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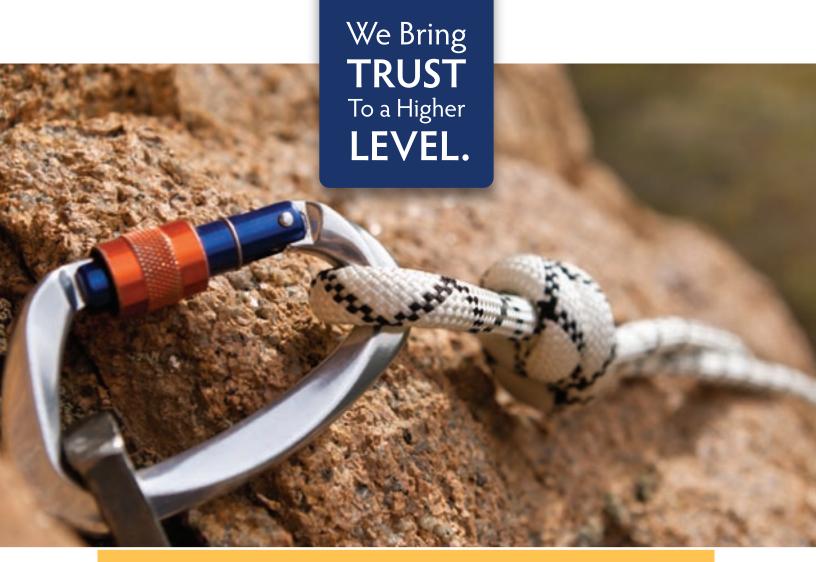
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For more than 80 years we have become recognized leaders in providing accounting, tax and business consulting services to the manufacturing industry. The developments in this area are significant, raising many questions for manufacturers regarding their future growth and development of their business and the financial viability of various corporate structures. At JGS, our approach is simple. We address insights, provide objectivity and offer financial advice to the manufacturing industry.

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Harold King

Executive Vice President

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### **DEAR READER**

# On Innovation

NNOVATION AND ADVANCED MANUFACTURING GO HAND IN HAND. In 2012, manufacturers accounted for two-thirds of all spending on Research and Development in the nation, driving more innovation than any other sector of the economy. In the Hudson Valley, our manufacturers have a rich tradition of innovation with Robert Fulton's steamship, Samuel Morse's telegraph, and IBM's mainframe being just a few of the better known historical examples. This tradition continues today in areas such as bio-tech, pharmaceuticals and software development.

Innovation, however, is much more than just new product development. In business, innovation is the process of translating an idea or invention into a good or service that creates value. In this sense innovation can take the form of improved customer service or a more effective marketing strategy; it can be a more efficient process or a better way to recruit the most talented people to your firm. Innovation is about ideas and ideas come from people – people with knowledge and experience. It can be fostered and encouraged with the right resources, environment and culture, but ultimately it comes from people.

In this issue of HV Mfg. we take a look at innovation. David King looks at the link between Science Fiction & Comics and product Innovation in "Sci-Fi to Reality." Our Leader Profile of Mechanical Rubber's Cedric Glasper notes his application of 'coopetition' to grow his business. The Company Profile is of Schatz Bearing Corporation, a firm that thrives through innovations to a product that is among the most common of all manufactured goods – the ball bearing. Dean Domenico and Ed Kowalski from Ethan Allen Personnel Group discuss the types of skills necessary to thrive in the innovation economy of the coming 21st century. Finally, Alex Silberman writes about the building blocks of a successful innovation system.

I hope you enjoy the issue and we welcome your comments. I would also like to extend my thanks to the many advertisers whose support is essential to the success of HV Mfg.

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# The Election is Over... Time to Get Ready for the Next Election.

Win some, lose some, that's the democratic process. It's incumbent on voters to make their voices heard and their votes count. The National Association of Manufacturers provides the tools to make an even better showing at the polls next time.

MANUFACTURING

OME EMPLOYERS may be reluctant to talk about politics, legislative issues or campaigns to their team members. You shouldn't be worried.

Polling has shown that employees like to hear from their employers about legislative issues that impact jobs and the company's bottom line. They appreciate hearing non-partisan and unbiased information about how to register to vote or request an absentee ballot. Polling also shows that such information is viewed as very credible. The Council of Industry has partnered with the National Association of Manufacturers (NAM) to make these efforts easier for you. Whether you want

(NAM) to make these efforts easier for you. Whether you want to launch a full, civic-minded Get Out the Vote (GOTV) campaign or pick and choose among election activities, the NAM's resources can make a world of difference in reaching your employees and increasing voter turnout. Here's an in-depth look at how you can use the NAM



Ned Monroe is Senior Vice President, External Relations, National Association of Manufacturers

Election Center resources to make the manufacturing vote count on Election Day.

## A One-Stop Shop

The NAM Election Center offers comprehensive resources to help you get out the vote, find your legislators and advance the manufacturing agenda. The resources are divided into three sections: one for Manufacturing Woters, one for Manufacturing Employers and even one for Manufacturing Candidates, the three primary audiences that the NAM hopes to motivate during this important election season.

#### **Resources for Voters**

The Manufacturing Voter page is designed with your workforce in mind. Here, employees and family members will find videos that can be shared with co-workers or social media networks. There is also information on the current members of Congress that includes their NAM voting records on key manufacturing issues. "What is a Manufacturing Voter?" will help your employees understand why it's important to vote and what their voices bring to the national debate.

Employees can also take advantage of a unique new voter registration platform. The NAM has partnered with TurboVote, a non-partisan web-based voter registration platform that simplifies the process to make it as easy as ordering a movie from Netflix! TurboVote asks users to answer a few basic questions and, at the end of the process, provides a completed voter registration form that they can print, drop into an envelope and mail in. What really sets TurboVote apart from similar technology is that already registered voters can sign up for Election Day reminders so that they never forget to go to the polls. You can link to TurboVote through the NAM Election Center or by visiting www.nam. turbovote.org.

Finally, the NAM has zip-code-searchable side-by-side Voter Guides available that show where candidates stand on crucial manufacturing issues. These Voter Guides can be custom-branded with your company's logo and are easily printed, making distribution to your employees simple.

## **Resources for Employers**

The Manufacturing Employer page is designed to make the work involved in operating GOTV activities as light as possible. The resources are easy to copy, paste and print for busy people—like you. Everything on the Manufacturing Employer page is open-source and can be used by your

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These days, in every election, there's too much at stake for manufacturers to sit on the sidelines.

company without attribution to the NAM.

On this portion of the Election Center website, you will find a digital how-to guide that is based on input and best practices from NAM member companies. Whether you are a GOTV novice or looking to grow an existing program, the how-to guide provides advice and ideas for building an effective, legally sound GOTV campaign.

The Manufacturing Employer section also houses resources and sample materials, including draft email and newsletter messages, sample postcard text, a customizable flyer and co-brandable posters for your use. Voting dates and deadlines are listed for easy reference so you can remind your employees when important voter registration and election dates are approaching. Finally, there is copy-and-paste code that puts an Election Center button on your internal website—and allows you to link directly to the Election Center home page.

