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FALL 2014

TECHCONNECT

ARIZONA'S TECHNOLOGY MAGAZINE

PUBLISHERS

Sandra Watson
Steven G. Zylstra

EDITOR

Don Rodriguez

EXECUTIVE EDITORIAL DIRECTOR

Joseph Valdez

ART DIRECTOR

Erin Loukili
Lucky You! Creative
www.luckyyoucreative.com

DESIGNER

Jaelyn Threadgill

CONTRIBUTING WRITERS

Joseph Caspermeyer
Nitin Dahad
Don Davis
William Harris
Paul Tumarkin
Steve Yozwiak

E-MAIL

editor@techconnectmag.com

For queries or customer service call 602-343-8324

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Super Bowl and Pro Bowl

SHOWCASE ARIZONA'S OPPORTUNITIES TO THE WORLD



Millions of eyes from around the globe will be fixed on Arizona and the Greater Phoenix area when Super Bowl XLIX is played at the University of Phoenix Stadium on Feb. 1.

Arizona has achieved elite status as one of only seven host sites to be selected for the NFL's Super Bowl at least three times. By also landing this year's Pro Bowl, which will be played the week before the Super Bowl, Arizona strengthens its reputation as a preferred destination for the world's greatest events.

Our state's assets and capabilities helped to attract these marquee events, and securing them is a testament to the collaborative work being done statewide to stimulate tourism, trade and business opportunities. Together, the Super Bowl and Pro Bowl will translate into hundreds of millions of dollars in economic impact for Arizona. The positive permanent impression made on the worldwide audience will be the real payoff for our statewide economy.

With more than 160 million U.S. viewers, the Super Bowl ranks as the nation's most watched television program year after year. Internationally, the game is televised in 198 countries in 25 languages, providing an unmatched platform to showcase Arizona's advantages to the world.

Sharing Arizona's story with the globe will be 6,000 media personnel and hundreds of thousands of fans descending upon the Greater Phoenix area to be part of the games. The millions of news stories and personal experiences they generate through broadcast, digital and social channels will highlight the best our dynamic state has to offer.

This year the Phoenix area provides an exciting metropolitan backdrop to Super Bowl week that will exhibit Arizona's world-class sporting facilities and venues, hospitality and tourism

assets, modern transportation infrastructure, top-ranked university and medical research centers, and our robust business and innovation environment.

Since our state hosted its last Super Bowl in 2008, Phoenix has made dramatic advances to its urban core, infusing \$4 billion into new downtown development. These enhancements include 250,000 square feet of new retail space, completion of the state-of-the-art Phoenix Convention Center, 20 miles of light rail connecting the broader metro area to downtown and 1,500 new hotel rooms. Scores of new restaurants and entertainment hotspots have followed.

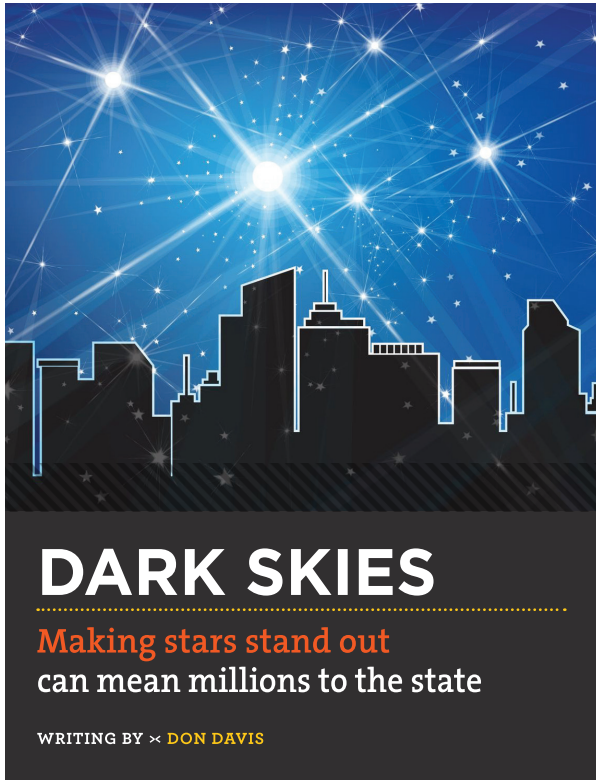
Super Bowl Central in downtown Phoenix will be a focal point for Arizona's lineup of fan and sponsor activities with 1 million people expected to participate. Top CEOs and business executives from national and international markets will be among them.

Through coordinated efforts by the Arizona Super Bowl Host Committee and the Arizona Commerce Authority, decision makers from Fortune 500 corporations to early-stage innovators will participate in tailored visitor experiences. Each will learn how Arizona supports business success, and these activities will foster future attraction and expansion opportunities throughout our state.

Arizona is ready for this moment once again. We have cultivated a pro-business environment that encourages innovation, rewards talent and promotes growth. On the world's biggest stage, Arizona will demonstrate why it's one of the best places in the nation for both talent and business to thrive and win.

Sincerely,





DARK SKIES

Making stars stand out
can mean millions to the state

WRITING BY ✕ DON DAVIS

The 1985 announcement was startling: California's Mount Wilson Observatory, once the home of the largest and most productive telescope in the world, was being closed. Why? City lights overwhelmed starlight. Astronomers learned from this experience, so when the astronomy industry in Arizona took off in the 1960s, it worked to protect the dark skies vital for future success.

