



## WORLD MANUFACTURING FORUM 2017

The fifth edition of the World Manufacturing Forum (WMF) was held on November 7-9, 2017 in Monterrey, Mexico. The program, which focused on progressing the digital market and advancing connected manufacturing ecosystems, attracted over 500 attendees and 45 high level speakers. The forum featured tours of local factories and R&D centers along with comprehensive discussions on topics including industrial policies for digital and interconnected manufacturing markets, connected factories and value chains, digital workforces, the value of future manufacturing jobs, energy and resource efficient manufacturing, new business models, service engineering, and technology trends for future factories.

The forum provided an ideal opportunity for international thought leaders to productively discuss the manufacturing paradigm of the near future. To find out more about the WMF, please visit our website.

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## U.S. ASSUMES IMS CHAIRMANSHIP

The United States assumed the IMS chairmanship on December 1, 2017. Jack Harris was introduced as the incoming chairman of IMS in November at the 2017 WMF. The focus of the U.S. chairmanship will be SME manufacturing growth and sustainability through Industry 4.0 and the launched manufacturing innovation program, ManuVation 4.0. The new IMS approach will be based on working with local and regional economic development groups and federal governments to spur further collaboration and results. In his role as chairman, Mr. Harris will also become part of the steering body for the newly created, Italian-based WMF Foundation.

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## INDUSTRY 4.0 WORKSHOPS

IMS hosted a series of Industry 4.0 workshops on the subtopics of simulation, IoT, analytics, and skills & education at the WMF. The workshops explored the drivers of Industry 4.0 as well as obstacles and barriers in technology and manufacturing practices.

Participants in the simulation breakout session crafted a vision of opportunities that outlined the benefits of simulation including: decreasing cost and time-to-market, reductions to shop-floor waste, creations of digital thread and applying digital twin processes, supply chain improvement, better processing power, and greater utilization of big data.

In order to execute these visions and opportunities for strategic growth, drivers that foster the use of simulation were identified. These drivers included the need to replicate more complex processes, value engineering, technology such as 5G and ubiquitous computing, low capital expenditure, customization, smart production, and carefully crafted government policies and strategy. While barriers such as lack of user knowledge, missing standards, and immature technology exist, the future of simulation is promising and encourages further R&D efforts.

Other breakout sessions in IoT, analytics, and skills & education also assessed opportunities, barriers, and drivers in each respective category. The workshops produced the following project ideas that IMS will be working to implement throughout 2018:

1. *Ceramic Composite Simulations*  
This project cluster would aim to simulate the effect of a kiln upon sintering different ceramics compositions and the behavior of different advanced ceramic composites under high temperature and erosion conditions.
2. *Simulation Training "Cook Book"*  
This project would aim to create a guide of processes, methods, and tools to implement simulations in a factory with change management and lessons learned. Elements such as problem identification, experimental progress, parametric modeling, automatic set-up and comparison, and problem-solving will be included in the guide.
3. *Simulation Modeling and Standardization*  
Goals would include creating an ontology-based simulation modeling system while crafting simulation standardization for shared validation data and shared best practices. This project would also work to produce a manufacturing processes simulation toolbox that would cover conventional processes.
4. *Open Source Solutions*  
This initiative would create open source solutions for factory layouts, overall simulation, integration with models, and would incorporate digital twin processes and VR technologies. It would also incorporate the design of an ergonomic motor to work evaluation, standardization, and best practices of user interfaces. It would allow for interactive, real-time simulations with VR and AR, a collaborative and remote working environment for simulation, and an augmented operator, supported by simulation.
5. *Standard Hardware Profile*  
This initiative would aim to identify modular platform components that allow easy implementation of IoT Devices.
6. *Define Open Connectivity Software Platforms*  
This project would help to identify compatible brands, protocols, and standards that support easy implementation of IoT devices.
7. *"Anomalytics"*  
Goals would include gathering product analytics and big data in manufacturing in order to detect anomalies.
8. *Digital Value Stream Demonstration*  
This project would perform specific technology demonstrations to show impacts on value streams.
9. *Try Before You Buy*  
This initiative would aim to give free or discounted trials of sensor integration equipment.
10. *Industry 4.0 Training*  
Goals will include defining key elements of curriculum, identifying training partners, and launching classes.
11. *Industry 4.0 Certification Program*  
This program would identify suitable certification partner(s) and participate in setting guidelines.
12. *IIoT Sensing Solutions*  
This project would provide a state-of-the-art review and benchmark of sensors available in the market with industrial-grade.

