

TECHCONNECT

ARIZONA'S TECHNOLOGY MAGAZINE



THE SPACE & PLACE ISSUE

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HOW DO YOU GET TO BE THE LEADER OF THE OTHER 49?



ARIZONA KNOW HOW. RANKED A BEST PLACE FOR BUSINESS.

In Arizona, we kick the future into high gear. So do the top-level talented people moving here for unbeatable lifestyle and opportunities. Arizona is a best state for business. We're 1st in the nation for job growth. We have the country's largest public university graduating the best and brightest in high-demand disciplines. Arizona's undisputed top-line priority is supporting and backing business. Icons Intel, Avnet, Boeing, GoDaddy and more thrive here. Our aggressive pro-business, tax reductions and pro-growth legislation mean record relocations and expansions. Simply put, our state leads the pack. When it comes to success, Arizona is all business.



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AUTHORITY

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Planting the Seed that Changes the World



SARA SCOVILLE-WEAVER

excitement. Hope. These words are on the lips of many Phoenixians as of late. With the harsh realities of our 2008 recession-era city seemingly far behind us, I find the Phoenix of today ripe with possibility and bursting with optimism. It seems there is nowhere to go but up and forward! The innovative work of SEED SPOT and other pioneering accelerators and incubators have heralded this optimism with the belief that community-grown entrepreneurship is the key to local economic development.


The work of SEED SPOT has driven hundreds of entrepreneurs to share and execute on their ideas. Since 2012, SEED SPOT has helped launch 288 ventures, resulting in the creation of 742 jobs. Of these, 96 percent remain headquartered in Arizona and 82 percent remain in business. This success is a mutual benefit to our whole state and startup ecosystem, and represents the great power of the incubator and accelerator model. From the beginning, SEED SPOT was founded on a culture of inclusion, community building and the belief that what Phoenix needed was a safe space for social entrepreneurs to launch and test their ideas.

SEED SPOT and the tech community in Phoenix have created a model for the rest of the country of what can be achieved through collaboration. Without our network of over 500 local mentors, dozens of community partners, the City of Phoenix and a deeply committed board of directors, we would not be where we are today: ranked a Top 20 Global Accelerator by Gust and a Top 3 Social Incubator in the U.S.

by Cisco and UBI Global. Most importantly, we would not be able to serve our entrepreneurs.

This fact shows our city's greatest call to action: We all must work together to create a deep support network for those entrepreneurs willing to tackle the world's greatest problems through the power of technology. So many of the issues dominating headlines around the world—increasing water scarcity, a large aging population demanding new health care solutions and refugees fleeing war who are striving to integrate into our communities—play out day to day right here in our own neighborhoods. Our local issues represent the biggest challenges and opportunities for incubators and accelerators like SEED SPOT to help tackle. We must continue to foster this safe support system for the big dreamers of our community who will become our next CEOs and globally recognized innovators.

Investment in accelerators/incubators drives the path of Phoenix forward. Our success in helping young companies launch and strengthen becomes our entire state's success.

We need committed devoted citizens who contribute to the city and drive innovation from all genders, demographics and industries. Entrepreneurs and a workforce that are making Phoenix a hub for high-tech companies represent great potential for the city to grow and develop, and we must continue to invest in their potential. 

SARA SCOVILLE-WEAVER is Phoenix executive director for SEED SPOT, whose mission is to educate, accelerate and invest in entrepreneurs who are creating solutions to social problems.



1 SIZE NOT FOR ALL

A sample of the programs and cultures where creativity thrives

Is it the space or is it the place? When it comes to executing that next great idea, what is it that can help take it to next level?

As Arizona evolves into a breeding ground of innovation, many entrepreneurs realize their old habits from study hall are not enough to make winning ideas. Working in a home office may be great for some businesses but the energy and support that comes from being part of a group outside of the home office often can make all the difference between toiling in anonymity or surrounded by others who aspire to top-level commercialization.

That may come from an incubator, where startups can access such needs as space and training, or accelerators that provide early-stage companies with mentoring and pathways to capital in a set time period. Sometime partnerships are formed with local

municipalities and academic institutions that get involved as they understand the value for economic development. Or commercialization may occur in group or individual settings where companies and their employees embrace non-traditional cultures.