Today, Arizona benefits from these early efforts. Astronomy contributes over \$250 million annually to the economy with a capital investment of over \$1 billion, according to a 2007 study. These investments continue: A major new array of telescopes is being considered for northern Arizona and the largest single telescope in the world is reaching maturity on Mount Graham. Arizona's vibrant optics industry had its origins in astronomy, and The University of Arizona's Steward Observatory is the leader in producing the giant mirrors for next generation telescopes. Astro-tourism has blossomed with the establishment of dozens of private observatories and entire communities being planned around dark skies. Astronomi-

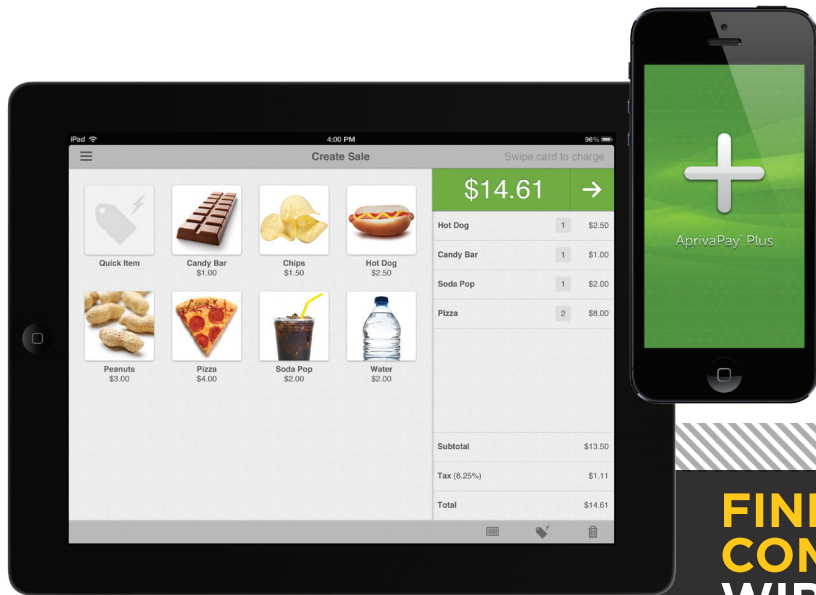
cal images even grace a wide range of ads for Arizona, making them almost as ubiquitous as the saguaro!

Arizona residents are very supportive of astronomy and value their clear dark skies. However, the state's growth threatens our dark skies. Outdoor lighting codes (OLCs) have been successful in mitigating the impact of increasing sky brightness. But continued protection is essential as existing cities expand, new ones spring up and people spread throughout remote areas. Furthermore, a quiet revolution is taking place in the lighting industry: Light emitting diode (LED) fixtures are rapidly replacing traditional lamps. LEDs promise significantly longer fixture lives, superior beam control and greater operating efficiencies. Prices are plummeting and new products appear regularly as the market expands. But LEDs not only offer opportunities, they also pose a threat to dark skies if their broad range of radiated color is not managed.

The astronomical community has long worked with communities to fashion OLCs. APSS (Astronomy, Planetary and Space Science), an association representing the major astronomical observatories in the state together with other astronomy-related organizations, is promoting increased vigilance in maintaining dark skies. APSS works with local jurisdictions to educate about the importance of dark skies and how to improve existing OLCs. For more information, visit the APSS website at www.azapss.org.

APSS would like to hear your thoughts on preserving the natural beauty of our dark skies for astronomy, the economy and the life quality of all Arizonans. Send an email to info@apps-az.org or also arrange a presentation.

DON DAVIS is senior scientist and director emeritus of the Planetary Science Institute in Tucson.



“ In a world of WikiLeaks, you want to know who’s accessing the data. ”

- Apriva CEO
Chris Spinella

FINDING THE RIGHT COMBINATION IN THE WIRELESS WORLD

Start with Kool-Aid, add a BlackBerry and blend in a little Apple. If that sounds like a blend to create something “sweet,” the team at Apriva would agree. It captures what has been their recipe for success.

Scottsdale-based Apriva is the leading provider of end-to-end wireless transactions and secure information messaging solutions that are reliable. Its latest victory is its Mobile Environment Security Architecture (MESA) virtual private network gateway being added to the approved products list for the National Security Agency/Central Security Service. This means the agencies can take advantage of using commercial products and protocols while protecting national security information. “In a world of WikiLeaks, you want to know who’s accessing the data,” says CEO Chris Spinella, also one of Apriva’s founders.

This pinnacle was 15 years in the making. Spinella explains that it all started in 1999 when one of his business partners dropped a BlackBerry device into a pitcher Kool-Aid. After taking it apart to dry it out in an attempt to salvage it, what they discovered was a “mini computer” that had the potential for so much more. “We thought at that time, what if you’re

able to build other applications that go on this device,” he says.

Not long after, the company was taking credit card transactions with its wireless gateway services. It moved deeper into this segment to eventually create the technology that three out of the top five banks now use for their credit card processing. So with the recent chatter about Apple Pay, it’s more like old news for Apriva. But Spinella sees this as opportunity to increase awareness about his company as it becomes part of the Apple development community.

The other sector Apriva serves is government, which includes the latest designation by the security agencies. With such technology in place for government virtual private networks, this opens the avenue toward commercial applications to serve such fields as healthcare and law. For example, medical records can be sent with the doctor and patient knowing the transmission is highly secure. “Authenticity, if you will,” says Spinella.

This all allows Apriva to plan on adding another 40 employees this year to its 245-member workforce. Just as a rising tide lifts all boats, Spinella says his company “sees this as an opportunity to rise.”