13. *Industrial Analytics Framework*

Goals would include developing an industrial analytics framework for factories to help support the development of information, analytics and decision processes capabilities.

14. *Enterprise Operating System*

Project would develop an Enterprise Operating System (EOS) based on the concept of industrial data space, where data can be shared between organizations at different levels of aggregation to enable analysis of economies of scale and scope.

15. *Intelligent Maintenance*

This initiative would provide demonstrations of the benefits of big data analytics in an industrial context.

16. *Big Data Analytics Education and Training*

This project would form awareness of certification programs for different big data analytics, concepts, methods, and techniques.

17. *Selling the Job*

This initiative would seek to boost the visibility of manufacturing positions, and to highlight the attractiveness of those positions. Efforts would focus on creating awareness of existing manufacturing jobs, encouraging curiosity regarding manufactured products, facilitating factory tours for students, and establishing a shadowing and mentorship program for students.

If you have an interest in IMS's Industry 4.0 projects, please reach out to Dan Nagy (dnagy@ims.org). More information on the simulation breakout session is available here.

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## QUAD CITIES INITIATIVE

On October 26, 2017, IMS held an Industry 4.0 workshop at Rock Island Army Arsenal. The workshop began with a comprehensive session to help small and medium manufacturers (SMEs):

- Share knowledge and best practices with peers
- Identify common priority problems they are facing
- Hear about key barriers and opportunities addressing their problems
- Leverage technology and R&D results
- Identify gaps in technology maturity that can be addressed in a pre-competitive fashion with peers – strengthening the industry in the region and throughout the country
- Learn about the key benefits of using solutions in specific targeted technology areas of data analytics & the industrial internet of things; additive manufacturing; advanced robotics
- Identify synergies and potential collaborations with other manufacturers who share the same perspective, to maximize mutual benefits

Later in the day, two breakout sessions were held on the topics of additive manufacturing and robotics and automation. Within both sessions, IMS coaches identified three key priorities for SMEs which produced new project ideas.

Skills development proved to be a top issue for participants. Specific issues included:

- How to acquire the skills (both train current workers and attract new workers with expertise)
- How to apply the skills to your products
- How to keep skilled workers
- Not all skills needed by companies taught in area high schools
- A need to ID where the skills are taught & where gaps still exist

The discussion produced the following project idea:

Work with local high schools to implement vocational training and enticing them with tech. Sponsors with manufacturers of machines, tool software, get donations. Create vocational program and give students basics of manufacturing with calibration and tools. Talk with counselors to set career paths, get info in front of parents.

Further, the participants indicated a desire to learn more about the potential of “big data analytics,” primarily in an exploratory fashion rather than any one specific application. The project idea produced was:

Capture data for energy monitoring (audit, ID product requirements, analyze data. Machine learning/AI can teach/fix itself – use for data forecasting that learns over time to apply to equipment failure.)

Finally, the participants felt they should team up and approach some of the large vendors as a group, and thereby secure favorable terms for trying out some of the more expensive support systems available. The project description was:

Work to get SMEs exposed to and acclimated to using an ERP system. Form a alliance/consortium to get a software provider interested in providing 5-6 companies under one license. Siloed data, full use of ERP. Value proposition for software company is an increase in sales, proving ROI for individual licenses. Coordination with academia will also be needed.