#### **Resources for Candidates**

Another goal for the NAM is to support candidates, and ultimately officeholders, who understand the value our members bring to the economy and to their communities. If you host candidates in your facilities or have an opportunity to meet with them on the campaign trail, please direct them to the Manufacturing Candidate page. This is the destination for information, policy papers and data from the NAM that can help them learn about manufacturing issues and craft their messages to manufacturing voters in your area.

It does not take a major, coordinated effort to make a huge difference in the turnout of your employees at the polls. Take a few minutes during a staff meeting to talk about voting. Hang posters in your facilities. Hand out reminder flyers at shift change. Encourage voter registration among your employees. Invite local candidates to visit and meet with your workforce. The Council of Industry and the NAM are committed to making it easy for you to ensure your employees have the opportunity to vote for the candidate of their choice on Election Day.

For information about the NAM Election Center and GOTV activities, contact Leann Paradise, external relations manager, at lparadise@nam.org.





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# Skills for the 21st-Century Workplace

Technical skills are not enough to ensure success in the modern manufacturing workplace, a fast-paced environment where advanced technology is integrated with interpersonal connections.

LANNING FOR THE WORKFORCE of the future requires coming to grips with two major concerns. The first is the skilled-talent gap and how to close it.

The second concern involves identifying the core competencies that will be most needed to augment these skills and finding ways they can best be developed.

Let's look at the skills gap first. Two studies co-sponsored by the Manufacturing Institute—the Accenture "2014 Manufacturing Skills and Training Study" and Deloitte's, "The Skills Gap in U.S. Manufacturing" (both available at www. themanufacturinginstitute.org)—provide extensive data and insights regarding the situation.

According to these reports, the skills gap is severe. Of the manufacturers surveyed, 67% currently have an overall shortage of qualified workers and 56% expect this shortage to worsen over the next three to five years. The shortage is even greater in skilled production positions, such as machinists, operators, craft workers, technicians and industrial engineers. For these positions, 83% of manufacturers reported current shortages, with 69% expecting the shortage to get worse over the next three to five years. These skill shortages have impacted the ability of 77% of surveyed manufacturers to maintain production levels consistent with customer demand and, for

72% of respondents, have dampened new product development and innovation.

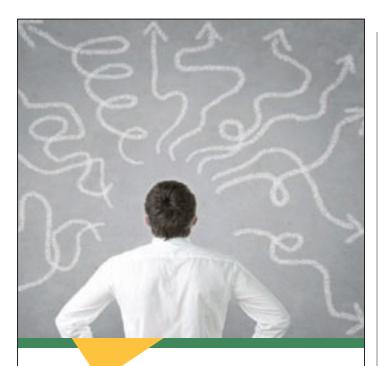
Manufacturers are using multiple strategies to overcome the skills gap. The most common involve providing internal training and development programs, ranging from informal job shadowing to structured apprenticeships. In some cases, the training employs digital learning from sources such as Tooling U and American Welding Online. Additionally,



formal training from community colleges, trade schools and certificate programs are often combined with internal training. Not coincidentally, Dutchess Community College graduated the first cohort of students from its Certified Production Technician program in August and will be starting a new cohort this month.

Other strategies include the use of overtime and of staffing agencies; enticing older workers to stay employed by scaling back hours; using knowledge-management solutions to capture critical information and

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The 21st-century worker must possess the basic employability skills of interpersonal communication, self-management and the ability to learn.

expanding the candidate pool to include trainable candidates with more general skills.

There are several root causes of the skills gap. One of the most significant is the outdated and incorrect public perception of the manufacturing sector. In a recent study by Deloitte Consulting, 80% of public respondents said that manufacturing jobs are the first to be offshored and only 43% believed that manufacturing jobs are as secure as jobs in other sectors.

Manufacturers can't solve the problem on their own. In order to clarify public perception, government agencies and educational institutions need to provide young people and their parents with positive messages regarding manufacturing. These messages might include such facts as: manufacturing employees' average compensation is 19% higher than that of workers in nonmanufacturing industries; 82% of US manufacturers plan to increase production in the next five years; and the fact that, since 2006, hours worked per week in manufacturing has increased while the economy as a whole has seen a decrease. Promoting these realities could serve as a starting point for creating more demand for manufacturing training and education.

# **Skills Plus Competencies**

Having technical skills, however, is not enough to ensure success in the 21st century manufacturing workplace, a fast-paced environment where advanced technology is integrated with interpersonal connections. Workers also need a set of core competencies, including proficiency in information-processing skills such as literacy, numeracy and, importantly, the ability to do problem-solving in technology-rich environments. These abilities have become crucial, mandated by the ubiquitous use of computers and dependence on information and communication technologies (ICTs) in the supply and utilization of services.

Finally, aside from having technical training and being adept at problem-solving and information-processing, the 21st-century worker must possess the basic employability skills of interpersonal communication, self-management and the ability to learn. Employers want workers with "evergreen" job skills that will continue to be useful in changing times.

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# Skills for career growth

f you want to find a job that will let you grow professionally, you'll want to make sure that you have skills that will help your company grow right along with you. These skills will make you a highly sought-after candidate in any field, and will help you to keep the job you get:

- I. Research skills: Nobody has all the information they'll ever need already in her head (or on her desk), but if you know how to do research, you'll always be able to find the information in a timely manner.
- 2. Logic and reason: Every company runs into problems, and those problems need to be solved. A firm grasp of logic and reason will make you an invaluable asset.
- 3. **Technological literacy:** Computers have taken over the workplace and every worker needs to have at least a basic level of skill and comfort with modern technology, just to be able to function.
- **4. Communication skills:** Every job will require you to communicate with other people, in speech and often in writing, as well. Employers are interested in workers who can express themselves clearly when dealing with supervisors, underlings and co-workers.
- 5. Organization: A messy desk may be acceptable (though it is never recommended), but a messy approach to your work is never something an employer is looking for. You'll probably have to do a lot of different tasks, each with a different schedule and deadline, and being able to organize your work is crucial.
- 6. Interpersonal skills: Every workplace has people in it, and those people are likely to have different personalities and temperaments. Being able to work well with others and communicate across barriers of culture and personality is a necessity.
- 7. Career-minded orientation: If you don't know where you're headed, neither does your company. Having a plan for your own career will make your employers more willing to help you achieve your goals since they will benefit from your growth.

These skills aren't the only ones that you'll need for your specific job, but they are skills that will make you an asset to any employer and serve you well in any position that you may find yourself in.

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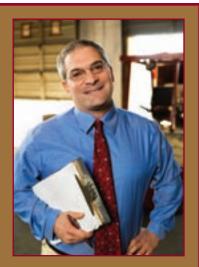


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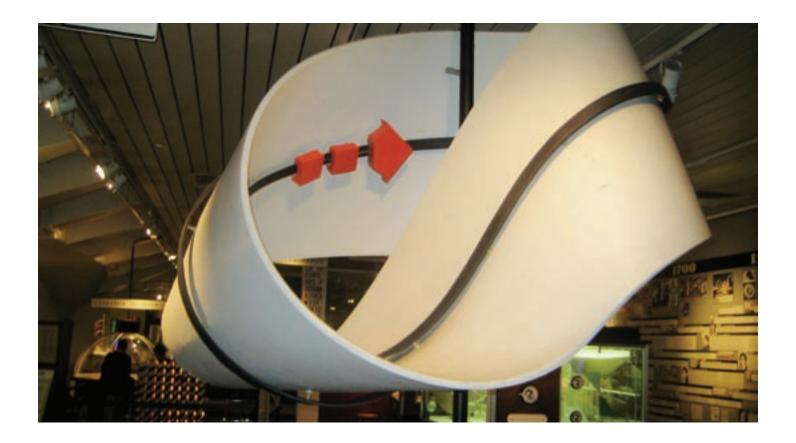
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**HV Mfg:** How did you come to own a manufacturing business? Did you come to manufacturing or did manufacturing come to you? **CG:** A little bit of both. My mom worked for many years on an assembly line in my hometown of St. Louis, Missouri. My dad worked for UPS and was also very mechanically inclined. He was always working on projects around the house, so there was always talk of making things and fixing things at home. I became pretty handy myself and when the time came to decide what to study an uncle of mine suggested that I should become a mechanical engineer.