Pat Sullivan

TRIPLE THREAT

Founder of three companies
among tech award winners

Launching one company should be enough to make anyone proud. And if it's successful, that's a plus. So when you launch three successful businesses, it's cause to celebrate.

That happened when members of Arizona's technology community gathered to honor Pat Sullivan with the OneNeck IT Solutions Lifetime Achievement Award at the 11th annual Governor's Celebration of Innovation on Nov. 13. The event was presented by Avnet and co-hosted by the Arizona Technology Council and the Arizona Commerce Authority.

Sullivan is co-founder & CEO of Contatta in Scottsdale. He also is co-founder of ACT! and founder of SalesLogix.

Other 2014 awards and their winners are:

William F. McWhortor Community Service

Leader of the Year: Harry George – managing general partner of Solstice Capital, Tucson

Ed Denison Business Leader of the Year:

Tomas Gorny – CEO of Nextiva, chairman & CEO of Unitedweb, Scottsdale

Pioneering Award: Infusionsoft, Chandler

Judges Award: Society of Women Engineers – Phoenix Section

Innovator of the Year - Start-Up Company:

Clairvoyant (Chandler) – Recognized for developing custom data analytics software that reduces the friction, time and cost associated with analysis, allowing businesses to convert compiled data into empowering information.

Innovator of the Year - Small Company:

SynCardia Systems (Tucson) – Recognized for developing the Freedom, the portable power supply for its temporary Total Artificial Heart, which allows patients to be discharged while waiting for donor hearts.

Innovator of the Year - Large Company:

Securaplane Technologies (Oro Valley) – Recognized for developing improved rechargeable lithium battery systems that are 42 percent lighter, have nearly double the cell replacement timeframe, offer 40 percent higher power availability and are less prone to failure due to puncture, overcharge and temperature extremes.

Innovator of the Year – Academia: ASU

Image Processing Applications Laboratory (Tempe) – Recognized for developing a cloud-based computer simulation platform that allows live modeling of individual patient data, facilitating for the first time a patient-specific pre-treatment plan for endovascular treatments.

The next generation of Arizona's innovators also were recognized. The Future Innovators of the Year winners and their projects are:

- **Diego Aubert-Vasquez – Tucson High Magnet School:** The effects of bacteria isolated from waste water on sodium lactate microbial fuel cells
- **Rachel Done – University High School, Tucson:** Expression and purification of a fusion protein for breast cancer drug discovery
- **Sarah Nicole Galvin – Corona del Sol High School, Tempe:** An innovative approach to improve spin polarization in $\text{CO}_2\text{FeAl}_{0.5}\text{Si}_{0.5}$ thin films for spin transport electronics
- **Shrey Gupta – BASIS Scottsdale:** Advancing cancer research with an integrated repository and search engine for gene regulatory networks

UNITED FOR SUCCESS

WRITING BY × WILLIAM HARRIS

Collaboration enhances education and workforce development

the Arizona STEM Network led by Science Foundation Arizona recently launched a 21st-century collaboration platform to enable businesses, educators, government and philanthropy across the state to help graduate more students who are prepared for the global economy.

The Network is focused on enabling partner organizations to create meaningful business engagement opportunities in education; strengthen teacher effectiveness in science, technology, engineering and mathematics (STEM); integrate the academic disciplines into schools and districts; change the culture and community fabric to embrace STEM; and ultimately measure outcomes.

Businesses want to get involved in education and often aren't sure how to engage. Educators want assistance from business partners but don't know whom to ask. The business advocate program provides a technology solution for businesses to connect with STEM educators. Now, we need business to step up and get involved. Becoming a business advocate is simple. Just visit stem.sfaz.org.

Through the collaboration platform, businesses can connect with educators throughout Arizona and support STEM learning. The platform is also a great resource for teachers. They can access Tools4Teachers, which contains materials for implementing a STEM program, the latest school policy, content and resources, professional development tools, and outreach and partnership information.

The Network is a backbone organization providing value to the statewide STEM community through:

- Scaling successful education programs to achieve greater impact and to reach more students and teachers.
- Enhancing efficiency and effectiveness through continuous communication and coordination among network partners.
- Maximizing philanthropic donations by identifying high-impact programs and activities with a proven track record of return on investment and leveraging resources throughout the STEM education ecosystem.
- Engaging business through the STEM Advocates program, which matches business volunteers with schools in need.
- Providing expert assistance through access to best-in-class tools, program certification and validated metrics to measure progress.

Freeport McMoRan Copper and Gold Foundation and the Helios Education Foundation provide major funding for the STEM Network, a trusted partner for all entities that provides new and useful knowledge and research-based solutions to community efforts for improving STEM education. But it is also a tool for the business community to leverage its resources and assist in implementing STEM programs throughout the state to build the workforce we so desperately need to grow and maintain a strong economy. 📌

WILLIAM HARRIS is president and CEO of Science Foundation Arizona.