Each of the project teams identified a leader, who will serve as the primary point of contact as IMS and the Quad Cities Chamber of Commerce take the next steps to help these projects ideas evolve into productive and successful activities.

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## IMS IN THE NEWS

The World Manufacturing Forum and Dan Nagy of IMS were featured in the Ideólogos de la Manufactura (Ideologists of Manufacturing) December Newsletter which featured the top men and women helping to create a new global manufacturing order. An English translation of the excerpt is below:

“They are the minds behind digitization and industry 4.0. These women and men are creating a new global manufacturing order, which is based on the internet of things, the communication between machines, intelligent data analysis, and research and development. Their contributions in the development of innovations for manufacturing are transforming production systems throughout the world.

Just in November Monterrey, Nuevo Leon, held the fifth edition of the World Manufacturing Forum, whose main theme was the evolution towards the digital market and connected manufacturing ecosystems to discuss industrial and digital policies and trends in the era of the fourth industrial revolution. Here are their profiles and some of their ideas (the order of appearance does not matter).

‘The policy of a country establishes the bases for the future of the manufacture of that region.’ - Dan Nagy

Dan Nagy is responsible for overseeing strategies, marketing, finance, project portfolio and dissemination activities in the IMS, a program founded to develop the new generation of processing and manufacturing technologies through multilateral collaboration, in addition to participating in the planning and election of programs and speakers for IMS manufacturing research workshops, the global manufacturing forum and other international events”.

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## UPCOMING EVENTS

### Industry 4.0 Cluster Match Making USA – EU

February 25- March 3: Delegation Visit to the US

Participants will tour and share best practices on visits to smart manufacturing and IoT clusters plus local companies in the greater Cleveland, Ohio region, the Automation Alley Initiative in Michigan, and workshops at the University of Illinois, Chicago and other Chicago company visits.

May 14-18: Delegation Visit to Europe

Participants will tour and share best practices on visits to the Virtual Dimension Center in Stuttgart, Microtec Südwest in Freiburg, and Automatisierungsregion Rhein Main Neckar e.V. and its members and labs.

For more information please contact:  
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## World Manufacturing Forum 2018

The 2018 WMF will take place September 27-28 in Villa Erba, Cernobbio, Italy. More information will be available soon on our website.

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## MANUFACTURING NEWS

### U.S. Chamber President: Double Down on Growth in 2018

(U.S. Chamber Press Release: 1-10-18) U.S. Chamber President and CEO Thomas J. Donohue, in his annual “State of American Business” address today, reflected on 2017 as a breakthrough year for economic growth as he outlined a forward-looking policy agenda to build on gains and put America on a path toward meaningful, long-term prosperity. Donohue used the speech to urge lawmakers in Washington, D.C., to focus their efforts on advancing policies that will strengthen, sustain, and share growth – and he warned against policies that would undermine those goals. “Today, the economic winds are at our backs,” said Donohue. “There is so much we can do this year to make America more prosperous and hopeful – and this time, for everyone.” Recent successes on tax reform and regulatory relief have helped usher in a “new era of growth,” Donohue said. To strengthen and sustain that growth, Donohue called for immediate action to modernize the nation’s infrastructure, and he made the case for corporate governance reforms to lift impediments currently dissuading businesses from going public and staying public.

### UK Manufacturing Output at its Highest for 10 Years

(BBC – Staff: 1-10-18) UK manufacturing output is expanding at its fastest rate since early 2008 after recording a seventh consecutive month of growth in November. Renewable energy projects, boats, aeroplanes and cars for export helped make output 3.9% higher in the three months to November than in 2016. Official figures also show industrial output rose by 0.4% in November. Construction output in the three months to November fell by 2%, compared with the previous three months. That was the industry’s biggest quarterly fall since August 2012, with the only bright spot for the sector being a 1.2% increase in new housing. For the month of November, total production was estimated to have increased by 0.4% compared with the previous month, with the biggest contribution coming from energy supply. This increased by 3.2%, mainly because the temperature was warmer than average in October, but colder than average in November. Economic growth had slowed in the first nine months of 2017 with higher inflation caused by the fall in sterling after the Brexit referendum, although the UK economy did grow by 0.4% in the three months to September. While the manufacturing figures are good, it is important to note that the sector only makes up roughly 10% of the economy.