### HV Mfg: So you're an engineer?

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**CG:** Well, no. I spent a year at the University of Missouri. Notice I did not say I spent a year studying, because I didn't. College was fun! Then I grew up a bit and transferred to Cal Poly, changing my major to Architecture and Urban Planning in the process. My degree is in Urban Planning. I did some work out of college in urban public policy in California. It was important work, but I found it very frustrating. I was young and idealistic and the bureaucracy kind of frustrated me. I couldn't see the results of my efforts and I just felt powerless to make any positive change, so I left that field.

A marriage brought me to a job in central New Jersey as a telemarketer for a rubber manufacturer, a company called Itran Rubber. I was pretty good at it, I suppose, because in a few months I was promoted to "Lead Generator," then "Marketing manager."

I loved being in the private sector, in manufacturing. It makes sense; revenue, expenses, costs, employees, facilities, equipment all come together to produce an item and sell it to a customer who needs it. They need it – we make it.

**HV Mfg:** How did you come to own Mechanical Rubber? **CG:** Mechanical Rubber had been in business since the early 1940s. They had a great reputation in the defense industry that lasted for decades. The

company fell on hard times in the 1900s due, I think, to defense cuts and their inability to diversify their customer base. The company's reputation in the industry had suffered as well. They filed for bankruptcy in the mid 1900s and the company I was working for bought them out of bankruptcy.

Itran pretty much stripped Mechanical Rubber of all its useful assets and customers before generously offering to sell the much smaller company to me in 1995. They offered

to finance me for five years and I figured that opportunities like this don't come along in life too often, so I accepted and the struggle began.

#### **HV Mfg:** Struggle?

**CG:** Yes. For the first five years I had big ideas and no resources. I needed to overcome the bad reputation that the industry associated with the name "Mechanical Rubber"; our biggest customer in the Region – Texaco R&D in Beacon—closed and we had a three-year battle with the Internal Revenue Service.

By 2004 we had battled through most of that and managed to stay in the game. We bought the assets of another small rubber company in the region, Minisink Rubber. Their products and customers gave us a nice boost and by 2007 we were turning the corner and seeing some real growth when bam, the Great Recession hit and almost everything came to a complete standstill—no orders, no payments, nothing. We suffered a 40 percent drop in revenue in 2008.

**HV Mfg:** Things are humming here now, how did you turn it around? **CG:** Well it took some doing. One of the first things that had to happen was for me not to take it personally. You know, I take responsibility for everything. If good things happen, it's because of my efforts; if bad things

approach, Mechanical Rubber reverseengineered the Mobius Band in a New York Hall of Science exhibit to develop the appropriate neoprene compound and create a custom extrusion needed to refurbish it.

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happen, it's because I failed in some way. Given the extent of the drop, I got really down. I was isolated, wallowing in the day-to-day lousy numbers. While I knew things were bad in the industry across the country I didn't really understand how bad. It actually was my parents who helped me get back on track. They have always been my best mentors and when I was speaking to them one evening about how difficult things were they just said, "Yeah, so? It's not your fault. Things are tough all over and they will get better." They told me that I should start preparing for when things turn around – be ready to take advantage.

**HV Mfg:** Sounds like really good advice—how did you prepare, what did you change?

**CG:** At about this time I had been doing a lot of reading about management theory and leadership and I stumbled upon this concept of "Co-opetition." It has roots in game theory but, as the name implies, it is a blending of cooperation and competition with the idea that companies and individuals can cooperate with each other to reach a higher value creation than could be achieved without working together.

I found that our company could cooperate with other firms in the specialty rubber industry that are actually competitors in some areas, to win business and compete with bigger firms. Working as individual companies, we did not have the resources to bid on certain contracts, but by joining forces, pooling our resources and expertise, we could. This greatly expanded our potential markets and helped us recover.

I also had to rethink what it meant to work at Mechanical Rubber. For this new vision to succeed we needed a buy-in from all our people—management, designers and especially our sales people. We all needed to share the same vision. I needed people who cared. That took some time and some people never caught on, so we needed to part ways.

But the group we have now... they're all sharing the vision. They come to work every day asking what they can do to add value to the customer. This is reinforced through our motto, "Reputation cannot be easily mitigated." This applies to employees, co-workers, customers and associates. It's a constant reminder that how you treat someone will leave a lasting impression; it's customer satisfaction on a macro and micro level. With that in place, I really no longer manage the company—I get to spend all my time working strategically to implement the vision.

**HV Mfg:** Can you give us an example? What are some of the strategies that you have employed to implement that "co-opetition" vision. **CG:** Well, for one thing, we have been able to invest in a number of certifications: ISO-AS, MBE, DOT. We recently became approved to supply the MTA. All of which make us a more valuable partner. We've also expanded our product offerings to include spec plastics, aluminum and, most recently, assemblies. Another example is our "WeConnect" website, which we have completely overhauled into a better tool for marketing and customer support.

**HV Mfg:** What do you see as the biggest challenges in the next year or so? **CG:** In a word, capacity. We really have positioned ourselves very well to grow in the next few years. We may need to expand pretty quickly if some of the projects we are pursuing come to fruition. We have not bid on anything we can't handle, but we know we will have to add capacity in the near future.

**HV Mfg:** What are the opportunities?

**CG:** I see a lot of potential in the transportation sector. That is why we pursued the MTA approval. Our products are used in the automotive, aerospace and rail industries and we have worked hard to get in front of



these companies. Federal, State and local governments buy a lot of the products from these industries —such as rail cars, for example—and our status as a minority-owned business gives us a leg up in bidding on some of these projects. It's not a big leg-up, we still need to be competitive in terms of delivery, quality and price, but we do have a good chance to grow in that sector.

HV Mfg: What do you think makes a good leader?

**CG:** Being a good listener. It is one of the simplest things but also the most important. How can you lead people if you don't know their constraints, their needs? Sometimes being a good listener means hearing what's not being said as well as what is being said. It means asking the right questions and then listening to the answers. Of course, communicating back is important too. Hearing what the constraints and needs are is one thing. Doing something about it is another. But it all starts with listening.

**HV Mfg:** You have been involved with the Council of Industry for quite a few years now. You serve on its board of directors. What are we good at? What can we do better?

**CG:** Without a doubt, our advocacy efforts on behalf of manufacturing are a strength. Working to form the Manufacturing Alliance, MANY, that has proven to be a real success. The Council and MANY are giving a voice to all us little guys and that is terrific.

