

Unsurprisingly, renting equipment to get the job done is now becoming a preferred option, increasing the demand quite a bit—so much that the latest quarterly forecast in the US shows equipment rental revenue was expected to grow by 11.1% in 2022, or reach nearly \$56 billion. By focusing efforts on and executing work with rental equipment, O&G companies streamline operations and boost bottom lines.

To navigate growth successfully, equipment-rental businesses can prepare themselves for the influx of business. One major way companies can succeed is with an end-to-end solution that maximizes assets and increases output throughout the entire rental cycle, creating a clear operational picture from the warehouse to the field and back to the office, while capturing assets and consumable data throughout the rental cycle.

Oil and gas rental equipment can experience plenty of daily wear and tear, so it's important to maintain these assets to ensure maximum performance and profitability. An end-to-end field-service solution can do this in the most efficient way possible by accounting for the entire operational picture, including, but not limited to:

Asset service and maintenance management. Lost time and availability due to equipment repair is detrimental to high rental performance and the flexibility of rental offerings. To ensure equipment is always available for use, maintenance should be conducted effectively and strategically. An end-to-end solution eliminates delays and errors associated with paper handoff and provides complete access to service and asset history. This empowers technicians to address challenges as they occur and to plan for future preventative maintenance and calibration activities.

Accounting for rental-process equipment and billing. When equipment is delivered and put out for rent, managers can update the rental status of each asset in real-time, segmenting by day to deliver a synopsis of all rental assets.

Reporting data. All data must be accessible to ensure a single source of truth for all assets. Businesses can collect data, make it centralized and actionable, and produce reports for profit margins, assets on location, utilization,

upcoming deliveries, returns, and pending outstanding orders. Then, reports can be organized by job, region or globally.

Warehouse processes and pick sheets. An end-to-end mobile solution can ensure any rental items requested for a job will be correctly selected in the warehouse. A custom pick sheet enables those on a jobsite to select the necessary equipment and send the information straight to the warehouse, enabling them to reserve equipment multiple weeks out.

The bottom line is that incorporating an end-to-end solution is the most effective way equipment-rental companies in the oil and gas industry can keep pace with growing demand. This approach maximizes assets, increases output through the entire rental cycle, and streamlines the process as a whole—all mission-critical aspects on the road to profitability.

RENT VS. BUY PERSPECTIVE FROM A SYSTEM INTEGRATOR

By Renato Leal, CEO of GreyLogix Brasil Automacao Industrial

System integrators are the most suitable players to capitalize on this industrial revolution, but most of them still do not know how to do it.

Of course, the tricky thing about recurring revenues is that from the customer perspective they are recurring costs, so it can become a zero-sum game if you are fighting to push recurring revenues without a good value proposition. Like Netflix, if you want to sell recurrently, you must have solid content. In our case, it meant choosing a great tool (COMOS, from Siemens), investing heavily in software licenses and even more in developing a solid team for database administration, engineering, maintenance and support. We put that all in a package and rent it to our customers.

Basically, we build their digital-twin environment with smart piping-and-instrumentation diagrams, integrated documentation, maintenance, engineering and so on and we rent it to them including setup, licenses and services. The result is that the customers have an as-is version of their plant instead of as-built.

It has been a success. In fact, the model has proven so successful that we are partnering with other system integrators and construction companies worldwide, where we maintain and update their databases and they rent or sell the digital twins to their own customers. This is only one example of the many new opportunities arising from Industry 4.0. These are exciting times with a whole new generation of solutions for industries, and opportunities are up for grabs. ■

The way manufacturers utilize technology for everyday tasks is set to undergo one of the most drastic evolutions in history. Just a few short years ago it was nearly impossible to think any technology could have a greater impact than networked computers, the internet or even mobile computing. But now, immersive mixed reality powering the metaverse is doing just that.

HOW COMPANIES WILL LEVERAGE DIGITAL TWINS

Today's IT leaders are building the metaverse—a virtual world where people, consumers and workers gather to

communicate, collaborate, and share through a virtual presence on any device. This means companies will build immersive virtual spaces, aka metaverses, for employees to virtually collaborate using digital twins. They will chat, email, conduct video calls, even have “face-to-face” meetings.

Well-known companies like Microsoft, Accenture and Facebook, which itself is now called Meta, are all paving the way toward this new reality of business. But consider the companies working behind the scenes, building this immersive reality, modeling and simulation technologies that will ultimately power this new metaverse for manufacturers.

