Focus
TECHNOLOGY

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THIS IS THE (TECH) PLACE!

Utah's high-tech industries are bringing attention to the state and building on its reputation as a great place for innovation

Frances Johnson
The Enterprise

Utah has long been known on the national stage for snowy ski slopes, and the designation of "Silicon Slopes" for the emerging high-tech hub stretching from Ogden to Provo has been around for some time. But the area's reputation for the latter is rapidly gaining ground nationwide.

According to a recent article published by CNBC, the U.S. Chamber of Commerce recently ranked Utah No.1 in innovation and entrepreneurship, No. 2 in high-tech performance and No. 3 in economic performance in a study of all 50 states.

They are rankings a long time in the making. Utah's history in the tech industry goes back to the 1970s, when Novell and WordPerfect got

their starts in Utah. The trend continued in the 1990s with the founding of Ancestry.com, Omniture and APX Alarm Systems, today known as Vivint Smart Home.

Drawn by low taxes, cheap real estate and easy access to a large pool of engineering and tech talent from the University of Utah, Utah State and BYU, established companies have also taken up residence in Utah. Adobe opened a 680,000-square-foot office campus in Lehi four years ago. Three years ago, eBay opened a 241,000-square-foot facility in Draper and hired 1,800 local employees. In total, CNBC reports, tech start-ups and established software companies in Utah are worth at least $1 billion on paper.

The state has been working hard to keep the tech momentum going. Gov. Gary Herbert has supported a

tech-friendly agenda and last year, legislation passed that allocated nearly $20 million to the Utah Science Technology and Research governing authority to support research at Utah State and the UofU.

The Utah Technology Council (UTC) is also working to "grow and protect businesses by creating valuable connections with members and others," according to the council's website. UTC boasts more than 5,000 high-tech, clean tech and life science companies as members, representing 10 percent of the state's total payroll.

Some of the UTC's landmark accomplishments over the past 10 years include:

• Pushing an engineering initiative instrumental in increasing the number and quality of computer sci-
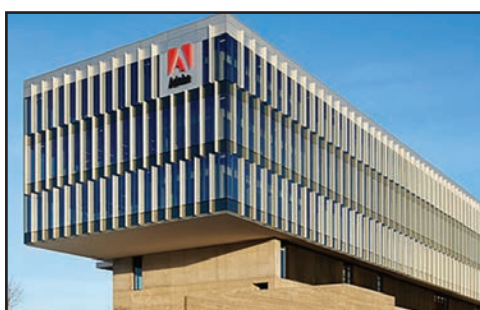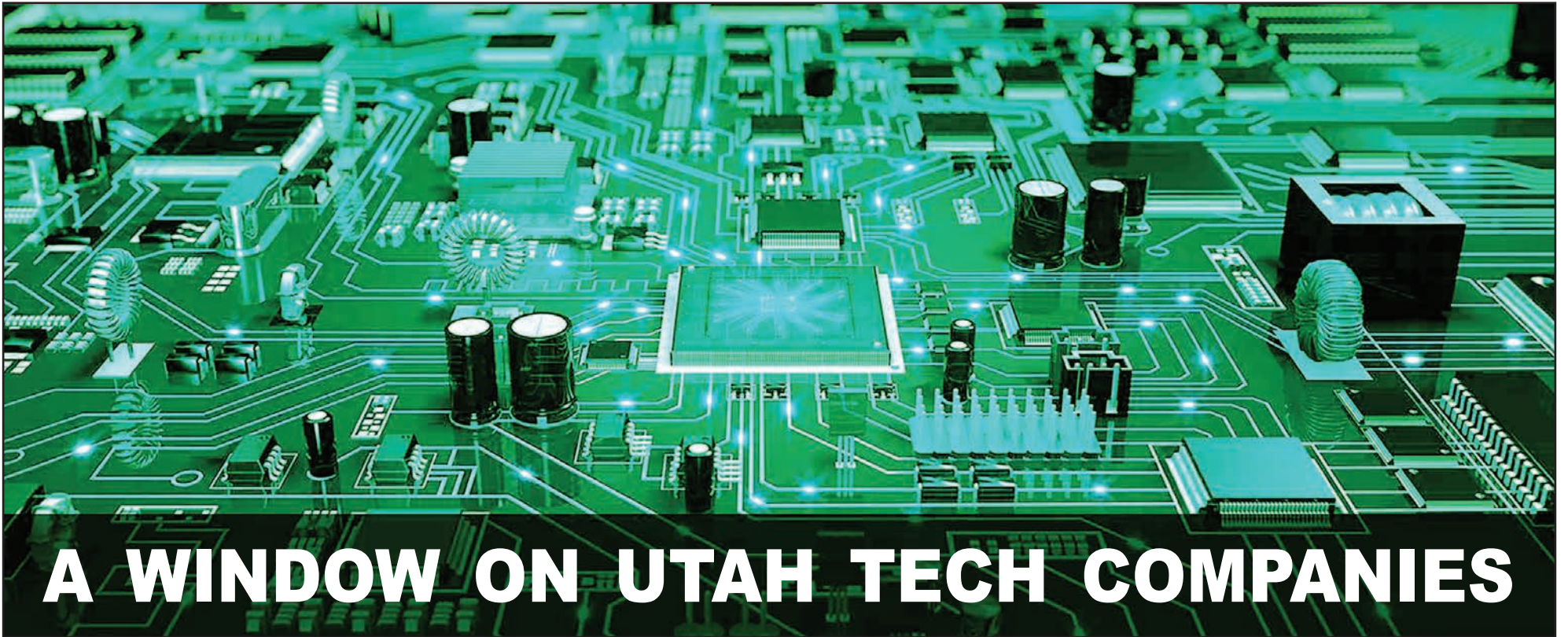
A WINDOW ON UTAH TECH COMPANIES