As for what can we do better, well, I think we need to build that advocacy even more, speak even louder on behalf of manufacturers. Also, and I guess its related to that, I think we could do more networking, more connecting of the executives of our Hudson Valley manufacturers. I still appreciate the advice I was given by some of my peers when we did a tour and visit here at Mechanical Rubber, 10 or so years ago. I still consider many of the other members to be mentors and I hope I prove to be a mentor to some of them as well. Building those connections is something that would make the Council an even better resource.



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The company has changed dramatically from its heyday in the 40s and 50s and from the tumultuous years of labor strikes and layoffs in the 70s. The Schatz Bearing Corp. of 2014 is enjoying success and expecting to increase business by at least 50 percent over the next five years. The company still manufactures ball bearings though its customer base has evolved from the automotive industry to more highly regulated industries like aerospace and defense, where the quality and traceability of components is critical.

"Innovation, teamwork and customer service have become important parts of the current company philosophy at Schatz," said company President, Stephen Pomeroy, Ph.D. "One of the best things about the company today is the work atmosphere we have. Customers come in and tell us they can feel the enthusiasm and employees are excited to come in to work each day. It is this work culture at Schatz that makes the difference. Giving employees a degree of autonomy and the freedom to make decisions hasn't always been the case here, but it has made us a more successful company over the last few years."

The company was founded in 1895 as Schatz Hardware Manufacturing in New Haven, Connecticut, where Adolph Schatz and his son Herrman manufactured metal specialties. In 1910 the business was renamed the Schatz Manufacturing Company and relocated to Fairview Avenue in Poughkeepsie, NY. By1915, having realized that there was great potential in the automotive industry, Adolph Schatz started a separate company, the Federal Bearings Company, which manufactured high-grade ball bearings for automobiles.

Expansion in facilities and workforce continued through the 20s and

30s and by 1940 the company employed 700 people. In 1944, Schatz Manufacturing bought out Federal Bearings and the company became known as Schatz–Federal. The facilities had grown large enough to house a fully equipped hospital and employment topped 1400. During this time the company manufactured ball bearings primarily for the automotive industry, with accounts like NAPA and Ford, but a small percentage of their product was designed for the emerging aerospace industry. Business was booming and, along with IBM, Schatz was one of the

"One thing we know today is that to be successful in our industry you have to always be improving.

Complacent companies fail."

largest employers in the Hudson Valley. Unfortunately this growth was not sustainable. "A lot of organizations have to fight complacency when they become big and are doing well like Schatz was in the 40s and 50s," Pomeroy explains. "One thing we know today is that to be successful in our industry you have to always be improving. Complacent companies fail."

By 1967–68 that complacency had begun to take its toll and there was a 15-month labor strike, not the first strike for the company but the longest. During this time Schatz-Federal lost some of its key customers because they were unable to fulfil orders. The 1970s saw a drastic downturn for the American automotive industry and Schatz-Federal suffered along with it. Parts were being imported from overseas and many of the more skilled workers had found other employment during the '67 strike. After losing the NAPA account, the company was forced to file for bankruptcy



New products generate the need for new innovative bearing designs, so the company provides customers with engineering design services as well as manufacturing.

in 1980 and there were major layoffs. In 1981, the company was closed and liquidated. The Schatz name and many pieces of equipment were purchased from the liquidator, enabling the birth of a new Schatz Bearings Corp., with 10 employees, in December 1981.

In 1985 the Pomeroy family purchased the company. Current President Stephen Pomeroy began working there in 1989 and now leads a workforce of 100 people. Schatz still manufactures precision ball bearings but the focus is now on quality rather than quantity. "Bearings are a commodity and in certain sectors we just can't compete on price with those produced in low-cost countries

like China. Schatz is the company to look to when quality and traceability are important. Many of our customers are in aerospace, defense, and safety critical industries," explains Pomeroy. "We manufacture bearings with a minimum bore diameter of 1/8" up to 14" outside diameter. We use standard bearing quality steel as well as several different kinds of stainless steels."

"There's a difference between a watch and a ball bearing," says Chuck Kitchen, Vice President of Sales and Marketing. "Drop both and which do you worry more about damaging? The fact is that you will do more damage to the precision of a ball bearing than you will to the watch."

Schatz products are found in several industries including aerospace

(the customer list includes Boeing, Airbus, Bombardier and Embraer) defense, medical, and semiconductor. Not only does the company have to be an approved supplier, nearly all of the products manufactured must also pass a stringent testing and customer approval process and, in some cases, receive government approval as well.

Schatz now manufactures smaller volume and specialty orders in close consultation with its customers. New products generate the need for new innovative bearing designs, so the company provides customers with engineering design services as well as manufacturing. In applications where safety is critical and product life spans are long, such as aerospace, some bearing designs have been in production for decades. The challenge in these applications is to keep up with the significant improvements in manufacturing technology.

Over the last few years, Schatz has been able to cut down production time. "Schatz is a lean company and has streamlined its manufacturing process to enable quick changeovers on machines and shorter set up times," explains plant manager, Bob Lanser. "Our employees are like a pit crew in racing. Since embracing the lean methodology, set ups that once took eight hours can now be accomplished in 30 minutes. This makes us different from our competitors because we can produce the product nimbly and with the required certifications and specifications our customers need."

To accomplish that, it is important to hire the right people. Schatz offers competitive wages and provides training opportunities for employees, recognizing that turnover can be more costly than investing in a positive work culture. Employees are encouraged to contribute innovative ideas



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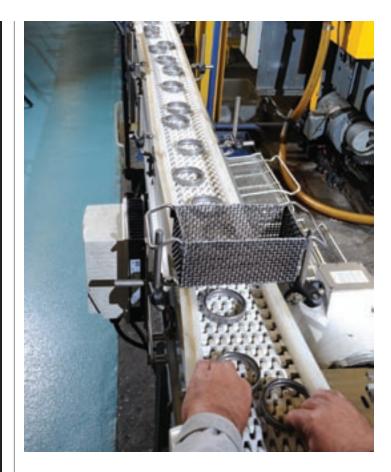


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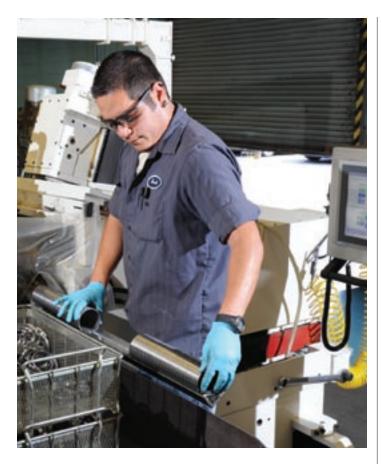
about the process and given autonomy and authority to encourage their contribution. "We have excellent engineering capabilities that allow us to solve problems with existing applications as well as create innovative solutions for new products," explains Pomeroy. "But innovation isn't just new products, it's also ideas that reduce our set up time or improve quality. Those ideas can, and have come from anyone that works here."