IMMERSIVE MIXED REALITY WILL POWER THE METAVERSE FOR MANUFACTURERS

VIRTUAL SPACES EMPOWER TRUE COLLABORATION
BY DIJAM PANIGRAHI, CO-FOUNDER AND COO OF GRIDRASTER INC.



WHAT COMPANIES CAN DO WITH THE METAVERSE

Microsoft, in particular, believes individuals will engage with one another in an immersive experience once they can interact in a virtual setting where they exist as avatars, perhaps even one day as holograms. The company expects people to access virtual settings from its Mesh for Microsoft Teams application through mixed-reality headsets like HoloLens, as well as everyday smartphones and laptops.

In one of the earlier enterprise-level buildouts, Accenture has been developing a virtual campus where its employees meet for coffee, parties, presentations and other virtual events. The company also leverages this virtual meeting space when onboarding new employees so they can build their virtual twins.

MODELLING IS AT THE CENTER OF POWERING THE METAVERSE

In this virtual metaverse, digital twins based on modeling and simulation play a leading role. Simulation enables companies to take copies of the digital twin, run simulations on it, and then identify optimizations that are too complex to find by monitoring the physical environment alone.

The power of simulation will be a game-changer for enterprises and businesses throughout the metaverse in a variety of industries—think optimizing production planning in the automotive sector, accelerating design in the aerospace industry, improving overall production efficiency for manufacturers, and increasing accuracy for consumer-packaged-goods companies. Many companies are poised to leverage virtual simulation to make better business decisions and generate the greatest return on investment. Perhaps you are one of them.

Optimum immersive-reality systems are needed to support ultra-realistic, high-fidelity digital-twin visuals during the modeling and simulation process—precise fusion of the virtual on the real world in a multi-platform environment and the ability to demonstrate a variety of realistic environments.

Metaverse is a new kind of application that is enabled by tight integration between real and virtual worlds. Metaverse is empowered by a multitude of new technologies that can be categorized in five groups:

1. Communications and computing infrastructure:

Metaverse will need to perform large scale compute-heavy tasks, and access large databases to merge the real and virtual worlds.

2. Management technology: Metaverse will require resources like energy, compute, etc. This layer manages and allocates most optimum resources to run the metaverse.

3. Fundamental common technology: AI and spatio-temporal consistency are fundamental common technology for the metaverse.

4. Virtual reality object connection: Metaverse will create 1:1 connections between real and virtual-world objects and technologies like blockchain; identity modeling will enable that.

5. Virtual reality space convergence: Metaverse will fundamentally need a new medium in which to interact. AR/VR/MR, BCI, gaming technologies will enable this.

Who is creating these tools? Immersive reality solution-providers offer foundational technologies to run industrial enterprise metaverse, including:

Virtual reality space convergence—AR/VR

Low latency is extremely critical to provide an immersive experience in the metaverse. AR/VR partners provide unparalleled realism of environments by leveraging ultra-low latency remote rendering on cloud/on premises in full fidelity and wirelessly streaming the solution to affordable, commercial-off-the-shelf devices (think HMD, tablet and desktop).

High-precision 3D AI-based spatial mapping

Uses high-fidelity remote spatial mapping with high-fidelity 3D-scene reconstruction, scene segmentation and 3D-object recognition using 3D vision and deep-learning-based AI with precise fusion of the real and virtual worlds to merge real world and virtual worlds.

Communications and computing infrastructure

Industrial enterprises will always subscribe to multi-cloud, edge cloud. Depending on different factors like data sensitivity, latency, cost, different parts of the metaverse need to be run at different clouds/edge in a distributed manner.

Messaging framework

In the distributed applications there is a need to update the metaverse at global scale so users can collaborate seamlessly. AR/VR partners have messaging-framework updates distributed to the metaverse at global scale.

Fundamental common technology

Security and privacy are among the biggest issues. Since the metaverse has the digital twin as an integral part, it will have much richer data. The security and privacy in the metaverse cannot be solved by traditional security tools. AR/VR partners have built tools that handle security and privacy related to digital twins.

The metaverse is going to be important for all businesses, enterprises and consumers. Today, people and employees can only experience the internet when they log on, but with new connectivity, new devices and new technologies powered by immersive mixed approaches, we'll be able to experience the internet—and work with it—in unprecedented ways. ■



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CYBER-ATTACKS HAVE BECOME COMMODITIZED BY RANSOMWARE-AS-A-SERVICE

(THIS IS ACTUALLY GOOD NEWS)

BY DANIEL TRIVELLATO, VICE PRESIDENT PRODUCT & ENGINEERING WITH FORESCOUT TECHNOLOGIES INC.