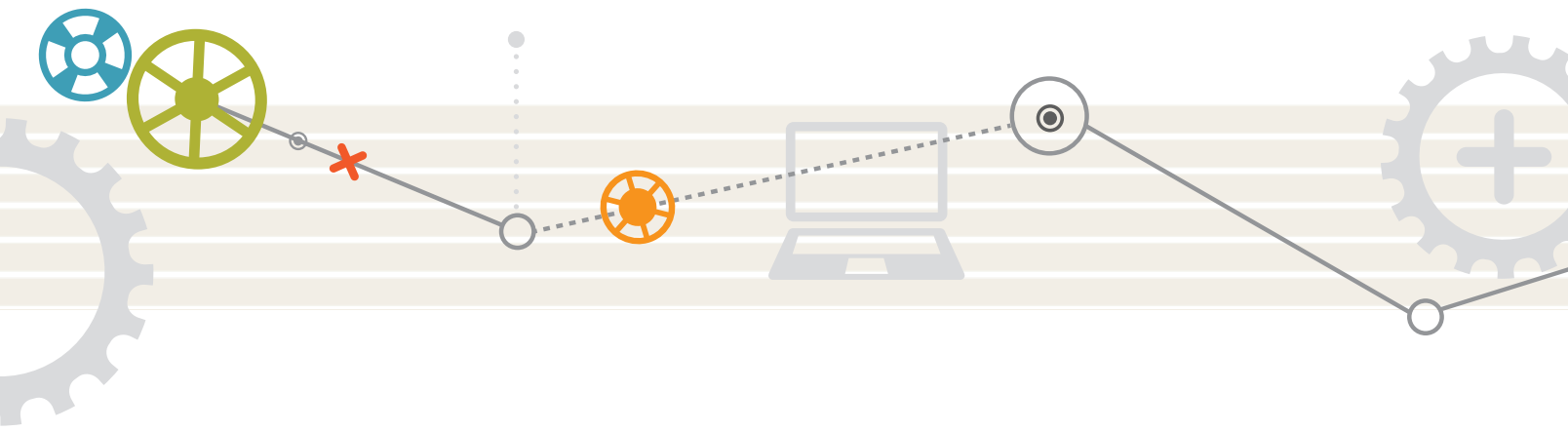


THE RIGHT CONNECTION

Information and communications technology makes the most of big data

WRITING BY >> DON RODRIGUEZ

As Arizona saw the worst days of the recession behind it, the Morrison Institute of Public Policy was interested in finding out what cities, counties and the state had in mind for the pursuit of their renewed economic development. In a survey for “Arizona’s Economic Development Landscape: Charting a Unified Course” released in November 2012, Maricopa County, Phoenix, Chandler, Avondale and Prescott Valley shared at least one targeted sector: information and communications technology.



If you're thinking this is just a long-winded way of saying "telecom," you're only looking at a small piece of the puzzle. Information and communications technology (ICT) involves gathering, storing, transmitting and receiving data in digital forms through such methods as computers, mobile devices and applications. If you think of telecom simply as a way for you to call your friend while driving, ICT figuratively is like your car is collecting information to help you figure out where you want to go and why you would want to make that call in the first place. As stated in the "Roadmap for Open ICT Ecosystems" published by the Berkman Center for Internet & Society at Harvard Law School, "Increasingly, decision makers in all fields are looking to technology to provide solutions and drive desired changes by commingling local, national and global resources in innovative ways."

Indeed, ICT's roots are in telecom. For example, the name of Salt River Project's SRP Telecom unit may lead an observer to think its purpose is pretty simple. That would be the wrong conclusion. It actually uses the utility's power transmission network to offer one of the state's largest fiber-optic networks. This network has helped metropolitan Phoenix draw and maintain a technology and financial industry base that includes companies such as Intel and American Express. Further, SRP has more than doubled its number of smart meters while establishing a data management system for the meters. SRP is among a small number of large utilities offering advanced metering services to all its customers.

ECONOMIC BOOST

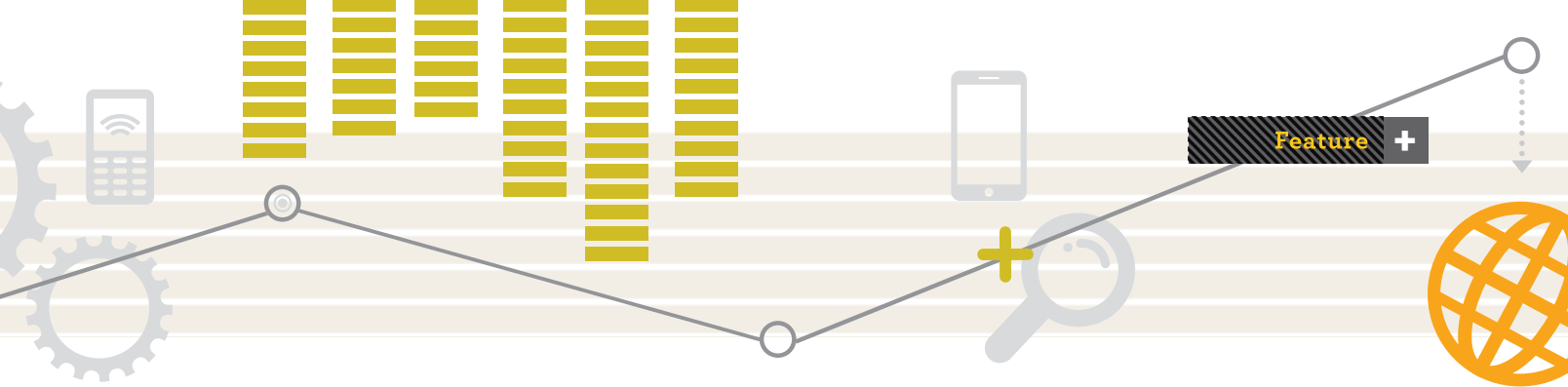
Science Foundation Arizona understands the role ICT plays in economic stimulus, especially

with increasing the pace of technological progress and spurring growth in productivity. That's one of the reasons it has supported research projects specifically in this sector. For example, it awarded \$2 million for a project by Arizona State University researchers entitled "An Integrated Design Framework for Application Development on Multi-core Processors." Recognizing better performing and faster computer networks were necessary in computing-intensive industries like defense, they worked to help Tucson's Raytheon improve computing capabilities for its products.