### ‘It Can’t Be True.’ Inside the Semiconductor Industry’s Meltdown

(Bloomberg -- Ian King, Jeremy Kahn, Alex Webb and Giles Turner: 1-8-18) Former Intel Corp. engineer Thomas Prescher was enjoying beers and burgers with friends in Dresden, Germany, in late November when the conversation turned, ominously, to semiconductors. Months earlier, cybersecurity researcher Anders Fogh had posted a blog suggesting a possible way to hack into chips powering most of the world’s computers, and the friends spent part of the evening trying to make sense of it. The idea nagged at Prescher, so when he got home, he fired up his desktop computer and set about putting the theory into practice. At 2 a.m., a breakthrough: he’d strung together code that reinforced Fogh’s idea and suggested there was something seriously wrong.

“My immediate reaction was, ‘It can’t be true, it can’t be true,’” Prescher said. Last week, his worst fears were proved right when Intel, one of the world’s largest chipmakers, said all modern processors can be attacked by techniques dubbed Meltdown and Spectre, exposing crucial data, such as passwords and encryption keys. The biggest technology companies,

including Microsoft Corp., Apple Inc., Google and Amazon.com Inc. are rushing out fixes for PCs, smartphones and the servers that power the internet, and some have warned that their solutions may dent performance in some cases. Prescher was one of at least 10 researchers and engineers working around the globe – sometimes independently, sometimes together – who uncovered Meltdown and Spectre. Interviews with several of these experts reveal a chip industry that, while talking up efforts to secure computers, failed to spot that a common feature of their products had made machines so vulnerable.

“It makes you shudder,” said Paul Kocher, who helped find Spectre and started studying trade-offs between security and performance after leaving chip company Rambus Inc. last year. “The processor people were looking at performance and not looking at security.” All processor makers have tried to speed up the way chips crunch data and run programs by making them guess. Using speculative execution, the microprocessor fetches data it predicts it’s going to need next. Spectre fools the processor into running speculative operations – ones it wouldn’t normally perform – and then uses information about how long the hardware takes to retrieve the data to infer the details of that information.

Meltdown exposes data directly by undermining the way information in different applications is kept separate by what’s known as a kernel, the key software at the core of every computer. Researchers began writing about the potential for security weaknesses at the heart of central processing units, or CPUs, at least as early as 2005. Yuval Yarom, at the University of Adelaide in Australia, credited with helping discover Spectre last week, penned some of this early work. By 2013, other research papers showed that CPUs let unauthorized users see the layout of the kernel, a set of instructions that guide how computers perform key tasks like managing files and security and allocating resources. This vulnerability became known as a KASLR break and was the foundation for some of last week’s revelations.

### Digital Trends Manufacturers Should Watch for in 2018

(IW – Stephen Gold: 1-8-18) More than a half century after he postulated it. Today Gordon Moore’s Law is still highly relevant, and the consequences have dramatically revolutionized our world. Intel’s current CEO Brian Krzanich provided this mind-boggling evidence: if a 1971 VW Beetle were upgraded at the same speed as a computer chip from the same year, today it would have a maximum speed of 300,000 miles per hour and cost 4 cents. “We’re living in a time that I call a technology renaissance,” observes Michael Steep, executive director of the Stanford Engineering Center for Disruptive Technology and Digital Cities. “I have not seen the kind of development of technical advances crossing so many different areas of technology ever... These technologies are converging and creating exponential opportunities for both disruption and growth.” Here are four digital trends that will likely affect manufacturers this year: B2B manufacturers will embrace the Internet of Things ... The rise of “cobot” production ... Blockchain comes to manufacturing ... and Cybersecurity risks increase.