Operational technology (OT) has a mark on its back. Industry trends suggest that 2023 will be a year of increased risk and exposure for OT. Digital transformation has widened the attack surface, while ransomware attacks, hackers and nation-state attacks have increasingly turned their attention toward OT environments...and there are a plethora of vulnerabilities in OT devices for attackers to exploit.

Moving into the new year, cybersecurity teams need to be aware of these trends, so that they can best mitigate the risk of attack.

Critical-infrastructure protection has been top of mind since a ransomware attack on Colonial Pipeline led to gas shortages, panic-buying and price spikes in some US states. However, OT cybersecurity extends beyond just the

critical-infrastructure sectors—every industry has vulnerabilities, including building automation systems that power up businesses' server rooms and control lighting, ventilation and access to offices and sometimes homes. Let's consider some other examples...

#1: INCREASED ATTACK SURFACE — CONNECTIVITY IS KEY

Digital-transformation trends, such as increased remote connectivity and the proliferation of IoT devices, have introduced a variety of new access points for attackers to enter and move around the network. These new devices blur lines between historically well-defined perimeter networks and increase the attack surface of organizations.

OT devices typically rely on outdated operating systems and firmware versions with vulnerabilities that are rarely (if ever) patched—either because of their age or because of the difficulty of doing so. OT and IoT devices are rarely built or configured with security as a priority (e.g., insecure protocols, default username/password), opening them up to easy exploitation. Supply-chain vulnerabilities, such as Log4J, compound this with third-party risk.

#2: CYBERATTACKS FLOW TO OT ENVIRONMENTS

There is a long history of cyberattacks targeting OT environments, originating with Stuxnet and building in frequency with Industroyer, Triton and Industroyer2. The Colonial Pipeline ransomware attack resulted in the voluntary shutdown of the company's OT environment in order to isolate the attack. Ever since then, cyberattacks have been targeting OT environments with unprecedented sophistication for espionage, disruption and financial gain—sometimes all of the above.

Some of these cyberattacks are carried out by state-sponsored actors, such as Sandworm (Unit 74455 of Russia's GRU), specifically targeting OT environments in the electric-power sector of their adversaries—oftentimes Ukraine, in the case of Sandworm. Other state-sponsored actors have started leveraging vulnerable IoT devices to gain initial access into OT environments. This is the case of TAG-38, a Chinese actor potentially linked to RedEcho, which exploited IP cameras in seven Indian State Load Dispatch Centers that control electricity-dispatch in specific states. State-sponsored attacks will continue into 2023 with a new arsenal of tools, such as OT/ICS-specific malware.

In the past months, hacktivist groups such as GhostSec (an anti-ISIS group) and One Fist (a pro-Ukraine group) have emerged amid international geo-political strife and started targeting critical-infrastructure organizations, in many cases exploiting OT protocols and exposed IoT devices.

Besides the state-sponsored and hacktivist incidents mentioned so far, OT attacks are now also part of ransomware campaigns in different forms. For instance, some attacks pivot from the IT to the OT networks and encrypt SCADA systems, others focus on exfiltrating sensitive OT data, and others cut remote monitoring or access to distributed physical locations. A well-known example of data exfiltration is ClOp's attack on UK's South Staffordshire Water, where the attackers exfiltrated credentials, networking details and SCADA screenshots from the victim.

The stage is set for an explosion of attacks using OT/IoT devices—either as the initial attack vector or the ultimate target—because organizations have increased connectivity to their IT network while simultaneously struggling with the complexities of OT-security management. OT environments have plenty of easy-to-exploit targets.

#3: OT VULNERABILITIES RIPE FOR THE PICKING

Vulnerabilities in OT and IoT devices, their firmware, operating systems and software libraries further illustrate how the complexity of OT environments makes them so difficult to secure. Newly discovered vulnerabilities cause ripples throughout the supply chain.

For example, Project Memoria collected more than 100 vulnerabilities in the TCP/IP stack over 18 months, affecting more than 250,000 devices. The TCP/IP stack is the foundation for internet communication, yet these vulnerabilities enabled remote-code execution, denial of service, and so forth.

Furthermore, OT:ICEFALL illustrates how insecure-by-design practices (e.g., weak encryption/authentication) can propagate OT vulnerabilities, even in the presence of so-called “secure by design” standards.