But ICT is not just limited to multimillion dollar defense projects. It's moving toward a segment of everyday items with which human interaction isn't always necessary. Arizona companies are involved in developing products that will become part of the Internet of Things (IoT), which is the network of physical objects that access the Internet through embedded technology. Phoenix's ON Semiconductor has launched a family of products that support high-performance, efficient communications for IoT and smart metering applications. "Low-power, robust, integrated wireless communications devices will be key in helping the Internet of Things and smart metering achieve their huge and exciting potential," says Ryan Cameron, vice president of Industrial and Timing products for ON Semiconductor. Chandler's Microchip Technology already serves designers for the IoT market and connected embedded products with a variety of wireless solutions, sensors and microcontrollers.

PUBLIC POLICY ROLE

ITC also impacts public policy. The U.S. government already is playing a role in ITC. Federal agencies are required to establish plans to



manage purchase, use and disposal of ICT. For example, the Department of Commerce developed an ICT architecture capability maturity model to help with internal assessments that identify weak areas and define ways to improve the overall architecture process. But the federal government has some catching up to do compared to others in the world. For example, South Africa's Cabinet in spring 2013 approved its Information and Communications Technology Research, Development and Innovation Roadmap to strengthen ICT R&D while tapping into the possibilities that ICT offers socioeconomic development.

Outside ICT's status in the federal government, does the United States have the infrastructure to drive economic growth on the back of this technology trend? There is much promise, thanks to the nation's global position in connectivity. According to the GSMA, the North American mobile industry is one of the most advanced and successful in the world, and accounted for about 3 percent of regional gross domestic product (about \$550 billion). The mobile ecosystem also made a direct contribution of more than \$63 billion in public funding in 2013, even before considering regulatory and spectrum fees.

In addition, the United States is one of the largest and most advanced machine-to-machine (M2M) markets, with M2M representing one in 10 of all mobile connections in the region compared with one in 20 in Europe and one in 100 in Africa. This is illustrated by at least two sectors: automotive and energy (smart grid).

CRITICAL CONNECTION

In automotive, the United States has 250 million cars on its roads, with 15.9 million either

registered or purchased in 2013, according to the Organisation Internationale des Constructeurs d'Automobiles. Consumer demand for in-car connectivity and services such as fuel consumption, safety monitoring, real-time news, maintenance and even pay-as-you-drive insurance subscriptions are growing rapidly, making the automotive sector probably the largest addressable market for future M2M growth in the nation. Phoenix-based Inilex is a member of this growing "connected car" ecosystem.

In energy, there has been fast deployment of smart grids using connected "smart meters" to track energy consumption in real time, as SRP has demonstrated, and enable a homeowner or business to remotely monitor their use of power. About 43 million smart meters were installed across the country as of the end of 2012. In many cases, smart meters may be integrated into a broader home automation system, enabling households to remotely control heating, air conditioning, lighting and even individual appliances such as security cameras and burglar alarms. There were approximately 2.3 million smart home installations in North America in 2013.

That's just part of the story. Last year ICT spending in the United States accelerated faster than overall global spending—a trend expected to continue through 2017, according to the Telecommunications Industry Association. Additionally, the nation passed Europe in overall ICT spending by region and now ranks behind only Asia. With such growth, expect information and communications technology to be a fixture in our lives. 

Contributing to this story was **NITIN DAHAD**, editor and co-owner of The Next Silicon Valley.

TRANSITION WITH TECH

Arizona establishing ecosystem necessary for a stronger economy

WRITING BY × NITIN DAHAD

At a recent technology summit, Benedict Evans of venture capital firm Andreessen Horowitz delivered a presentation entitled “Mobile is Eating the World.” This followed a similar presentation in which he said, “Software is eating the world.” The point is, technology now both dominates as well as underpins almost every industry. As Evans says, “For the first time, tech is selling to everyone.”

No matter the industry, technology plays some part in it. The United States has been a key adopter of mobile technologies, and industries like the automotive and energy sector have been quick to adopt the benefits. With all this growth in mobile connectivity and technology, and the opportunities for business and economic growth that arise, digital skills and talent as well as infrastructure are key requirements for any country or region. A good technology ecosystem is also needed to serve all the industries that rely on technology.

Steven G. Zylstra, president and CEO of the Arizona Technology Council, said Arizona’s innovation and technology ecosystem has grown at an astonishing rate over the past five years. Growth is particularly strong among technology companies. Of the 104 Arizona companies listed in the Inc. 5,000, about a quarter are in technology-related industries. He adds the



state has grown to more than 40 incubators, co-working spaces and accelerators.

GROOMING TALENT

In addition, when major technology, aerospace and defense, and bioscience companies establish themselves, they need to have confidence that there is a good stock of talent in the pipeline emerging from local universities. National rankings place Arizona second in workforce quality and availability, and first in higher-education degree output. The state differentiates itself with an integrated approach to developing talent for employers in need of specialized skills. For example, a comprehensive and cooperative job training and placement approach at the

state and local level is in place, recognizing that businesses are the most important consumers of workforce development and placement efforts.

This is made effective as a result of the alignment between economic development, workforce development and education. In Arizona, science, engineering, mathematics and technology (STEM) jobs are projected to number 166,000 by 2018. The sectors deploying this talent in Arizona include, of course, technology and innovation, aerospace and defense, bioscience and healthcare, optics and photonics, and advanced manufacturing.

In technology and innovation, research and development is critical. In Arizona, the state's three leading public universities invested more than \$3.5 billion in research from 2008 to 2011 and plan to double annual R&D investment by 2016.