Five Utah entrepreneurs talk about business leadership

Brice Wallace
The Enterprise

Tim Cook, the chief executive officer at Apple, was the headliner at the recent Utah Tech Tour, organized by U.S. Sen. Orrin Hatch, R-Utah. But several other tech giants — all from Utah companies — also took the stage and presented words of wisdom to a crowd of more than 1,200 that included young entrepreneurs and entrepreneurial wannabes.

The highlights of their quick presentations offered a window into the world of tech industry leadership.

JOSH JAMES
FOUNDER AND CEO, DOMO

James' talk focused on three metrics he believes every business leader should measure. The first is customer retention.

"Customers are the most important part of your business, the lifeblood of your business," he said. "You've got to have them if you want to pay the bills, and if everyone is centered around your customers, then things are going to be good."

Josh James

At an earlier company, Omniture, James had the company call customers it had lost to determine why. The replies ranged from "my credit card doesn't work anymore" to "I went out of business" to "I shouldn't have bought it in the first place."

"My favorite one was, 'My mom won't let me use the credit card anymore,'" James said. "I'm like, 'That's my business? That's a problem.'"

But in the enterprise space, Omniture had 100 percent customer retention. When he founded Domo, he found the company was losing some customers but compensated for it by having higher same-store sales at customers that remained.

The second metric is employee retention. James said he is notified every time a worker leaves the company. He was able to retain two salespeople comtemplating leaving by having them tell James about things the company was "screwing-up, that we were shooting ourselves in the foot. … Thankfully, it was mostly self-created problems, which is embarrassing but most of time is stuff you can fix," James said. Not only did Domo fix those problems but the employees now feel the company listens to their concerns.

Lastly, James stressed looking at competition and "how they feel."

"I want to get in the heads of my competition. I want to screw them up in the head so bad," he said. That can take the form of cherry-picking their customers or best salespeople. One competitor — one-fifth Domo's size — made fun of Domo, and James responded by offering a $10,000 bonus for customers Domo employees could pick off from the competitor.

"We took a lot of their customers, we took their best salespeople, and they died," James said. "Sorry. It's a dog-eat-dog world. I'm going to feed my family; you're going to feed yours. That's the way that it is."

RYAN SMITH
CEO, QUALTRICS

Smith spoke about women's role in the technology sector. His mother was an executive for a Utah university and would tell stories at home about her difficulties in that realm.

"I've got three little girls myself … and I hope they don't have to go through what my mother's had to go through," Smith said. "This is a hard problem, and I think the first part of talking about women and tech is [that] it's a tech problem, which means it's got to be solved by the tech community."

Ryan Smith

The second element is that the problem varies by geography. "But the good thing is, we're in tech and we solve problems, and we do hard things in the state of Utah," he said.

The first step is to recognize problems exist, in part through inherent bias, which can manifest itself in men talking over women or men claiming that assertive women are bossy. "If we understand that there is that bias, it actually makes life a lot easier," Smith said.

The second step is trying to make a company family-friendly, in part by having work/life integration. "If our organizations are not family-friendly, then we are running an old-school work environment, because it's about integration," he said.

Third, structural issues must be solved. He noted that only 28 percent of students involved in STEM (science, technology, engineering and math) are women.

"It's not a problem that we can solve with one effort. It's a problem that we've got to solve from the top and the middle and the bottom," he said. But in Utah, many women are inexperienced as executives and "have not been on a ride like this before, so we need to grow our talent," he said.

Fixing that issue will be "a 10-year journey," Smith said, but it should not involve ever compromising high standards. "This is what we're trying to solve. It's a flow problem, and we can solve this in Utah by growing the talent and solving it from the top."

CYDNI TETRO
CO-FOUNDER, ENABLEMINT

Tetro discussed what she calls "the fourth Industrial Revolution." It features the integration of digital and physical elements.

Currently, people have digital devices that allow them to get rides, answer complex calculus questions, sign documents and take selfies. "It's easy to imagine the innovation that's taking place in the digital world, but what's happening in the physical world is just as compelling and innovative," she said.

Cydni Tetro

She saw that integration at work while working at Disney, where she was able to learn about 3D modeling, data, programmable LED technology and robotics while also learning from Disney's storytellers. What resulted was an integration between the digital and physical worlds, she said.

"Ultimately when we build products, we want our users and our customers and guests to have a magi-

Kari Byron (left), formerly of the TV show "Mythbusters," responds to a question from Allison Barlow Hess, Weber State University's director of public relations, during the university's Wildcat Tech Expo.

Wildcat Tech Expo speaker: If you want your kids to be into science or technology, you have to be into it, too

Brice Wallace
The Enterprise

Kari Byron has some advice for parents wanting their children to grow up to become scientists, technologists or anything else: Your interest in a particular endeavor can rub off.