RESOLVE TO MITIGATE OT SECURITY RISKS

We have entered a new era where cyberattacks on OT environments will continue to increase, but it is not all doom and gloom. Cyberattacks are not fully automated and take days to reach their goals, giving security teams time to respond. Furthermore, many cyberattacks have become commoditized by ransomware-as-a-service (or the like), which means hundreds of similar attacks are occurring; this is actually beneficial for security researchers because it means that most tools, techniques and procedures (TTPs) are well-known and documented.

This is not to say that cybersecurity teams can take it easy. The trends we've illustrated of increasing complexity, increasing attacks and widespread vulnerabilities require organizations to prioritize their OT security with visibility, compliance and segmentation.

- Visibility is the first step for making sense of the complexity of OT environments. You can't prevent a risk you don't see and you can't stop a threat that you can't detect. Visibility must extend beyond devices to network communications, where controls can detect anomalous behavior.
- Next, compliance establishes what should or should not be trusted in the network, making it possible to plan mitigating controls for devices that do not meet compliance requirements.
- Finally, network segmentation enables the enforcement of security and compliance policies by limiting the network communication of devices.

Organizations need to be aware of the growing risk of cyberattacks on OT environments so that they can better manage their complexities. Network-monitoring solutions are useful for both establishing all of these practices, as well as monitoring for potentially malicious behavior and threats. ■

Far beyond compliance—how to develop a robust cybersecurity stance

BY WILLI NELSON, FIELD CISO FOR OT, FORTINET

THE LEGACY INFRASTRUCTURE PROBLEM

Much like other OT industries, the oil-and-gas sector is struggling with legacy technology.

OT systems frequently use older operating systems, making it more challenging to secure them using conventional endpoint security solutions.

Thus far, many organizations have attempted to cover new risk exposures by introducing a wide range of point-security products. Yet, this strategy adds complexity and creates chinks in the security armor. In our recent poll, 60% of participants said that their biggest problem in safeguarding OT technologies and processes was the technical integration of outdated OT technology with newer IT systems.

Convergence is the other key factor here. Infrastructures for an increasing number of organizations' OT and IT are converging. The security of industrial-control system (ICS) assets is now acknowledged by businesses as being essential to their operations. The top priority, in fact, for ICS organizations is assuring the dependability and accessibility of control systems.

So how the TSA's new pipeline-security guidelines will impact the industry?

After the May 2021 ransomware attack against a major pipeline, the TSA issued several security directives requiring owners and operators of pipelines to implement numerous urgent cybersecurity measures.

The latest version of these directives require that TSA-specified oil-and-gas operators prevent disruption and degradation to their infrastructure to maintain strong cybersecurity. Pipeline owners and operators must:

- Create and implement a cybersecurity-implementation plan that has been approved by the TSA and outlines the exact cybersecurity measures being used to meet the security objectives outlined in the directive.
- Create and maintain a cybersecurity incident-response plan that details the actions pipeline owners and operators will take if a cybersecurity incident results in operational disruption or severe business degradation.
- Create a cybersecurity-assessment program to test in advance and routinely audit the efficacy of cybersecurity safeguards, as well as to find and fix vulnerabilities in hardware, software and networks.

BEST PRACTICES FOR LEADERS

OT leaders should implement two strategies that will help them not only meet but exceed TSA directives. One is zero-trust access (ZTA). Now that the OT air gap is essentially gone, leaders can set up ZTA to prevent access to any user, device or application without proper credentials. By doing so, organizations can mitigate threats both inside and outside the network, thereby preventing data breaches.

Applying a consistent "never trust, always verify" policy to each wired and wireless network node is the first step in ZTA. In a complicated environment, this is not always easy to execute, but applying well-known best practices can greatly advance the strategy. By giving individuals and devices only the access they need, the principle of least privilege can be used to reduce threats in both internal and external network communications.

Microsegmentation is a second important strategy. Network segmentation enhances security by blocking breaches from propagating throughout a network and entering vulnerable devices. But given the possibility of unintentionally affecting a manufacturing process during the segmentation process, it might be particularly challenging in an OT context. With the appropriate procedures and tools, you can segment your network and further divides it into microsegments.

Security architects can further segment an environment with microsegmentation to provide a lateral view of all assets. Granularity is attained by logically segmenting the network environment into unique security areas all the way down to the level of a single task. Microsegmentation provides improved attack resistance and, in the event of a breach, restricts a hacker's ability to migrate between compromised apps because restrictions are applied to particular workloads.