In aerospace and defense, contractors like Raytheon, Boeing, General Dynamics and Honeywell have received more than \$6 billion in defense contracts for work being undertaken in the state while Arizona's universities conferred more than 3,200 undergraduate degrees and 1,600 graduate degrees in this sector and related fields in 2012.

TUCSON A LEADER

The next generation communications industry relies heavily on the optics and photonics

sector. One of eight major photonics clusters is in Tucson, putting it at the leading edge of the evolution of application oriented technologies in this sector. This field addresses wide-ranging applications in many industries, including telecommunications, defense, medicine, robotics and IT.

Technology is now pervading and underpinning almost every industry sector. This means states, regions and countries need appropriate infrastructure and skills. In terms of infrastructure, this means not just next generation communications networks and data storage, but also products and systems embedded with sensors to provide meaningful information, such as in smart grid implementations. In terms of skills, this is even more critical, as the workforce needs to be digitally literate and have appropriate skills to both understand how to deploy technologies, systems and networks, but also to understand, interpret and analyze data that becomes useful to citizens, consumers and customers. ■



NITIN DAHAD is editor and co-owner of The Next Silicon Valley, a website focused on technology-based innovation and regions around the world. Through various roles over 30 years, he brings a global perspective to industry, trade and economic development, and has spoken at seminars around the world on innovation and technology trends.



When Tech Goes **Boom**

BAY AREA FIRMS SIGNAL TIME IS RIGHT TO EXPAND TO ARIZONA

It takes three things to make a pattern. Four, and you have a noteworthy trend. And five? That's some serious momentum—a "boom," if you will.

The boom we're talking about here is five California technology companies expanding to Arizona in the span of just over a year. All are based in the Bay Area and all have come to the Grand Canyon State to enjoy the advantages of having a presence in a state where entrepreneurial activity is humming.

The Bay Area Boom is upon us, and it will pay dividends for Arizona now and long into the future. The increase of San Francisco-area companies picking our state is no accident. Arizona's tech sector is bigger and better than ever. It has more creativity, more entrepreneurs, more disrupters, more believers and more investors than ever.

The Bay Area Boom—with new lenders, data and online startups and Internet services—enhances the already stellar collection of major employment sectors in the established Arizona tech industries of aerospace, electronics and semiconductor manufacturing, not to mention emerging sectors in biosciences and green technologies.

The Internet, startup lending, data and online services and human resources technology make up the recent wave of Bay Area-based innovation that is helping reshape Arizona's

economy. All of that new business has happened since November 2013, when the Arizona Commerce Authority (ACA), Gov. Jan Brewer and Phoenix Mayor Greg Stanton joined Gigya CEO Patrick Salyer to announce the Mountain View-based data company was adding the state to its expansion list. The tech firm, which provides data and online services to other businesses, opened offices in north Phoenix.

Besides Gigya, these companies from the Bay Area have chosen to expand to Arizona in the past year:

- **Weebly** – A San Francisco-based website creation service that hosts 20 million sites and is leasing a 25,000-square-foot space in Scottsdale that serves as its North American customer operations headquarters.
- **Prosper Marketplace** – America’s fastest-growing peer-to-peer lender, which connects people who want to borrow money with those who want to invest it, opened a new office in Phoenix in May—the first outside its San Francisco headquarters.
- **Silicon Valley Bank** – The Santa Clara-based bank recently pledged \$100 million in loans to the Arizona tech sector. It is expanding its presence in Tempe to support the company’s growth.
- **Zenefits** – Called the “fastest-growing startup in recent memory” by the *Contra Costa Times*, the cloud-based human resources technology company plans to establish a 94,000-square-foot office complex in Scottsdale to supplement its San Francisco headquarters.

RIGHT COMBINATION

Why now? Why Arizona?

The Bay Area tech companies are choosing the emerging Arizona tech ecosystem to achieve their goals for growth. In addition to the spectrum of tech-related occupations here, they are tapping into its skilled and available workforce. They will benefit from its simplified tax system that lowers their cost of doing business. They will enjoy more sunny days, a steady climate, lower property taxes and exceptional

value in new and resale homes.

The companies are part of a tech drumbeat in Arizona that began with companies like GoDaddy and Intel, which helped launch the tech and innovation culture here. Now, companies born in the Silicon Valley and Bay Area are eyeing Arizona and its talented workforce, which includes graduates from the state’s world-renowned universities. The companies have landed smack dab in one of the nation’s largest concentrations of science and technology students and graduates.

FOCUS ON PHOENIX

Phoenix, for instance, has the “highest density of credit professionals in the U.S.” as well as “top universities, a business-friendly community” and is “easy travel to and from San Francisco,” says Prosper spokeswoman Sarah Cain. She added that many companies are looking to the Valley as a great place to expand their operations, which is a testament to its workforce and culture. Prosper has primarily hired Phoenix residents to work at its office here instead of relocating people from its San Francisco headquarters.

Zenefits wanted a location in the West that had a “big pool of talented workers and a friendly business climate,” says CEO and co-founder Parker Conrad. “The Phoenix area is a great place for Zenefits because there are already a lot of financial services, insurance, technology and general customer service companies located there. Eventually, we plan on having about 1,300 employees in the Scottsdale office and we have no doubt that Arizona holds the talent that we need.”

These expansions include millions in revenue and hundreds of high-wage jobs. The burst of expansion will serve as an even stronger magnet for innovative people looking for tech sector employment and agreeable weather. Tech’s infusion into Arizona’s economy helped by the state’s assertive stance on innovation led *Fast Company* to rank Arizona No. 1 in the country for “entrepreneurial activity” in 2013.