The company has also been reducing its carbon footprint through a variety of projects. "When the Council of Industry first got involved with the electricity purchase consortium, it got me to thinking about

Innovation isn't just new products, it's also ideas that reduce our set up time or improve quality. Those ideas can, and have come from anyone that works here.

ways that we could modernize our facility from an energy consumption standpoint. As I looked into it, I realized that there was a lot of great technology out there that would save us a lot of money in the long run. When you combine that with substantial government incentives and the fact that it is good for the environment, I think that it's one of the best investments that you can make," says Pomeroy. So far Schatz has upgraded the entire facility with state of the art high-efficiency lighting, upgraded the compressed air system, insulated steam supply piping, installed float switches on pumps and instituted material recycling.

In addition to participating in the Council of Industry's energy consortium, Schatz has also drawn on the Council of Industry as a resource for employee training. "We have sent many of our supervisors through the Certificate in Manufacturing Leadership Program and even some people that aren't supervisors, just because of the basic overview of business the program provides," Pomeroy says. "It helps when employees understand terms like ROI (Return on Investment) and the cost of waste



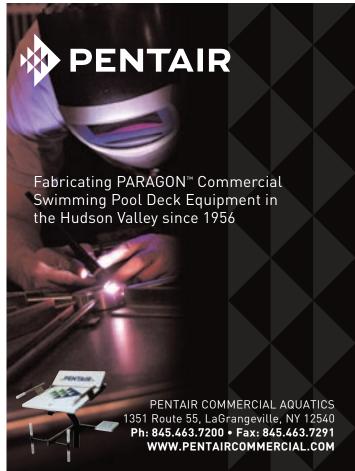
With the positive workplace attitudes of its employees and the innovative approach of its leaders, Schatz Bearing Corp. could see another hundred years of Hudson Valley manufacturing.

and scrap. The program provides an overview that adds value to the big picture. The Council has also been able to help us secure training grants and other funding for lean training. What I really like about the Council is that they help us to solve the problems we actually have, by steering us to the right resource. They don't force-fit us into programs that aren't needed."

It is this investment in their workforce that helps distinguish the Schatz of the 21st century from its predecessors, but the workforce itself is probably very similar to that during the early days of the company. Approximately 20 percent of current employees are immigrants, with a strong work ethic and drive toward making a better life. That sort of dedication and ethic, in addition to an aptitude for

mathematics and mechanical abilities, are attributes that the company looks for in its employees. Potential workers are interviewed by a team and to be hired must be considered a good fit by all members.

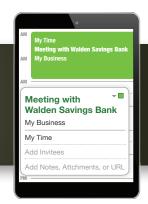
While the company, by design, will likely never reach the epic proportions of the post-WWII era Schatz-Federal, it plans to grow considerably over the next five years. Ironically, it is the lean processes making Schatz such a nimble company that also present its greatest challenge. Schatz has difficulties finding quality suppliers able to provide the materials they need on a just-in-time basis, part of the lean process of keeping just the amount of materials needed on hand. Yet, despite this obstacle, the company is thriving. With the positive workplace attitudes of its employees and the innovative approach of its leaders, Schatz Bearing Corp. could see another hundred years of Hudson Valley manufacturing.





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The Face of Manufacturing



A new program provides concentrated training that leads to a Certified Production Technician credential and prepares participants for eventual employment in high-wage, high-skill manufacturing occupations.

EKA ROWE WAS LISTENING TO THE RADIO one morning last
May while she fixed breakfast for her kids when WKIP's
Hudson Valley Focus Live came on. The show happened
to feature guests—Harold King, executive vice president
of the Council of Industry, and Glenn Tanzman of SUNY
Dutchess—discussing a new program being offered at SUNY Dutchess
that would train Certified Production Technicians (CPTs) who could
fill the workforce needs of local manufacturing companies. Rowe was
already considering taking nursing classes at SUNY Dutchess, but this
sounded like a better option. She had always liked working with her hands
and doing anything tactile. She could envision a career in pharmaceutical
production and decided to take the chance and enroll.

Tom Gannon, an Air Force veteran with work experience in industrial maintenance, heard about the CPT program from the Dutchess County Division of Veterans Services. Once enrolled, Gannon was impressed with the learning modules, an approach that enabled him to relearn two years' worth of math in three days. The 10-hour OSHA training module was also an eye-opener, as his past experience in maintenance hadn't included such a degree of detail in regard to safety. Gannon said the training on how to deal with co-workers was especially helpful to him as

someone reentering the workforce with, perhaps, outdated methods of interpersonal communication. Even though he has experience working in the manufacturing industry, Gannon says, "I'm learning so much more than I thought I would."

The first cohort of students began working in the program at SUNY Dutchess on June 9, 2014. By its completion, on August 28, they were ready for certification. The CPT program at SUNY Dutchess was created as part of the Trade Adjustment and Administrative Community College and Career Training Grant (TAACCCT), a federally funded, statewide initiative. The grant's purpose is to provide:

- Pathways for potential entrants into industrial jobs and careers
- A way for employers to identify potential employees with certified skills and familiarity with industrial processes
- A means for broadening and deepening employee skills, what TAACCCT calls 'latticed' and 'stacked' skills.

The grant gives community colleges and other institutions of higher education the funding to expand career training and education programs that can be completed in two years or less. The goal is to prepare participants for employment in high-wage, high-skill occupations. Initially, the 12-week CPT program will be available to veterans and to



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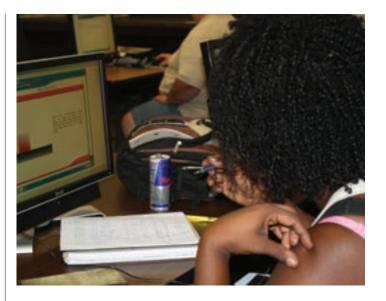


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"We asked employers what they are looking for in new hires and we are training participants to those standards with the hope of those same employers then hiring the program graduates."

unemployed workers displaced by the economy.

The six Mid-Hudson SUNY Community Colleges (Dutchess, Orange, Rockland, Sullivan, Ulster and Westchester) and the Council of Industry have partnered to implement the TAACCCT grant and have formed a workforce development committee to provide input for curriculum development. In the course of discussion about what kind of training the program should provide, a Council of Industry member observed, "I don't need a certified machinist. Our process is unique, so we'll need to train people to run our equipment anyway. What we need is someone who understands the manufacturing process, knows how to use basic tools, understands shop math, and who is reliable and can

learn. What I don't want is someone who begins to get trained and doesn't work out because he misses work or can't get along with coworkers." This sentiment was echoed over and over by company representatives and the CPT program aims to address this concern.

#### Designing the syllabus

Virginia Stoeffel, SUNY Dutchess Dean of Community Services and Special Programs, says the TAACCCT grant application process began about three years ago with a program designed around advanced manufacturing and preparing workers to meet the requirements for national certifications that had recently become available through the Manufacturing Skill Standards Council. The CPT program is the introductory level for Advanced Manufacturing and the curriculum is based on the MSSC's certifications for nationally recognized standards in Safety; Quality Practices and Measurement; Manufacturing Production and Processes; Maintenance Awareness; and Green Production.

Local manufacturers were also polled as to what training they would find desirable in new hires and thus Lean Six Sigma, root cause analysis and technical math were added to the syllabus. "This process is designed to be a closed loop," says Stoeffel. "We asked employers what they are looking for in new hires and we are training participants to those standards with the hope of those same employers then hiring the program graduates."



The CPT-trained candidate brings knowledge of safety; quality practices and measurement; manufacturing processes and production; and maintenance awareness to the interview.