"If you're a parent and you're excited about something, your kids are excited about it," the former "Mythbusters" TV personality said at the Wildcat Tech Expo at Weber State University.

"If you're excited about science, then they're excited about science. If you're excited about TV, they're going to be excited about TV. I think it's important. … It's easy to say but we have very limited time, but every now and then if you can grab them and do something fun — and usually [something] messy gets the kids most excited — I think that that's going to be the most inspiring thing, is just show them your passion."

The TV show aimed to either confirm or "bust" urban legends and the like, and Byron said her interest in such experimentation came at an early age.

"My dad tells me I've been training to be a mythbuster my entire life," she said. "He said that he caught me many times trying to turn my sister into a crash-test dummy. I used to do little experiments on her."

Examples include trying to get a playground swing to go a full 360 degrees — with her sister aboard. When Byron was about 5 and her sister was 2, the older sibling used a laundry chute for one experiment, until her father saw what was going on.

"I put a bunch of pillows down in the bucket that would catch all of the laundry. And I had been tossing dolls down the three stories of the chute, trying to see if they would land OK. And he came in just before I was going to toss my sister down the chute. And I was like, 'It's OK. See? All the teddy bears are fine.'"

In her adult life, Byron has become a science-focused TV personality and an artist. She sees similarities in the two.

"I always thought that science and art were in the same line. I mean, you're fostering a curiosity. They just manifest in different ways," she said. "I just think that when you approach science the way that you approach art — getting messy and getting your hands dirty and getting into it — I think you'll be more interested."

Byron has found many ways to "get messy" during her career. One "Mythbusters" test determined that — surprise! — pretty girls do indeed fart. Her flatulence was confirmed via a loudspeaker system throughout her workplace. Another had her inside a glass box while 40 scorpions were placed atop her to determine whether there truly is a "smell of fear."

As her career path progressed, she discovered that acceptance of nerds has become widespread.

"I feel like there has been a revolution, a sort of nerd appreciation, for sure. There's definitely been a change. Comic-Con has gotten bigger and I think shows like 'Mythbusters' wouldn't be successful unless the world started to appreciate the intelligence of the nerds," she said.

"As far as technology, we all sit there with our phones in our hands, constantly interacting. … More and more, it's just what we do. I think it's the future for us. We're not really building cars anymore; we're building apps."

Likewise, the role of women in technology fields has grown.

"It's really evolved over the years because in the beginning, I guess, they didn't see a lot of women on TV in roles that were compelling — like, the woman was always the nurse, not the doctor, or she was the assistant, not the scientist," she said.

"I think the problem has now evolved, because I think girls are interested in STEM (science, technology, engineering and math). Clearly, when I was growing up, I was being a mythbuster at 5 and I was interested in all those things. I think keeping them interested is now the question. How do you keep an environment where they don't get trampled by it?"

Interestingly, technology allows for improved ways for technology-focused people to share their passion, she said.

"We are so blessed with the technology that we can reach out, so if you're the only girl in a math club, you can reach out to other girls, the only girls in the math club three states over," Byron said.

Once the only female star on a show with four male stars, Byron can relate to girls who want to break into a field populated mostly by men.

"I think the most important thing is to network, to find each other and support each other, because sometimes we feel alone," she said. "You're not actually alone. You just happen to be alone in this one situation. We need to help each other out, lift each other up. And then when you get in a power position, you do the same. You're going to reach down and help young women out and make them not feel alone, bring them on in."

While the "Mythbusters" run is over, Byron has found other ways to keep her passion for science alive. She has hosted and produced other shows. She will co-host another "Punkin Chunkin" program this November, highlighting an annual event where all manner of contraptions launch pumpkins over a mile. And she is working with former "Mythbusters" colleagues Tori Belleci and Grant Imahara on a program titled "White Rabbit Project," set to debut Dec. 9 on Netflix.

"No matter what, if you keep following things that make you passionate, happy and have fun with, you're always going to have a job," Byron said.

Apparently, like with her sister, Byron's passion for experimenting on other people has not waned.

"There's a kind of program that works with amateur neuroscience, and they helped me hook Tori up with a bunch of electrodes so I could control his muscles, which was so much fun," Byron said amid giggles from herself and the Weber State audience.

"We did that as a filming project for 'White Rabbit Project,' and it was hilarious. I messed him up good."