THE TIME TO ACT IS NOW

It's critical for oil-and-gas companies to comply with all security requirements put forth by their governing bodies. But organizations can go beyond mere compliance and into a robust cybersecurity stance by following today's best practices. This includes implementing zero-trust access and microsegmentation across your network. These actions will help safeguard the critical sector to which you belong.

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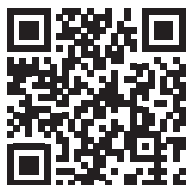
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CASE STUDY: ICE-CREAM MAKER LICKS SUPPLY CHAIN ISSUES

GRAPH-DATABASE TECHNOLOGY MEETS CHOCOLATE CHIP
BY HARRY POWELL, HEAD OF INDUSTRY SOLUTIONS AT TIGERGRAPH

How loudly do we all scream for ice cream? The average American eats four gallons of it each year, according to the US Census Bureau. In all, ice-cream makers in the United States churn out more than 1.3 billion gallons a year.

While enjoying their double-scoop cone or sundae with sprinkles on a warm summer day, hardly anyone thinks about the behind-the-scenes processes and supply chain that went into producing them. But that effort is multi-layered and complex, and, for one of the world's largest ice-cream producers, it had become anything but a treat.

To understand why, one must understand a little about vanilla. You may know that vanilla is often ranked as the world's most popular flavor. You may not know that vanilla is the second most expensive spice, costing more than \$600 per kilogram (about 2.2 pounds).



LIKE ICE CREAM, THE USEFULNESS OF CONSTANTLY CHANGING DATA CAN MELT QUICKLY.



The orchids from which commercial vanilla flavoring is derived grow in only a few corners of the globe. Madagascar produces 75%, with the rest coming from Papua New Guinea, India, and Uganda.

The ice-cream producer sources vanilla for its factories around the world from many suppliers in various countries, at different times of the year, sometimes buying through middlemen, sometimes direct. Prices tend to vary widely, not just for the vanilla but also for packaging and transport. Quality also can differ, requiring the company to constantly stay on top of who has the best product at a given time.

So, while a certain brand's vanilla may seem to the customer like, well, just vanilla, it may be made using a variety of sourced ingredients and formulas.

Trying to manage all this disparate data in its vanilla supply chain was giving the ice-cream maker indigestion. While all of the data was stored in a data lake, each country and business function had its own siloed data sets and schemas. That lack of coordination hampered the company from connecting the data to compare across regions and functions. Instead, it had to collect data abstracts from the multiple data systems of record and then combine them into a single big table using a complex, inflexible, and error-prone process.

The resulting table was huge, difficult to use, and hard for team members to interpret. The entire operation also was too slow—like ice cream, the usefulness of constantly changing data can melt quickly.

By putting a set of blinders on the ice-cream producer's attempts to get a handle on its vanilla purchasing across regions, these technological hurdles also were a competitive disadvantage, because even a 1% saving in the cost of buying vanilla can shave tens of millions of dollars from the company's costs.

Then the company decided to change its data-management recipe. It added graph technology, which enables

the merging of data silos—like the ice-cream maker had—into one enterprise-wide data set. With that connected view, the company could apply graph analytics, which enables complex inquiries in near real time to gain new understandings of the many dependencies in the supply chain.

With this approach, the company could ask questions like: Is there an alternative source of vanilla that has similar characteristics but costs less? How can we mix vanilla from different sources to get a consistent ingredient? Are we being charged different prices in different regions by the same supplier? How will sales be affected if one supplier is unavailable?

The ice-cream producer's experience vividly demonstrates graph technology's ability to connect meaningful data from a relationship perspective, at scale and with speed, and unlock critical insights about how people or entities interact with a business.

Because graphs are purpose-built for storing and processing connections, they inherently establish the relationships within data. All an organization needs to do is visualize and navigate through a graph to analyze previously hidden relationships and tackle sophisticated problems with nuance. Graph technology supports both transactions and analytics, so companies can bring massive processing power into the database.

Instead of hunting for facts in sprawling databases, the ice-cream producer can now explore data's natural shape and see the relationships that are revealed when many data points within databases are simultaneously connected to multiple other data points and analyzed in a more holistic manner.

The ice-cream producer isn't alone in its embrace of graph. According to Gartner research, graph technologies are used in 80% of data and analytics innovations, up from 10% in 2021. Judging by the ice-cream maker's account, the results of doing so are pretty sweet. ▣



SMART FACTORY VS. SMART MANUFACTURING

DO YOU KNOW THE DIFFERENCE?