The final syllabus provides training and testing in the following areas:

- Technical Math
- Safety, including OSHA-10
- Quality and Measurement
- Lean Six Sigma
- Production Processes
- Root Cause Analysis
- Maintenance Awareness

Graduates of the 12-week program put in over 190 hours of classroom and online work. In addition participants gained hands-on experience working with micrometers and using tools and machines during the job shadowing. The Dutchess County Workforce Investment Board (WIB) was able to cover the tuition for the first cohort of the CPT Program and also provided statistics calculators, micrometers,

calipers and notebooks for hands-on measurement work.

"The CPT-trained candidate brings knowledge of safety; quality practices and measurement; manufacturing processes and production; and maintenance awareness to the interview. He or she has also demonstrated reliability and responsibility in completing of the course," explains James Kimple, the TAACCCT Grant coordinator

for the Hudson Valley. "CPT is also designed so that technicians who have earned it are prepared to continue developing skills required by changing technology—what educational jargon calls "stacked" and "latticed" skills."

After program participants completed the classroom work, Council of Industry member companies MPI, Inc. and Nerak Systems provided a job-shadowing day. As CPT trainees were walked through the manufacturing process, it became obvious that their training had paid off. Many pointed out Lean practices and the use of production processes they had studied. They asked thoughtful questions about the maintenance procedures and were excited to use tools they had worked with in the classroom.

"The class would meet four mornings a week for a lecture or demonstration on the topic of the day, break for lunch and then reconvene in the afternoon for self-paced computer learning. Often they would complete these modules at home. One of the great things about this group is how they bonded and reached out to help each other when needed. They worked hard to help themselves and each other succeed," explains Glenn Tanzman, TAACCCT Grant Project Coordinator and instructor for the CPT program.

In addition to hearing about the training opportunity on the radio, participants in the first cohort of the CPT program learned of it through veterans groups and local programs designed to help dislocated workers. Hopefully, publicity generated by these graduates will attract more candidates and more companies interested in hiring.





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SUNY Ulster, SUNY
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launch their own
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other manufacturing
related modules.

The next cohort of participants will begin studies as soon as ten or more applicants are registered. Stoeffel says she will do all she can to have the Dutchess County WIB cover tuition for the next cohort so as not to impose a financial burden on participants. This fall, SUNY Dutchess plans to run a "Fast Track" version for companies wishing to get current employees the same certification.

After graduation, a mini-job fair was held to give company representatives an opportunity to meet with the CPT program graduates. Actually, program participants were going on job interviews even before graduation and several companies sent

Tanzman and Stoeffel emails requesting resumes and listing open positions. SUNY Ulster, SUNY Westchester and SUNY Rockland are ready to launch their own programs with training in the CPT certifications and other manufacturing related modules.

SUNY Ulster has added a twist to its CPT program, guaranteeing employment to Ulster County residents graduating from their recently announced "Ulster County Guaranteed Jobs Program." County Executive Hein said, "The way the Guaranteed Jobs Program works is [that] selected participants will complete a 3-week Work Readiness component followed by a one week Closed Job Fair. They will then complete a 6-week Manufacturing Skills Training course and pass the Certified Production Technician Exam in order to graduate. Graduates are expected to receive guaranteed job offers from Ulster County's private manufacturers."

James Kimple points out that the success of the program hinges on manufacturers recognizing the value of CPT training. "A prepared and skilled workforce is a key piece of economic strategy to retain and attract industry in combination with the campaign to make NY more business friendly. As CI members begin to advertise that they desire or require Certified Production Technicians, our partners in education will continue to train them. We in the Hudson Valley can then advertise that 'we have a workforce for you."

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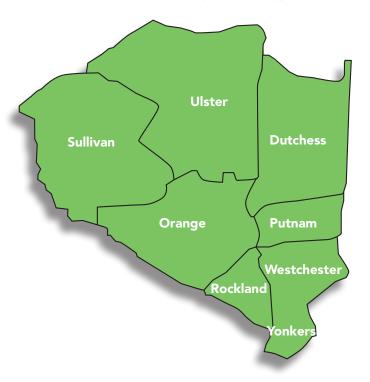


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# Building Blocks of An Innovation System

The steady dissemination of change can't be left to "inspiration."

Syngergistic policies on the part of government, finance, industry and the educational sector are vital for the creation of an innovation-friendly environment.

N THE CONVENTIONAL VIEW, innovation is something that just takes place idiosyncratically in "Silicon Valley garages" and research and development (R&D) laboratories. But, in fact, innovation in any nation is best understood as being embedded in a national innovation system (NIS). Just as innovation is more than simply putting together science, technology and business, an innovation system is comprised of more than those elements directly related to the promotion of science and technology. It includes all the economic, political, and social institutions affecting innovation (e.g., a nation's financial system; organization of private firms; the pre-university educational system; labor markets; culture, regulatory policies and institutions, etc.). A national innovation system is the entire network of institutions in the public and private sectors whose activities and interactions initiate, import, modify and diffuse new technologies."

It is one thing to invent and even institute an innovation. It is something rather different to create an environment that promotes the

steady stream of innovations and their dissemination upon which nations and economies depend for continuing prosperity.

One way to conceptually organize all the factors determining the pace and breadth of innovation in a nation is to visualize an "innovation success triangle," with business environment factors along one side of the triangle, the trade, tax and regulatory environment along another, and the innovation policy environment along the third. Success requires

correctly structuring all three sides of the innovation triangle.

#### THE BUSINESS ENVIRONMENT

includes the institutions, activities, and capabilities of a nation's business community as well as the broader societal attitudes and practices that enable innovation. Factors specific to a successful

This article is a highly abridged version of *Understanding the U.S. Innovation System* by Robert D.Atkinson, a report published by The Information Technology and Innovation Foundation, June, 2014. For the full version, visit www.itif.org/publications/understanding-usnational-innovation-system.

business environment include: high-quality executive management skills; strong IT (or as many other nations refer to it, ICT—information and communications technology) adoption; robust levels of entrepreneurship; vibrant capital markets that support risk taking and enable capital to flow to innovative and productive investments easily and efficiently; and a business investment environment that strikes

the right balance between short- and long-term goals. Broader factors include: public acceptance and embrace of innovation, even if it is disruptive; a culture in which inter-organizational cooperation and collaboration is embraced; and a tolerance of failure when attempting to start new businesses....

which inter-organizational cooperation and collaboration is embraced; and a tolerance of failure when attempting to starnew businesses....