The desert sky is the limit for tech here. That’s not just some fad. That’s a boom. ☑

BETTER BY DESIGN

Brain research offers options for online learning development

With online enrollment on the rise and more teachers incorporating digital technology in traditional classrooms, Professor Michelle Miller's research offers practical ideas for instructors.

The latest brain research can be used to design online information for better learning outcomes, says Miller. "For example, understanding attention drives a great deal of what we think and how we prioritize in the moment," she says.

Miller's applied memory research uncovered methods for improving online learning; the testing effect improves comprehension with frequent low-stake tests. Other processes shown to improve retention include spacing, which is splitting up study time across more sessions, and interweaving or alternating between topics.

Motivating students is another focus of Miller's research. "How do we get the students to turn on the computer and go to class instead of Facebook?" Miller says course design improves student motivation in online classes, along with careful creation of assignments to increase student's self-efficacy.

Miller's findings are the topic of "Minds Online: Teaching Effectively with Technology," which was scheduled for release in October. "The book isn't so much a narrowly focused how-to guide as it is a conceptual framework for making instructional design choices that reflect the ways in which the mind takes in and structures information," she says. Miller includes a



Michelle Miller

chapter on how computing and mobile technology affect us psychologically.

HONORS FOR STEM TRAINING PROJECT

Northern Arizona University's Power of Data project in the Center for Science Teaching and Learning recently was recognized as an exemplary teacher professional development program by Change the Equation, a national organization that brings together businesses and educators to ensure all students are STEM literate.

The project is now featured in the STEM-Works database, a resource utilized by the private sector to identify collaborators for improving science, technology, engineering and math (STEM) literacy in public schools.

Through the Power of Data project, career technology and education instructors mentor science and math teachers from across the country. Teachers learn how to help their students build an understanding of STEM as well as develop important life skills for future career success. The program is a collaborative effort organized by the center, the geology program in the School of Earth Sciences and Environmental Sustainability, and the Department of Geography, Planning and Recreation. 📍

NEW ERA

WRITING BY × PAUL TUMARKIN

Technology commercialization takes off at the UA



The TLA leadership team (from left): Bruce Wright, associate vice president, Tech Parks Arizona; Doug Hockstad, director, Technology Transfer; Sherry Hoskinson, director, Wheelhouse; and David Allen, vice president, Tech Launch Arizona.



fiscal year 2014 marked the best year to date for technology commercialization at the University of Arizona. Notable accomplishments for Tech Launch Arizona (TLA) between July 1, 2013, and June 30, 2014, include:


- 39 exclusive licenses and options executed
- 72 total licenses executed
- 167 patents filed
- 188 invention disclosures received from faculty inventors
- 19 proof-of-concept projects funded, which validate the correspondence of inventions to market features and drivers
- 11 startup companies created
- 24 patents issued

The numbers came during the first full year of operation with a complete team and new procedures and programs at TLA, the unit responsible for helping university faculty and researchers commercialize inventions arising out of their research. A complete report on TLA's accomplishments will be released in an annual report this quarter.

The university created TLA in 2013 by merging three separate functions—technology transfer, tech parks, and corporate and business relations—and creating a fourth function, new venture development. Under the leadership of Vice President David Allen, these four units collaborate as an integrated team, undertaking

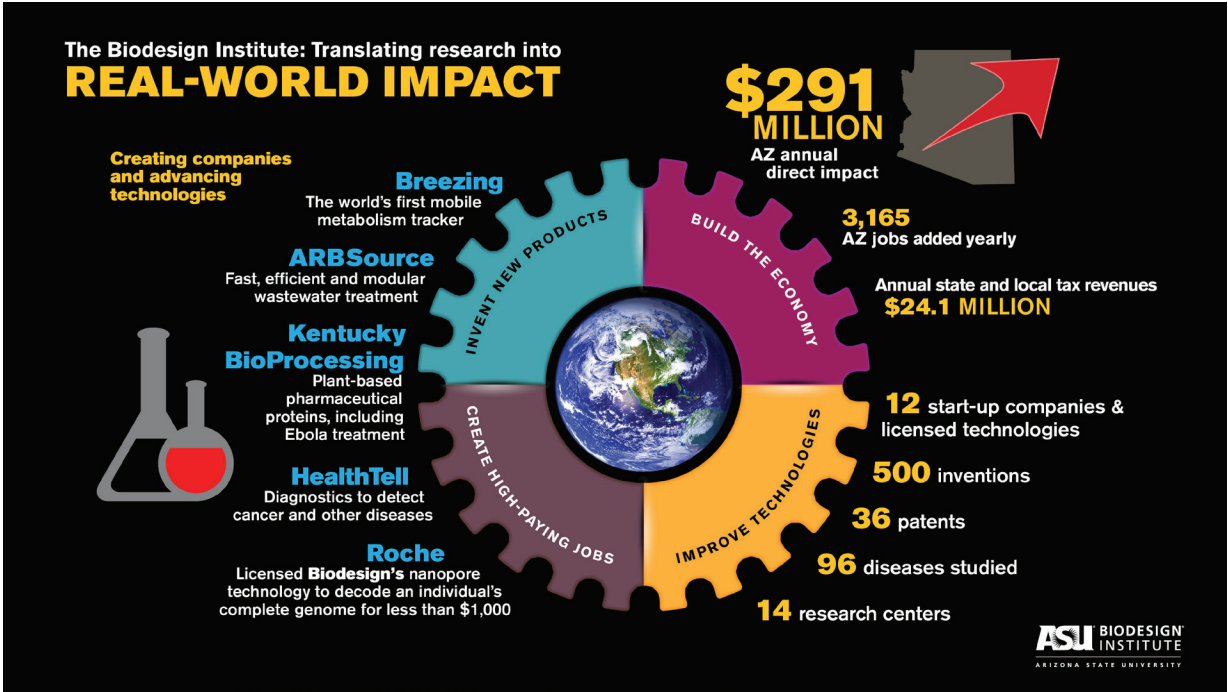
different yet complementary activities related to the purpose of creating tangible impact from UA intellectual capacity. “Our results provide evidence that a supportive commercialization culture is expanding at the UA,” Allen says. “Faculty are stepping up like never before.”