Internet Service Providers

Listed by Total Number of Utah Employees

Rank	Company Name / Address	Phone / Web	Total Number of Utah Employees	Area(s) Serviced	Number of Subscribers	Top Executive
1	**Veracity Networks** 170 W. Election Road Draper, UT 84020	801-379-3000 veracitynetworks.com	130	Utah	20k+	Marshall Erb
2	**South Central Communications** 318 N. 100 E. Kanab, UT 84741	435-826-4211 socen.com	100+	South central Utah, northern Arizona	8,500	Michael East President & CEO
3	**CentraCom** 35 S. State Fairview, UT 84629	435-427-3331 centracom.com	97	Sanpete, Sevier, Millard, Tooele, Juab, Rich	11,500	Branch Cox, CEO Eddie Cox, President
4	**ServerPlus** P.O. Box 970842 Orem, UT 84097	801-426-8283 DND	97	U.S. and international	500,000	Layne Sisk
5	**XMission** 51 E. 400 S., Ste. 200 SLC, UT 84109	801-539-0852 xmission.com	38	Utah with hosting, domains, and email worldwide	DND	Pete Ashdown
6	**Utah Broadband** 461 Parkland Drive Sandy, UT 84070	801-953-6706 utahbroadband.com	30+	Wasatch Front, Wasatch Back	10,000+	Steven McGhie
7	**American Wireless Inc. dba AWI Networks** 845 Red Hills Parkway St. George, UT 84770	435-0674-0320 awinetworks.com	36	Five-county area of Southern Utah	DND	Ray Carpenter CEO
8	**InfoWest Inc.** 148 E. Tabernacle St. George, UT 84770	435-674-0165 DND	30	Brigham City, Layton, Lindon, Midvale, Murray, Orem, Payson, Perry, Tremonton, West Valley City, Beaver, Minersville, Milford, Enoch, Cedar, Parowan, Summit, New Harmony, Kanarraville, Toquerville, LaVerkin, Hurricane, Washington, St. George, Santa Clara	DND	Kelly Nyberg President & CEO

Three technologies that help protect intellectual property overseas
- and why Utah companies should care

Utah has become a hub of global innovation, with 2014 exports totaling $12.3 million, according to the World Trade Center Utah. In fact, the state is one of the few with a trade surplus, estimated at $5 billion annually. The growth in international business has resulted in a 35 percent increase in patents filed domestically and internationally over the past five years, with the U.S Patent and Trademark Office showing 1,374 filed from Utah companies in 2014 alone. Subsequently, the volume of patent applications needing translation to and from dozens of languages also increases.

The success and enforceability of international patent applications depends, in large part, on the quality of the patent translation. The quality of the patent translation, in turn, depends on the quality of the translation service provider, which depends entirely on the quality of the people, processes and technologies employed.

It's especially exciting to imagine the emerging technologies that can help simplify the patent translation process. However, while machine translation technology, for example, continues to advance, even the innovators of such technology concede that most programs aren't sufficient to do more for IP translation than search for and review international patents (referred to as e-discovery or prior-art search) and act as an aid for human translators. That said, there are other technologies available to facilitate the process for human translators, whose specific language, culture and scientific expertise can help ensure the accuracy of the international patent applications.

Let's consider three major technologies your translation service provider should be using to ensure the best quality translation and process:

• **Terminology Management.** This technology streamlines the translation process by ensuring trademarked items, trade language, acronyms and other words used frequently within an organization are consistently translated into agreed-upon terms in target languages and even regional dialects. The starting point for terminology management is the creation of term databases standard to a specific industry or brand. The software then automatically provides a translation for recognized terms.

Additionally, the database captures additional terms and tracks the source of the term, the date the term was entered and which translator or translation team member entered the term. This technology is critical, since brands, technical and trade terms can rarely be translated literally, and each translator will make different interpretations and usually end up with different translations. Using the wrong word or phrase can lead to misinterpretation within the patent application, as well as the company showcasing itself as a newcomer to its target markets. Furthermore, the absence of this technology introduces risk that must be addressed with manual quality control measures, which results in increased labor and overhead cost.

• **Translation Memory.** Service providers should be using translation memory software to allow their translators to leverage previous translations in current projects. The software parses the material into segments, such as sentences or phrases, and will then match them in subsequent documents. Contextual matching technology looks for additional clues by recalling two to three sentences before and after the suggested match. As some suggested translations are based solely on a range of similar words, however, it is still critical that humans review the final product because the context of the translation must still be determined.

• **Machine-Assisted Translation.** This technology takes translation memory and terminology management a step — or even several steps — further by training a server to use contextual matching for an initial translation prior to human post-editing. As it currently stands today, machine-assisted translations are mainly used in e-discovery or prior-art search, as mentioned previously, or to assist human translators in their translations. In the later case, these machine translations require human post-editing — with some translations resulting in minor corrections and others needing to be restarted completely from scratch.

The Business Benefits of Technologies

In addition to facilitating patent translations, using the most advanced technologies results in two especially valuable benefits:

1. Eliminating Errors for Proper Patent Protection. To ensure IP is protected with enforceable patents, translation quality must be high. Even one mistranslated word could affect the meaning and scope of a patent, opening it to litigation and potentially resulting in millions of dollars in lost revenues. Translation technologies help ensure consistency and, coupled with human translators, will help eliminate errors across the board, including original errors identified in one language version but not another.

2. Managing Costs. Whether seeking protection in one country or several, international patents are expensive — but to compete in a global market they are necessary. Translations aided by advanced technologies help create efficiencies that fit limited IP budgets, whether filing each patent application across numerous countries or filing a high volume of patents.

Overall, contracting with translation service providers that use the most recent and advanced technologies specifically tailored for foreign patent applications — along with quality people and processes — will help ensure high-quality translations to properly protect your IP. As a result, it will also help your company — and the others multinational companies in the state — continue to position Utah as a global business leader for years to come.

Jeremy Coombs is the senior vice president of operations at MultiLing, a Provo-based provider of intellectual property translations and related support services for foreign patent filings.