BY ERIC WHITLEY, L2L DIRECTOR OF SMART MANUFACTURING

Smart manufacturing and the smart factory are both associated with Industry 4.0, but they are not the same thing. Many people are still misguided by these terms because some countries are still struggling to clearly define the concepts of the Fourth Industrial Revolution.

Before delving deeper into how smart manufacturing differs from the smart factory, first consider the definitions of manufacturing and factory separately. Remember that manufacturing is a process, whereas a factory is a facility in which manufacturing actually happens. Incorporating the smart or intelligent approach to these terms provides a deeper meaning.

Let's decipher the difference between smart manufacturing and the smart factory by understanding their concepts, principles, goals, relationships, and impacts on each other.

WHAT IS SMART MANUFACTURING?

The Fourth Industrial Revolution is more than a decade old, but we have yet to see a universally accepted definition of smart manufacturing.

In 2019, the International Organization for Standardization (ISO) created its definition of smart manufacturing and later referred to the Fourth Industrial Revolution as smart manufacturing. According to ISO, smart manufacturing is "manufacturing that improves its performance aspects with integrated and intelligent use of processes and resources in 'cyber,' 'physical,' and 'human' spheres to create and deliver products and services, which also collaborate with other domains within enterprise value chains."

ISO also introduced the terms "enablers" and "enhancers" as the side-effects of smart manufacturing. The "enablers" refer to disruptive technologies that led to smart manu-

facturing, while the "enablers" are the design principles to make smart manufacturing successful.

WHAT IS A SMART FACTORY?

Adopting the principles of smart manufacturing in a manufacturing facility can make a factory smart. A smart factory maximizes the applications of smart manufacturing "enablers" to improve the existing, traditional processes.

Since data in a smart factory is mostly digital, factories are increasingly going paperless. A smart factory operates in a way that makes the required data accessible in real-time, without physically going to specific factory departments, machines, or workers—everything is automated and inter-connected. A smart factory also uses smart manufacturing software to analyze data for process improvements.

THE RECIPROCAL RELATIONSHIP BETWEEN SMART MANUFACTURING AND SMART FACTORY

Smart manufacturing and the smart factory share the common goal of improvement by maximizing the use of advanced materials, processes and technology. However, that doesn't necessarily mean they're the same thing.

Smart manufacturing and the smart factory rely on each other to achieve this common goal. The smart factory takes full advantage of the principles and end-to-end solutions provided by smart manufacturing to reach its peak performance. Since fluctuations in consumer demands and market demands are inevitable, smart factories need to continuously drive improvement, efficiency and productivity to cope with these changes.

Smart manufacturing also takes advantage of these advancements and initiatives to unlock the true potential

of each technology and strategy. As smart manufacturing transforms traditional factories into smart factories, its implementation also drives the digital transformation of the manufacturing industry.

To understand this idea better, you need to be familiar with the way a smart factory operates—to see the role of smart manufacturing in its operation, but also how smart factories affect the smart-manufacturing process.

THE ROLES OF SMART MANUFACTURING IN THE OPERATION OF A SMART FACTORY

Let's examine the roles of smart-manufacturing technology and solutions in the manufacturing processes within a smart factory.

1. Smart manufacturing processes:

Automation and digital technology are already commonplace, even in traditional factories. Smart factories, however, have more advanced automation and implement more smart technology into their workflows.

Intelligent machines, instruments and equipment in manufacturing operations maximize the application of IIoT, artificial intelligence, wireless connectivity, and cloud computing. Using sensors and machine learning, these connected intelligent machines can exchange and analyze data. This, in turn, is great for problem detection and prediction, predictive maintenance, and quick adaptation to alternative manufacturing processes or changing conditions in the manufacturing operation.

Industrial and collaborative robots are some of the intelligent machines in a smart factory. They can move—with autonomous mobility—across a factory floor, making the manufacturing process more precise and efficient.

2. Smart manufacturing systems:

Almost all processes in smart factories are computer-controlled—this facilitates management and process monitoring. These processes use software and computer programs such as PLM, CMMS, ERP, CAFM, and EAM. These systems are often installed on intelligent machines and computers accessible to human workers, managers, and other related stakeholders in the smart factory, such as suppliers, subcontractors, and customers.

The manufacturing systems empowered by big data, data analytics, cybersecurity, and the IoT provide transparent, real-time data access and analysis, as well as optimized production systems. With the help of these innovative solutions, organizations can achieve immense efficiency gains and cost savings.