One of TLA's early activities was the creation in April 2013 of its strategic plan, called “Tech Launch Arizona: Roadmap.” The plan—which laid out both targets for the above metrics as well as structural, process and outcome measures—was formulated by examining leading practices at top commercialization universities, and combining that understanding with new approaches suited to the UA's strengths and assets such as engaging the community of technology-savvy alumni.

Victor J. Hruby, regents' professor of chemistry and biochemistry in the UA College of Science, has been at the university for more than four decades. Hruby, an inventor who has worked to advance several drugs into clinical trials, says, “Before, we had only imagined what could have been done,” Hruby says. “But now I feel so lucky to experience this new service culture at this stage in my career. I'm so excited for my peers and the UA as a whole.” 

PAUL TUMARKIN/TECH LAUNCH ARIZONA

PAUL TUMARKIN is marketing & communications manager for Tech Launch Arizona.



ROI @ 10
WRITING BY × JOSEPH CASPERMEYER
Investment in Biodesign Institute pays off

Arizona State University's Biodesign Institute has made an economic impact of \$1.5 billion in its first decade of operation, according to a study by the Seidman Research Institute at ASU's W.P. Carey School of Business. The annual direct economic impact is the highest for any single bioscience research institute in the state.

The real world impact of Biodesign was dramatically underscored by contributions from Charles Arntzen, an ASU regents' professor and founding director of the Biodesign Institute, who had a hand in the recent development of the first experimental treatment of the Ebola virus in people. The treatment, called ZMapp, had its roots from a decade-long collaboration between Biodesign and Mapp Biopharmaceutical, and recently made international headlines when, in an unprecedented move, it was used to treat two aid workers, Kent Brantly and Nancy Writebol, who became infected during the current Ebola outbreak in Africa.

This is just one of the scores of projects currently undertaken by researchers at the Biodesign Institute, which include:

- Diagnostics for the early detection of diseases such as cancer and diabetes.
- Novel nanomaterials for bioelectronics, drug design and delivery.
- Clean, renewable biofuels and bioremediation to mitigate environmental contamination.

Since its inception, Biodesign has attracted more than \$400 million in funding from competitive grant awards as well as support from philanthropic and industry sources. In FY2013, Biodesign researchers received \$58 million in funding for its research activities.

"With continued state support, we plan on significantly expanding the research infrastructure of Biodesign to attract top scientific talent, develop the high paying jobs and highly skilled workforce needed for the bioscience sector, and diversify our research portfolio to have an even greater societal impact," says Raymond DuBois, executive director of the Biodesign Institute.

JOSEPH CASPERMEYER is managing editor at the Biodesign Institute.

James Lowey, TGen's vice president of technology



CRITICAL PARTNERSHIPS

TGen helps provide tools for child cancer research

WRITING BY × STEVE YOZWIAK

the non-profit, Phoenix-based Translational Genomics Research Institute (TGen) is working with private companies to help install state-of-the-art computing and programing specialized for human genome investigations at the National Cancer Institute (NCI).


Texas-based computer giant Dell is providing NCI with the Dell Genomic Data Analysis Platform, designed to deliver fast analysis of the billions of data points required when sequencing, or decoding, aspects of the human DNA and other genomic data. A second private firm, Massachusetts-based Terasca, is adding technology that improves the reliability, ease of use and performance of computing storage.

TGen is providing NCI with high performance computing and bioinformatics support as well as specialized software and tools developed over the last three years as TGen and Dell have partnered globally in support of pediatric cancer research programs. NCI is providing TGen with access to more than 800 sequenced child-cancer genomes, which will be used in TGen's ongoing pediatric cancer research. Because children's cancer can advance so rapidly, high-performance computing technology is needed to analyze the billions of pieces of information in each patient's genome and provide oncologists with the best recom-

mendations for individualized treatments as quickly as possible.

"This is an enormous opportunity for the government to work with top private and research organizations to share information and expertise that will help guide physicians and medical benefit for children around the world," says James Lowey, TGen's vice president of technology. "A system like this is critical in expediting patient care."

This new system at NCI will host the largest collection of clinically annotated pediatric cancer genomic data ever to be released to the scientific community. Not only will this system enable state-of-the-art precision therapy trials for children and adults with lethal cancers but also provide clinically annotated high-resolution genomics data for basic science research.

One of the programs that have benefited from the TGen-Dell-Terasca efforts is a groundbreaking clinical trial for children with cancer being conducted by the Neuroblastoma and Medulloblastoma Translational Research Consortium. This trial is based on developing a personalized medicine process that permits near real time processing of information on patient tumors and prediction of best drugs for a specific patient. 

STEVE YOZWIAK is the senior science writer for the Translational Genomics Research Institute.

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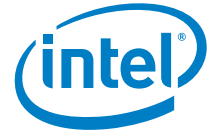
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