JEREMY COOMBS

Website Developers

Listed by Total Number of Utah Employees Dedicated to Web Development

Rank	Company Name Address	Phone Web	Total Number of Utah Employees Dedicated to Web Development	Notable Clients	Specialties	Year Est. Locally	Top Local Executive
1	**Fusion 360** 1434 E. 4500 S. Ste. 101 SLC, UT 84117	801-810-4001 fusion360studios .com	43	Red Bull, Wrangler, Peterbilt, Stein Eriksen Lodge, Robert J. DeBry & Associates, Elements Capital Group, Wasatch Academy	Branding, digital, film, web	2003	Todd Noall, CEO and Chief Strategy Officer
2	**Web Design In Utah** 6995 S. Union Park Ctr. Cottonwood Heights, UT 84047	801-557-4409 webdesigninutah .com	35	DND	Enterprise and SMB hosting, web design and development	2004	Braxton Tulin
3	**ThoughtLab** 56 E. Broadway Ste. 200 SLC, UT 84111	801-355-2696 thoughtlab.com	25	eBay, Grant Thornton International, Envision Utah, BlendTec, Advanced Auto Parts, Children's Miracle Network, Cushman & Wakefield, Primary Children's Hospital	Multiple platforms and programming languages for enterprise applications, .NET, PHP, Java, Javascript, C#, C++, MySQL, Microsoft SQL Server, HTML, CSS, Ruby, Objective C, Swift	1999	Mike Harker, CEO
4	**Riester** 1441 Ute Blvd. Ste. 360 Park City, UT 84098	435-647-2100 riester.com	25	Talking Stick Resort, Casino Arizona, Choctaw Casinos, Nationwide Insurance, Arizona Department of Health Services, La Victoria, Herdez, Park City Chamber/Bureau, PacifiCorp (Rocky Mountain Power and Pacific Power)	Custom CMS development, .NET development, Google Tag Manager	2001	Alan Perkel, Principal and Chief Digital Officer
5	**i4 Solutions Inc.** 707 W. 700 S. Ste. 201 Woods Cross, UT 84087	801-294-6400 i4.net	16	Utah Transit Authority, Intermountain Wind and Solar, Swire Coca-Cola, Kassing Andrews Advertising, Wasatch Commercial Management, Associated Foods, Augason Farms, Park City Summit County Arts Council, Bryson Sales and Service, Ontario Recreational Canoeing and Kayaking Association (ORCKA), and hundreds more.	Website content combined with search engine optimization (SEO), pay-per-click marketing (PPC), conversion rate optimization (CRO), other Internet marketing services, social media, extensive link building, and geographic targeting	2001	Brandon Anderson, Partner Mike Rivera, Partner
6	**Love Communications** 546 S. 200 W. SLC, UT 84101	801-519-8880 lovecomm.net	5	Salt Lake City Corp. Dept. of Airports, United Way of Salt Lake, Pioneer Theatre Company, Standard Optical, Arctic Circle Restaurants, Nicholas and Co., Cache Valley Electric	Full-service website design & development, search engine optimization (SEO), display and PPC marketing	1999	Tom Love
7	**SEO.com** 65 E. Wadsworth Park Dr. Ste. 200 Draper, UT 84020	800-351-9081 DND	5	DND	PHP, WordPress	2008	Boyd Norwood

The Enterprise
UTAH'S BUSINESS JOURNAL

Website Developers

Listed by Total Number of Utah Employees Dedicated to Web Development

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Rank	Company Name Address	Phone Web	Total Number of Utah Employees Dedicated to Web Development	Notable Clients	Specialties	Year Est. Locally	Top Local Executive
8	**modern8 Corp.** 145 S. 200 W. SLC, UT 84101	801-355-9541 modern8.com	4	Jacobsen Construction Bear River Mutual Architectural Nexus	Brand strategy and design	2001	Randall Smith
9	**Penna Powers** 1706 S. Major St. SLC, UT 84115	801-487-4800 pennapowers .com	3	DND	UX/UI development and design, SEO, mySQL databases, content management systems (WordPress), html email marketing and automation, interactive banner ads, custom analytics, web and content audits, user testing, social media integrations	1984	Chuck Penna
10	**Swivelhead Design Works** 8813 Redwood Rd. Ste. A West Jordan, UT 84095	801-566-3152 swivelhead design.com	2	Lingotek, Intermountain Healthcare, Village Baker	DND	2001	Matt Doyle

ENTREPRENEURS
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cal experience for how they integrate those two together," she said.

A major trend in the move has been the personalization of products, where technology has allowed people to, for example, not just be a spectator at a show but to be part of the show. Personalization of products led her 3D printing company to produce toys that allowed the customer to become Iron Man or a "Star Wars" stormtrooper or a big-league baseball player.

But personalization won't just transform consumer products. Its application in the medical realm has resulted in personalized prosthetics, vastly changing the lives of the users.

TODD PEDERSEN
CEO, VIVINT SMART HOME

Pedersen focused on how companies must always work on reinvention.

"As you're building your company, I think that people need to remain focused on the fact that if you build a successful business, other people are going to copy you," Pedersen said.

Todd Pedersen

"You may think you've created something new and different and it's not replicable, but it probably is to some degree. And if you are not thinking constantly about reinventing your business, someone else is doing the same thing to you. It's going to happen to you and it's going to make your company irrelevant."