Smart factories are reaching their key goals—being connected, optimized, transparent, proactive, and agile—by

implementing smart-manufacturing technology, strategies and solutions.

IMPACTS OF THE SMART FACTORY ON SMART MANUFACTURING

Despite the obvious benefits of transforming into a smart factory, the global manufacturing industry has been slow to adopt advanced technology, according to the according to World Economic Forum, which lists just 132 enterprises among its Global Lighthouse Network, which are heralded as leaders in this Fourth Industrial Revolution space applying advanced technology from all over the world.

These numbers may be small for now: even at the start of 2023 we are still the early phase of transformation to smart factories. However, it is believed that the number will continue to rise. In fact, smart factories drive competitiveness in industry, and the technology from smart manufacturing continuously emerges in different industries.

As we consider the definition of smart manufacturing, let's explore some of the greater impactful elements of smart factories on the cyber, physical and human spheres of smart manufacturing:

1. Cyber spheres—according to a recent survey conducted by Capgemini, 80% of organizations agree that cybersecurity is a critical component of a smart factory. Security risks have led smart factories and organizations to improve their cybersecurity frameworks. The need for heightened cybersecurity in smart factories has also contributed to the growth of the cybersecurity industry. Cybersecurity may be smart manufacturing's weak point currently, but the challenge to improve will bring a positive effect on individual organizations and the global industry.
2. Physical spheres—the development of smart machines and smart materials is clearly one of the benefits smart factories will have on smart manufacturing in the physical realm. Not only does this approach simplify daily tasks, but it also lessens waste production and energy use, bolstering sustainability efforts.
3. Human spheres—some are still concerned that robots and machines will replace humans' jobs in smart factories. What they don't realize is that these factories are actually enriching jobs while creating new career opportunities.

The concepts of smart manufacturing and the smart factory have been used interchangeably in the last few years. These two terms are completely different, but they are both central to the manufacturing industry's need to adapt quickly in this era of rapid, digitally driven change. Understanding the key differences between the concepts will enable us to capitalize, smartly, on both. ■

It takes an ecosystem

Solution providers offer their unique perspectives on digital transformation

If there's one thing that advocates of this new age of digital transformation agree upon, it's that no one technology provider has all the elements that are needed to realize this emerging vision. And, just as no single company has the complete solution, each has ideas that—taken together—continue to advance the dialogue.

On the page that follows, a solution provider shares her views on the digital transformation of industry: the challenges, the opportunities, and where their particular expertise fits in. Read on to discover what these key technology providers have to offer, and how her ideas can help advance your own organization's vision. >>>

Why IT and OT are Trending Toward Closer Collaboration

**CHRISTINE SEDELNICK**

Junior Marketing
Specialist
HMS Industrial Networks

For more information:
Christine.sedelnick@hms-networks.com
www.hms-networks.com

While today we might know IT (information technology) as the software/hardware, networks, communications technologies, and systems in a business environment, the term was not coined until the late 1950s. Although email first emerged in the 1970s, it was the introduction of the internet and world wide web two decades later that spurred the creation of many IT-related technologies. The focus of the IT department was strictly on its own systems and networks; it did not touch anything on the factory floor or out in the field. This was in the OT (operational technology) realm. OT systems, which monitored and controlled industrial equipment and processes, were isolated from any external networks and did not need to communicate with other systems. These Industrial Control Systems (ICS) had no dependencies on IT infrastructure.

WHY ARE WE SEEING A CONVERGENCE OF IT AND OT?

As the Internet of Things (IoT) began to take off and businesses became more data driven, the distinction between IT and OT began to disappear. Consumers welcomed this digitization as it allowed for features such as smart doorbells and thermostats, while Industrial IoT (IIoT) saw a slower adoption due to the cost associated with this technology in industrial settings. Cloud-based applications helped bridge this gap, however, integrating sensors and connected systems into management facilities. As a result, IT and OT professionals found themselves tackling the same problem: accessing industrial data. To keep up with today's data-intensive environment and advance into Industry 4.0, organizations are converging IT and OT in order to meet demands.


HOW ARE WE SEEING CONVERGENCE?

There is a melding of processes and workflow between IT and OT departments in organizations. This entails reorganizing internal business practices to facilitate communication on IT and OT projects. Existing processes for handling and protecting IT data are expanded to encompass OT systems. Businesses are modifying front-end software and data to address OT needs. This requires a certain type of technical convergence to reconfigure network architecture. For instance, IT often implements new services or tools to gather OT data and then combines it with IT data for analysis. In order to accommodate the addition of IT capabilities, existing operational systems and devices are being updated with newer hardware. This operational convergence involves retrofitting or replacing machines to ensure they can communicate and control data. New systems or aftermarket add-ons may be needed to facilitate data communication/control.