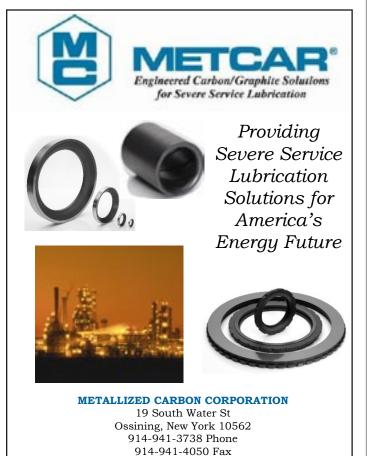
AN EFFECTIVE TRADE,
TAX AND REGULATORY
ENVIRONMENT features a competitive and open trade

regime, including serious

efforts by government to







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Despite the high quality of the U.S. managerial class, pressures for short-term performance and profits tends to reduce their ability to make the sort of long-term investment that fuels innovation.

protect its businesses against foreign mercantilist practices; support for competitive markets such that new entrants, including those introducing new business models, can flourish; processes by which it's easy to launch new businesses and to bring innovations to market; transparency and the rule of law; a reasonable business tax burden, especially on innovation-based and globally traded firms; a strong and well-functioning patent system and protection of intellectual property; regulatory requirements on businesses that are based on consistent, transparent, and performance-based standards; limited regulations on the digital economy; limited regulations on

labor markets and firm closures and downsizing; a balanced approach to competition policy; and government procurement based on performance standards as well as open and fair competition. Nations need a regulatory climate that supports rather than blocks innovators and that creates the conditions to spur ever more innovation and market entry, while at the same time providing more regulatory flexibility and efficiency for industries in traded sectors. ...

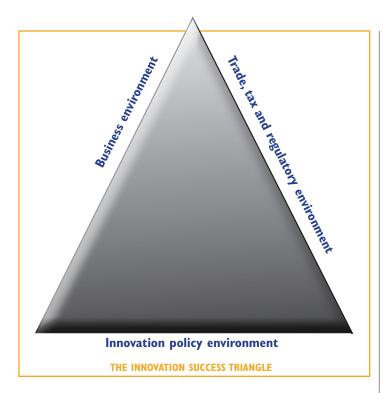
A SUCCESSFUL INNOVATION POLICY SYSTEM includes: generous support for public investments in innovation infrastructure (including science, technology, and technology transfer systems); support for digital technology infrastructures (such as smart grids, broadband, health IT, intelligent transportation systems, e-government, etc.); targeting R&D to specific technology or industry research areas; funding sector-based industry-university-government research partnerships; reshaping the corporate tax code to spur innovation and IT investment, including R&D and capital equipment and software incentives; a skills strategy, including high-skill immigration and support for science, technology, engineering, and math (STEM) education; encouraging private-sector technology adoption, especially by small and mid-sized manufacturers; supporting regional industry technology clusters and regional technologybased economic development efforts; active policies to spur digital transformation in the private and nonprofit sectors; and championing innovation in the public sector.

# **The American Innovation System**

America's industrial innovation, prior to WWII, was powered principally by private inventors and firms. After WWII, a more science-based system of innovation emerged, which would become dominated by large firms and the federal government. The establishment of large, centralized corporate R&D laboratories helped drive innovation in an array of industries, including electronics, pharmaceuticals and aerospace.

Still, the explicit promotion of innovation and productivity as an economic goal was largely ignored and even rejected through most of the post-war period. Attempts by the federal government to explicitly support commercial innovation were made in fits and starts and never really got off the ground.

This began to change in the late 1970s with the emergence of competitiveness challenges from nations like Japan and Germany. It was with the election of President Jimmy Carter in 1976 that the federal government began to focus in a more serious way on the promotion of technology, innovation, and competitiveness. The motivation for this was



the major recession of 1974, the shift in the U.S. balance of trade from one of surplus to one of deficit, and the growing recognition that nations like France, Germany, and Japan now posed a serious competitiveness challenge to U.S. industry. At this point, a host of major policy innovations created a long list of alphabet soup programs to boost innovation.

By the time Bill Clinton was elected in 1992, America's competitiveness challenge appeared to be receding. Japan was beginning to face its own problems, and Europe was preoccupied with its internal market integration efforts. Moreover, with the rise of Silicon Valley as a technology powerhouse and the rise of the Internet revolution and companies like Apple, Cisco, IBM, Intel, Microsoft, and Oracle, America appeared to be back on top, at least when it came to innovation.

But while IT was thriving, U.S. industrial competitiveness was not. The United States lost over one third of its manufacturing jobs in the 2000s, mostly due to falling international competitiveness, not superior productivity of competitors.

#### **Renewed Attention to Innovation**

After the losses of the 2000s, the Great Recession and the emergence of robust new technological competitors, including, but not limited to China, the state of U.S. industrial innovation and competiveness has gained renewed attention. Because of this, the Obama administration has proposed a number of initiatives, including the establishment of a National Network of Manufacturing Innovation; an expansion in the research and experimentation (R&D) tax credit; increased funding for science agencies; policies to expand the number of STEM graduates; patent reform; and increased efforts to limit unfair foreign policies. Congress has also introduced a variety of similar measures.

These measures are helpful, but not necessarily defining. The U.S. innovations system has many positive aspects, but also several characteristics that pose a problem to innovation. Despite the high quality of the U.S. managerial class, firms are buffeted by pressures for short-term performance which, in turn, reduces their ability to invest for the long-term. A focus on maximizing short-term returns does make companies effective in reducing waste and pulling the plug on poor investments, but pressure to achieve short-term profits can also result in sacrificing the long-

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The nation that can put together all three sides of the innovation success triangle most effectively is likely to be the nation that reaps the rewards in greater economic vitality and prosperity.

term investment which fuels innovation.

To this, add a tax system that does not always foster investment and an inconsistent regulatory climate that stifles innovation, both of which have grown over the last decade. While America still largely tilts toward innovation, anti-innovation forces in U.S. culture appear to be stronger today than ever before in American history. Whether it is fears of job loss from automation, privacy loss from the Internet, or environmental damage from nano-tech or biotech, anti-technology forces—in the media, "public interest" groups, and the public at large—have expanded, making it harder for the U.S. economy to press ahead with innovation....

**ON THE PLUS SIDE, U.S. FIRMS** are among the world leaders in adoption of information and communications technologies and invest more as a share of sales and of overall capital investment in hardware, software, and telecommunications than almost any other nation.

Also, a cultural bent toward "venturesome consumption" on the part of of American consumers—that is, their eagerness to be early adopters of and experiment with new products and technologies—has played a role in supporting U.S. innovation success.

In recent years the concept that while innovation is about competition, it's also about "coopetition" and cooperation—in other words, groups working together to drive innovation—has taken hold. The culture of collaboration in places like Silicon Valley and Boston's Route 128 is one of the keys to their success. Likewise, the ability of leading U.S. universities to work cooperatively with industry has been key to driving regional innovation hubs and clusters. These collaborative learning systems are supported in part by strong intellectual property (IP) protections.

The concept of innovation clusters has been long understood by regional planners, but it wasn't until Harvard Business School Professor Michael Porter popularized the notion of clusters in the 1990s that many governments in the U.S. began to focus more explicitly on spurring innovation clusters. The emergence of high-profile clusters, such as Silicon Valley and North Carolina's Research Triangle Park, lent credibility to the notion that innovation clusters can power innovation and growth. Explicit innovation cluster policies have been the province of states and sub-state regions, in part because these units of governments are "closer to the ground" and have a better sense of which clusters are important.

s nations compete to win the global innovation race, some will sprint out ahead, others will remain stuck in the middle of the pack, and still others will struggle to get out of the starting gate. Nations face different challenges in the race. No nation has it entirely right just yet, although a few come close. While some nations—such as Japan and much of Europe—have strong innovation policy systems, many of them suffer from limited regulatory and business environments.