His own company, for example, has moved from a focus on security to smart home technologies. And the future is always on the mind of its executive team, he said.

"What we're talking about doing is always something very, very different than what we're doing right now. We're laying the groundwork, we're laying the plans, for what's going to happen in a year, 18 months, two years, five years, whatever the case might be," Pedersen said.

"What we're doing and the way we look right now at Vivint, if we execute, if we perform properly, [the company] is going to look very different in three or four years than the way the company looks right now."

One complexity in undertaking a reinvention lies in internal communication, he said. "It's difficult to communicate and message to an entire company, especially the bigger it gets. … It's absolutely critical, because you have to have complete buy-in into what you're going to do, because if you're not communicating properly and [your] people don't understand what they're doing or why they're doing it, they're probably not going to be committed to it."

AARON SKONNARD
CO-FOUNDER AND CEO, PLURALSIGHT

Skonnard emphasized three skills that young entrepreneurs need. The first is to "learn how to learn." He was 8 years old when his father brought home an Apple II personal computer. They grabbed the instruction book and learned how to use the new technology, along the way igniting a passion for technology and the process of learning, Skonnard said.

Aaron Skonnard

"It's probably *the* most important thing you can learn in school,

in universities or even if you don't go there," he said. "If you can learn how to learn, and you can learn how to learn fast, and faster than other people, you will find success in your life and in your business and in your startup and in your vision of what you're trying to create."

He also encouraged audience members to "live an unconstrained life" as a way to open up possibilities.

"We see the world through the lens of what's currently possible, what we currently know, and when we look at solutions, we look at all the options that we're familiar with," Skonnard said. "And when you start to live an unconstrained life, you let go of all of that and you actually can envision and see possibilities for a new future that no one else can see. And that's when the magic happens."

He also spoke about having an intentional organizational culture. That involves taking those first two principles "and infusing that into the fabric of the company you're building, and any other precious or sacred thing that you think is going to drive to a healthy and productive work experience for all the people you're going to inspire with your vision."

SLOPES
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ence and engineering graduates from Utah's universities.

• Championing the passage of the Utah Fund of Funds-Fund I, which changed the state's early stage capital structure and attracted more than 200 venture capital and private equity firms for a total to-date investment of $121 million.

• In close collaboration with the Salt Lake Chamber and EDCUtah, playing a key role in the creation and funding of the $400 million Utah Science Technology and Research Initiative (USTAR), which now serves as the state's "innovation framework," attracting top researchers and federal funding to Utah's leading research institutions with the goal of creating new companies and high-paying, high-skilled jobs.

• Strongly advocating a change in the science, technology, engineering and math (STEM) high school graduation requirements to enhance the rigor of Utah high school students by requiring an additional year of math, science and language arts.

• Lobbying with Westminster College to get the the State Board of Education to agreed that high school students can count a rigorous computer science class as one of three science credits required for high school graduation.

• Advocating for the passage of SB 59, a bill that gives every school one letter grade for students' quality of STEM education and overall preparedness with the goal of better preparing the state's 625,000 underserved students to successfully compete for high-demand jobs in the global economy.

• Securing multiple rounds of funding for the STEM Action Center, with the primary goal of supporting digital professional development for teachers and providing effective STEM education through digital learning tools to public K-12 classrooms statewide.

These efforts don't just help Utah's tech sector grow, they help the state's entire economy grow. According to an article published by *AdWeek* last month, the U.S. Chamber of Commerce Foundation ranked Utah as the best-performing state in terms of economic growth for two years in a row. *Forbes* included Salt Lake and Ogden on its list of the fastest-growing U.S. cities, at numbers 5 and 6, respectively. The state added more than 46,000 jobs in 2015 on top of an unemployment rate around 3 percent, which is half the national average.

Thanks to the rising tech tide, $800 million in venture capital came into the state between 2013-2014 from high-profile investors such as Peter Thiel, making Utah the leader for venture capital infusion in the Rocky Mountain West, beating out Colorado, Arizona and Idaho combined. And the trend continues. Suburban communities in particular, like Draper where eBay opened its new facility several years ago, have blossomed and grown, filled with new business and new construction.

The only question, according to an article published last year in *The New Yorker*, is whether the success Utah has already experienced can continue to be replicated. Certainly, the piece argues, Utah's success offers plenty of lessons worth learning from expanding publically and privately funded research and development; improving the pipeline of STEM workers as the UTC has advocated; and creating attractive local "ecosystems" with public transportation, access to recreation and a family-friendly environment that improves quality of life.