BENEFITS OF IT/OT CONVERGENCE

IT/OT convergence offers decision-makers access to real-time operational data, quickening decisions. Downtime is minimized, production can be scaled, process control is simplified and supply chain problems can be foreseen. Companies can reduce costly maintenance and licensing fees while still controlling multiple systems. With the advancements in IIoT and the financial and operational benefits, it is no wonder the industrial sector is seeing increased collaboration between IT and OT.

FOR FURTHER LEARNING: SECURITY PERSPECTIVES—IT AND OT

In the IT mindset, security is focused on the protection of data and intellectual property. OT security measures are more concerned with safety, centered around protecting workers and machines from external dangers. To learn more about these security perspectives, download our whitepaper "Security for Industrial Devices" 

| | |
|----------------------|----------|
| AutomationDirect | 2, 13-16 |
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| HMS Networks | 3, 40 |
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| Moore Industries | 6 |
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WEBINAR

Tips To Increase Equipment Profitability With New Remote Support Tools

Speakers:

Brian d'Ingee, HMS Industrial Networks OEM Business Manager
Chris McNamara, Smart Industry Editor in Chief

April 18, 2 pm ET



How will this tuxedo look while I do The Worm?



“I had to try on my tuxedo in front of an analog mirror, like some kind of caveman.”

The breadth of topics that make up the concept of digitalization is astounding.

We recently ran a Smart Industry feature about using artificial intelligence to bargain shop for manufacturing supplies. Clipping coupons is going high-tech.

We have explored the tax ramifications of automation initiatives, smart controls for cow-milking carousels, and how COVID proved to be a boon for small-town airports.

We regularly run interesting features on educational programs for the modern manufacturing worker, particularly since so many industrial executives bemoan the loss of skilled labor. A few have admitted that their factory workers, once properly trained on cutting-edge technologies, abandon manufacturing altogether for roles at tech companies. *“Thanks for the training. I quit!”*

So what does this all mean?

Well, this trend—whether you call it Industry 4.0 or digital transformation or digitalization or whatever—is multifaceted. It contains multitudes, to paraphrase Walt Whitman completely out of context. And this digitally driven trend constantly evolves, deepens, snowballs in complexity just as its solutions and tools become simpler and more mainstreamed.

Heck...calling it a trend is probably dismissive.

Personally, I love the diversity of ideas in this space. It keeps my work interesting. I marvel at the novel applications and digital solutions that emerge on a daily basis—these disparate solutions and the process optimizations they create spotlight the benefits of Industry 4.0 and are cause for optimism about the future of industry. This is a deep pool and more swimmers dive in every day.

That said, I regularly receive pitches for story ideas that exist outside of our wide area of focus. Just today I was pitched an article about how China’s aggression in Taiwan might affect infrastructure security here in the US. Interesting, for sure, but not the right fit.

Another publicist’s pitch was for a story about how Men’s Wearhouse is partnering with a company called Snap’s Magic Mirror to provide shoppers with an interactive and innovative formal-wear-browsing experience featuring something called Try-on Technology. “Powered by industry-leading AR Image technology, the apparel try-on solution repurposes existing product photography to render a try-on experience that visually moves on the customer to give them the feeling that the experience is realistic and personalized.”

First: I love the phrase “apparel try-on solution.” Kudos to the marketing rep who came up with that doozy.

Second: I respect that the “try-on experience” enables the virtual clothes to virtually move with the potential wearer, simulating how that baby-blue tuxedo will look while the prom-goer performs The Worm across the dancefloor in the high-school gymnasium.

Digital transformation has come of age, it seems.

I passed on both of these pitches—the China aggression piece is too speculative and the AR tuxedo piece is too silly. But story ideas like this highlight how vast and varied the concept of digitalization really is, particularly in this current era of transformation.

Back when I was prepping for my prom in the early 90s, Taiwan sovereignty wasn’t making headlines; I had to try on my tuxedo in front of an analog mirror, like some kind of caveman; and had you asked me what digitalization meant, I’d have thought it was some new break-dance move I’d be seeing at the dance that night.

A handwritten signature in cursive script.

CHRIS MCNAMARA, EDITOR IN CHIEF

cmcnamara@endeavorb2b.com



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