### Is the U.S. at peak of industrial production?

(Supply Chain Management Review – Bob Trebilcock: 1-2-18) Back in 2012, I read an article in the New York Times that stopped me in my tracks. We were still in the midst of the jobless recovery, yet, the Times noted that “... the economy now produces as many goods and services – more, in fact – than it did before the downturn officially began in December 2007. But it does so with almost five million fewer jobs.” At the time, I called Hal Vandiver, president of F. Hal Vandiver & Associates, who put the statement in the context of the materials handling industry for a column I was writing. “If you look at why manufacturing companies are making money today, it’s because they have found more productive ways to deliver the same or more output,” Vandiver said. “That’s what our industry is all about.” It struck me then, as it continues to do today, that automation did very well during the downturn, as companies made investments in equipment rather than employees, and is likely to do so in the future, especially if tax breaks create incentives to invest in equipment.

## MANUFACTURING NEWS *continued*

### Will Millennials Change Manufacturing?

(IW – Steve Minter: 12-28-17) Dark, dirty and dangerous -- mention the 3Ds of old-time manufacturing and HR managers shudder. It's exactly the image they don't want the public -- or millennials considering careers in manufacturing -- to have of the industry. They want to be able to talk about an industry that is attractive and safe, innovative, even cool. So it must gladden the hearts of Lockheed Martin recruiters when Emilee Bianco talks about being "excited" to work at Lockheed Martin Space System's facility in Sunnyvale, Calif. Bianco, 25, has been working on building solar arrays to power satellites. As a manufacturing engineer, Bianco takes design specifications, puts them into work instructions and then works to ensure that satellite hardware is built correctly. Though she has been working just over a year for Lockheed Martin, she has already been part of a transition to a new type of solar array that uses thin, flexible sheets in place of rigid panels. The flexible arrays produce 50% more power but with 30% less mass.

### Top 10 Predictions for Global Manufacturing in 2018: IDC

(IW – Staff: 12-19-17) IDC recently released a report, "IDC FutureScape: Worldwide Manufacturing Predictions 2018," surveying the global manufacturing landscape. When creating its predictions, the firm examined ecosystems and experiences, greater intelligence in operational assets and processes, data capitalization, the convergence of information technology and operations. Most of the predictions refer to a continuum of change and digital transformation within the wider ecosystem of manufacturing and the global economy. "Manufacturers of every size and shape are changing rapidly because of new digital technologies, new competitors, new ecosystems, and

new ways of doing business. ... Manufacturers that can speed their adoption of digital capabilities to create business value will be the leaders of their industry," said Kimberly Knickle, research VP, IDC Manufacturing Insights." Technologies that will have the greatest impact include cloud, mobile, big data and analytics, and internet of things. Manufacturers also have high expectations for the business value of technologies that are in earlier stages of adoption such as robotics, cognitive computing/artificial intelligence, 3D printing, augmented reality/virtual reality, and even blockchain.

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## MANUFACTURING FACT OF THE MONTH

***For every \$1.00 spent in manufacturing, another \$1.89 is added to the U.S. economy.***

That is the highest multiplier effect of any economic sector in the United States. Also, for every one worker in manufacturing, there are another four employees hired elsewhere. (Source: National Association of Manufacturers)

There is also new research from the Manufacturers Alliance for Productivity and Innovation (MAPI) that suggests the economic impacts of manufacturing are even larger when we take into consideration the entire manufacturing value chain plus other supply chains. The study estimates that the total multiplier effect for manufacturing is \$3.60 for every \$1.00 of domestic manufacturing value-added output. Using these calculations, it is also estimated that for each full-time job in manufacturing dedicated to producing value for final demand, there are 3.4 jobs necessary for workers in other industries. (Source: Manufacturers Alliance for Productivity and Innovation)

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*For more information on IMS and its services please contact...*

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