As a report on the technology sector recently released by The Brookings Institution put it: "The speed and complexity of innovation and its global champions are ratcheting up the urgency of the enterprise and demanding new strategies for engaging in it. Both the private and public sectors must radically rethink their technology development strategies accordingly if they are to remain relevant."
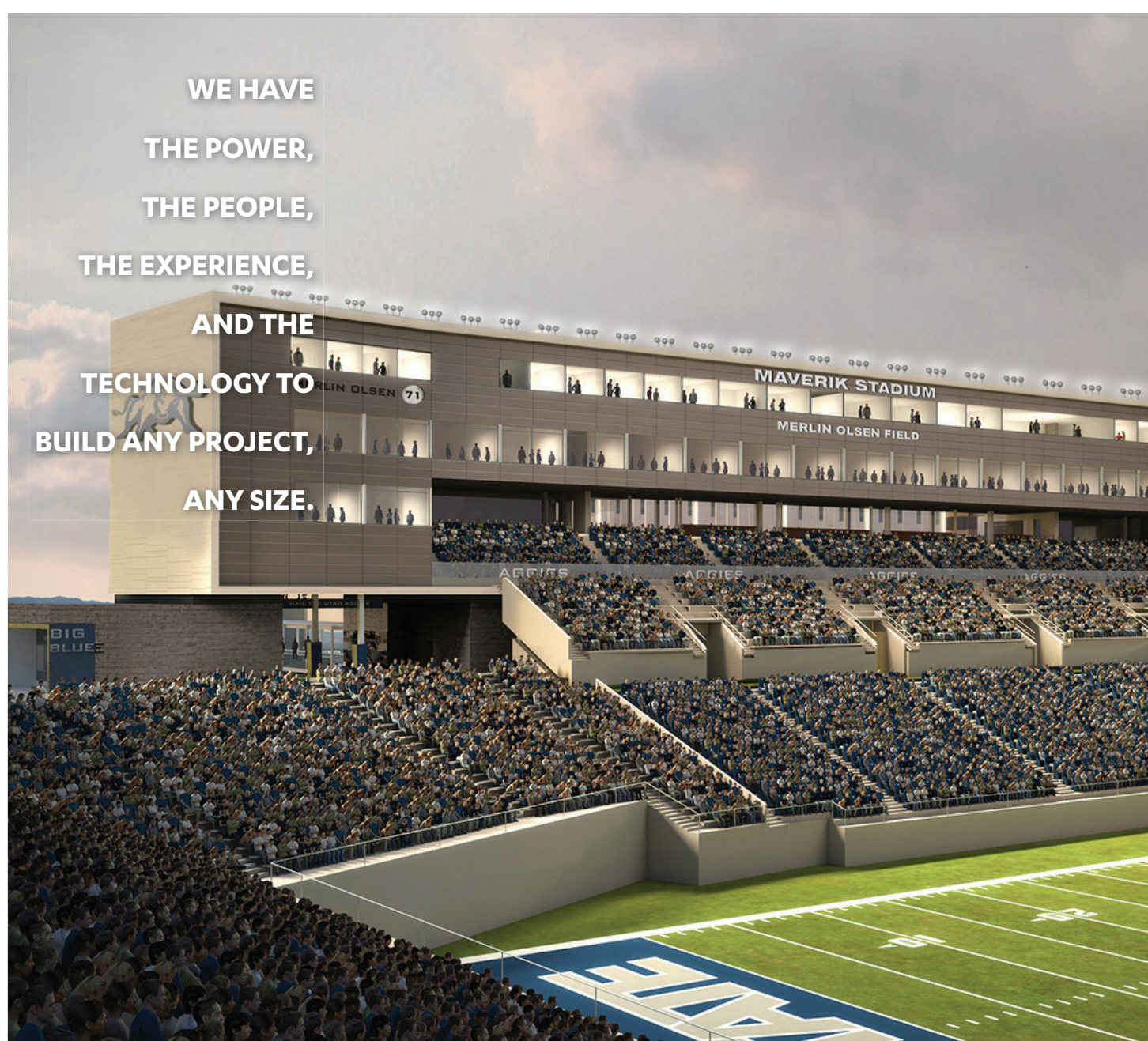
Distributing change: Effects of technological disruption on industry and logistics
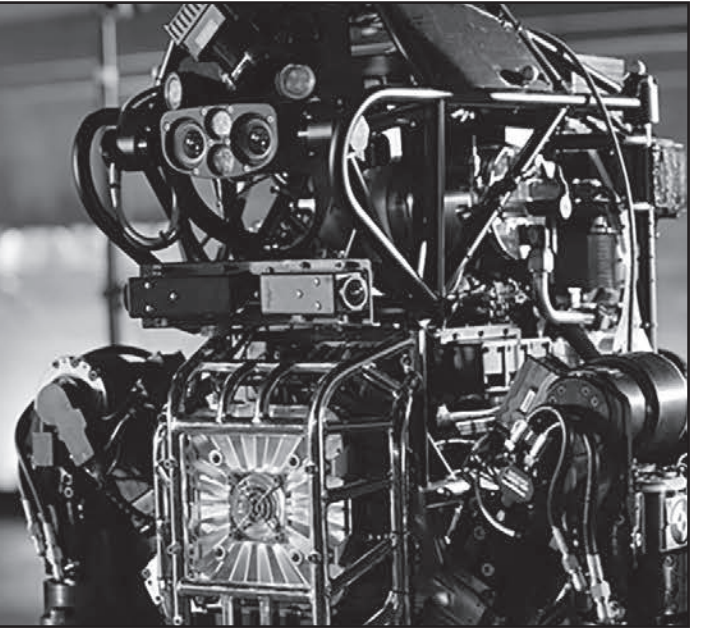
Technology is changing the way the world does business, and the industrial and logistics industry is currently experiencing the effects of technological disruption. Utah's industrial market has always played a part in the national economy due to its location at the "Crossroads of the West." As the state's economy has evolved, local industrial operations have taken on an ever-increasingly global role. As such, both local and global players can benefit from preparing their facilities to adjust to technological shifts occurring in the industry.