In contrast, the United States has reasonably good business and regulatory environments but a weak innovation policy environment. The nation that can put together all three sides of the innovation success triangle most effectively is likely to be the nation that wins the race and reaps the rewards in greater economic vitality and prosperity. Thus, the challenge for the United States going forward is whether it can make the needed changes to its innovation system to meet the new competition. Our economic future will depend on the answer.

# **Futures Past**

Devices that were once hallmarks of science fiction and a dream of comic book imagineers have become standard furnishings of the real world. Emerging technologies continue to stretch the horizons of the possible.

O ONE CAN PREDICT THE FUTURE, but that's never stopped people from trying. Speculation about things to come has fueled mankind's imagination for centuries, and have really captured the public's fancy since Mary Shelley jumpstarted the science fiction genre with Frankenstein. Since then, countless writers, artists and filmmakers have imagined scientific advancements big and small, good and bad. Oftentimes the speculation turns out to have been far off the mark, but every so often something goes eerily as predicted. Jules Verne, for example, famously predicted the Apollo missions and diesel-electric submarines.

The past few years have seen the development of several devices that were once hallmarks of sci-fi: flat screen TVs are now commonplace, as are cordless phones. Skype has made video communications, a sci-fi standard, an everyday banality. While we're still a long way from the gadgetry of The Jetsons, the four examples of emerging tech described below might well have sprung from comics and science fiction.

#### Iron Man's Exoskeleton

When billionaire inventor and weapons manufacturer Tony Stark is captured by terrorist agents in Afghanistan he escapes by building a rudimentary suit of armor. Once back in the U.S. he constructs a more advanced version that enhances his strength and comes equipped with state of the art weaponry, allowing him to take up crime-fighting in the guise of Iron Man. In real life, the U.S. military has been trying to build exoskeleton prototypes for years now. In theory, soldiers will be able to wear a robotic frame that improves their strength and endurance.

Scientists and engineers may have finally reached a breakthrough with the French-designed RB3D Hercule, which finally became available this year. When using the device, which is fitted to the wearer's arms and legs, a soldier can easily lift about 200 pounds, perform difficult labors with minimal effort and gain endurance for long hikes or climbs. On the home front, the Hercule's potential for people with disabilities is enormous; it could easily be used to supplement prosthetic limbs. The bot runs for about 12.5 hours on a charge and does not require any training to use, since it simply augments the normal movements of a human. It's still a long way from being as flashy as the armor Tony Stark wears, but

The Frenchdesigned RB3D Hercule gives its wearer strength and endurance.



the possibilities it offers could reshape the world.





#### Star Trek's Replicator

Instant Matter Materializers, machines that make something out of nothing, once seemed to be on the farthest edges of sci-fi, just one step short of straight-up magic But all that's

MakerBot acknowledges the Star Trek legacy and the promise of additive manufacturing with its Replicator line of 3D printers.

changed with the advent of 3D printing. Matter materializing devices have appeared in countless science fiction media. The 1956 film Forbidden Planet, for example, featured a robot capable of synthesizing diamonds and emeralds on demand. But if there was any one sci-fi device that seems likely to have inspired additive manufacturing, or as it is more commonly known, 3D printing, it would have to be Star Trek's Replicator.

For now, the majority of 3D printers produce objects made of

hard plastics. More specialized printers handle concrete, metals and even human tissue. Medical applications are among the most promising for the technology, with customized prosthetics and implants already being produced. Foods, too, are issuing from the 3D printer, with chocolate a popular choice of material. It seems it

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won't be long before we all have our "tea, Earl Grey, hot" on demand, just like Captain Picard. Simpler, affordable 3D printers are now being mass-produced, and the possibilities for this invention truly seem to be endless.



# Minority Report's Targeted Advertising Face Scanner

The movie is set in a futuristic world where privacy has all but become extinct and facial scanners are a part of daily life, used not only for security purposes but also to customize advertisements.

When Minority Report came out in 2002, there really wasn't a consumer version of biometric face scanning technology, the kind that knows who you are when you walk through a mall or sit down at your computer. Now, face scanning is available on everything from the new Dell XPS Ultrabook to many Android phones, including the Samsung Galaxy SIII.

To use the scanner, you just sit still for a moment and look at the camera. The detector scans your face and examines your nose, the distance between your eyes and the shape of your cheeks. Granted, face scanning is not perfectly accurate yet; if someone who resembles you attempts to break into your device, the biometric reader will probably grant him access.

Some retailers are already taking advantage of the newly affordable technology, using it to scan customers' faces in order to use the data to create advertising targeted at specific demographics. The process mirrors the personalized advertising depicted in Minority Report as well as Google's and Facebook's real-life use of browser cookies. It's important to remember that technological advancement is usually a double-edged sword.



#### **Back to the Future Part II's Self-Tying Laces**

OK, so we'll still need roads for the time being, but pretty soon we won't need shoelaces. In the sequel to Robert Zemeckis' sci-fi comedy classic, "Doc" Brown takes Marty McFly 30-years into the future, to the then distant year of 2015. Among the many futuristic gadgets featured are a pair of sleek Nike (product placement will never be outdated) sneakers with laces that fasten themselves automatically. In 2011, Nike manufactured a limited number of sneakers based on the ones in the film, but those still used regular laces. The company has confirmed it will release shoes outfitted with the so called "power laces" to the general public in 2015. The question is, will their appeal be limited to 80's nostalgia buffs or will the tech be developed into a standard feature on all footwear.



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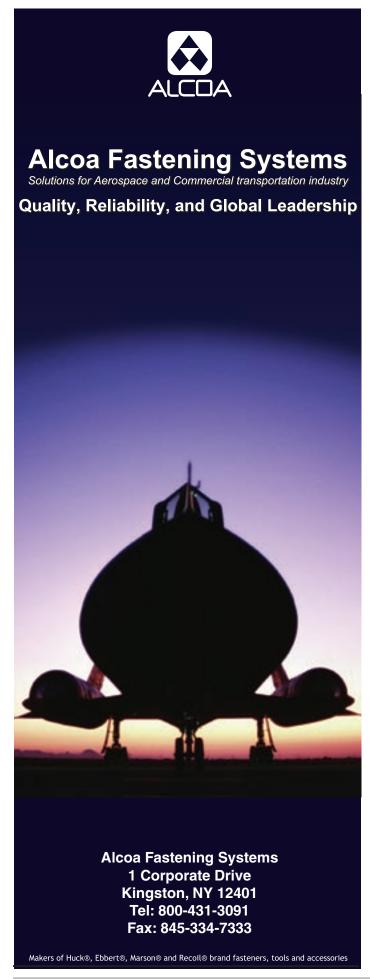
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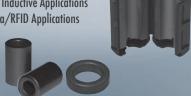
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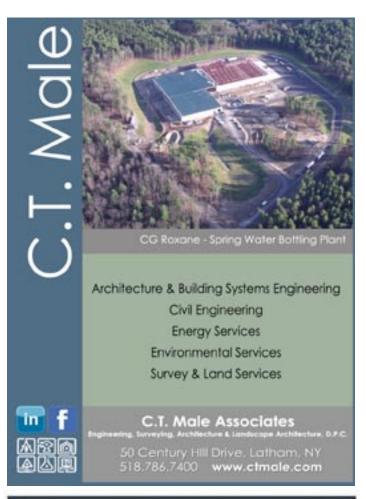
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