JEFF RICHARDS

A recent CBRE Research report, titled "Automated Technology: Driving Change in Real Estate," highlights some of the transformations taking place in the global supply chain and expands upon three of the major technological disruptors: Autonomous Vehicles, 3D Printing and Automation Within the Logistics Space (robotics). A short summary of each of these disruptors, including how this will affect commercial real estate, is included below.

Autonomous Vehicles

Self-driving vehicles are a constant topic in the news, but most people are too concerned with how it will affect their morning commute to consider the effects of driverless vehicles on logistics. As automated vehicles become more prevalent, major shifts in trucking, labor and warehousing will naturally follow.

In the U.S., labor accounts for approximately 75 percent of the cost to move a full truckload from Los Angeles to New York. At the same time, trucking companies have seen a decline in available drivers in recent years due to the long hours and safety risks associated with the industry. Per U.S. federal regulations, truck drivers are restricted to 70 hours per week, equating to roughly 400-500 miles per day. Labor is a top concern for U.S. trucking companies. Consider

the replacement of these trucks with automated vehicles. This reduction in labor costs would result in lower delivery costs for the consumer and an increase in the total number of miles a truck is able to cover within a 24-hour period, supporting increases in e-commerce sales and a change in distribution structures. In short, the entire logistics framework of an organization will completely change.

This technology is quickly being tested and adopted throughout the globe. In April 2016, a caravan of roughly 12 self-driving, semi-trailers traveled more than 2,000 miles across Europe crossing four national borders. Organized by the Dutch Ministry of Infrastructure and the Environment, the trucks traveled from manufacturing facilities in Belgium, Denmark, Germany and Sweden to the port of Rotterdam in the Netherlands. As more successful testing continues to occur, adoption of this technology is rapidly increasing. According to a survey done by eyefortransport.com, a website covering supply chain logistics, 59 percent of respondents anticipate driverless trucks in their operations in the next nine years.

So, assuming this is the future of the industry, how can real estate users and owners prepare for the changes that will occur? There are three important ways in which automated vehicles will most likely affect industrial and logistics companies:

1. The decrease in labor and transport costs will ultimately result in the need for fewer warehouses. There is already a noticeable trend in the industry of users consolidating their warehouse space. As a result, it is likely that in the coming years there will be fewer warehouses built, but those constructed will be larger and in more remote locations.

2. Last-mile delivery facilities, the transport of goods from the hub to their final destination, must be able to

accommodate large truck convoys and deploy electric city delivery vehicles, a common means for delivering products to the end-user. As such, these structures will need extensive battery loading stations.

3. Warehouse courtyards will need to be constructed in a manner that allows automatic maneuvering to accommodate the self-driving trucks.

3D Printing

3D printing is completely transforming the manufacturing industry — especially in the high-tech and healthcare segments. Some logistics companies have extended into the 3D printing sector and now offer 3D printing services located near their logistics hubs, creating a timely and efficient manufacturing network for parts. China has invested heavily into this technology as a means of lowering costs and decreasing its reliance on other countries for parts. 3D-printed manufactured goods only represent 1 percent of all manufactured products in the U.S., but the sector is rapidly growing. The global 3D printing market is on track to exceed $10 billion by 2018 and is expected to surpass $21 billion by 2020. Part of its quick growth is due to the fact that it can meet many of the most common challenges facing todays supply chain managers.

The impact of 3D printing on industrial real estate is not likely to be dramatic. It is possible that fewer large sites will be needed, with last-mile delivery points becoming production locations. But until then, raw materials will need to be shipped, so there will be more emphasis on bulk transport, which can potentially be facilitated by automated vehicles. Also, it would indicate less need for central hubs and more emphasis on last-mile distribution facilities.

Automation Within the Logistics Space (aka Robotics)

Robotics within warehousing has been steadily increasing for many years and this has resulted in a transformation of the labor component,

altering the way operators configure and build their distribution centers and warehouses. Automation is becoming critical for the logistics space, but human labor will not disappear completely. There will always be a need for skilled laborers to make higher-level decisions that robots are incapable of making.

How will this rise in artificial intelligence and automation affect commercial real estate? As warehouses become increasingly autonomous, this will likely cause a shift in the way logistics facilities are built and maintained. They will require accommodations for more advanced technology, including IT infrastructure and new software programs that will likely be interconnected throughout the space, allowing for large amounts of data to be stored and analyzed. It is likely that this will increase the cost of building new facilities, affecting rents in the short term until these technologies are adopted across the industry. It could also lead to a new development cycle within the industry if current distribution centers are unable to adapt to the rise in automation. The use of robot picking systems will also lead to different requirements for daylight and ceiling height, stimulating high-bay warehousing, multi-layered developments and greater use of mezzanines. This may place further pressure on warehouses to become larger, with fewer sites and a leaner logistics network.

As advances in technology continue to alter the way we do business, disruptions within the supply chain are guaranteed to occur. Logistics companies, owners and operators who begin to prepare for these changes now will be best-positioned to remain competitive as these technological advances become mainstream.

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