Here is just a sampling of these entrepreneurial stations where the next great ideas are being born in Arizona.

CENTER FOR ENTREPRENEURIAL INNOVATION

This division of the Maricopa Corporate College offers a collaborative community for innovative early-stage and startup companies from a variety of industries, including emerging technologies, software development, bioscience and renewable energy. The Phoenix center offers the services and space critical to the development of these companies. This guidance and support to commercialize the products and services comes from the center's proactive business counseling and mentoring as well as its state-of-the-art facility. The goal at the center is to not only improve a company's potential for profitability but also become an economic engine committed to creating jobs in Phoenix and the region.

BIOACCEL

This Phoenix-based organization is dedicated to supporting qualifying early-stage medical device and technology entrepreneurs by successfully navigating the "Valley of Death" as their development is accelerated with needed training, mentoring and early-stage funding. One of its programs, BioInspire, was created in partnership with the city of Peoria to help support startups while diversifying the city's economy. BioAccel's premiere event is the Solutions Challenge in which competitors solve critical healthcare needs through the advancement of medical device and information technology solutions. The entrepreneurs are encouraged to form multidisciplinary teams vetted through an application process to decide on finalists who pitch their medical innovation



and business plan during a Scorpion Pit (think “Shark Tank”) judging event.

AZTECHCELERATOR

Sometimes you just need some space—a little now, much more later. AzTechcelerator is offered by the city of Surprise as a business incubator with a focus on new innovation, technology and entrepreneurship. The four-building campus offers nearly 60,000 square feet of flexible space, tools and resources to grow businesses. There also is access to mentors with expertise in grant writing, intellectual property, accounting and marketing. In addition, AzTechcelerator also offers connections through partnerships such as the University of Advancing Technology in Tempe.

NORTHERN ARIZONA CENTER FOR ENTREPRENEURSHIP AND TECHNOLOGY

More commonly known simply as NACET, this accelerator actually has managed to create a coordinated outreach that goes beyond its offices in Flagstaff, thanks to partnerships in northern and central Arizona. NACET offers state-of-the-art facilities, virtual and live programs, funding access and community events targeted to help startups with planning, building, launching and growing. It provides the tools and connections that startups need through its network of three partner incubators: Startup Flagstaff; Innovations with the city of Chandler and the Maricopa Center for Entrepreneurship with the city of Maricopa. Add to the roster an accelerator recently in opened Flagstaff.

SKYSONG

Technically, this 1.2 million-square-foot complex in Scottsdale is named SkySong, The ASU Scottsdale Innovation Center. But it’s the connection with Arizona State University

that is the main driver. With ASU President Michael Crow’s vision for “The New American University” to include partnerships with the private sector, ASU SkySong was designed to help companies grow by providing business services and programs—for example, new technologies, capital networks and skilled workers—offered or facilitated by the university. Also included are the co-location of several ASU units engaged in corporate engagement, technology transfer, entrepreneurship, and interdisciplinary research. The result has been a community of individual tenants from startups to Fortune 500 companies, and global partnerships with an entrepreneurial approach that combines research, technology and business development. This all has led to the Greater Phoenix Economic Council forecasting Skysong will generate more than \$32 billion in economic output and more than 10,000 new jobs across the Phoenix metro area during the next three decades.

IPRO

Sometimes a company creates an individual culture that is its best motivator. When visitors go to the job openings page of Tempe-based Ipro and sees employees dressed in uniforms suited for the bridge of the Starship Enterprise, you get a sense this place is different. And it’s not because it’s a startup. This leader in the development of software solutions for the legal profession was founded in 1989. It proudly proclaims to “work hard, play hard” with “a ‘sunshine committee’ which creates fun activities for all.” But it’s global reputation comes from a team that encourages a creative, forward-thinking work environment. As the website indicates: “It is a truly collaborative culture where you can learn from the best and we can learn from you.”

In the end, that’s really the common thread whether it’s about the space or place. 📍



BEYOND BACKYARD

It's never too early to plan for serving markets outside Arizona

Most startup owners are thinking about global opportunities, even if they may not say that out loud. Even as they work on the important issues involved in creating and building their businesses—product development, IP protection, marketing plans, obtaining funding—in the back of their minds they are thinking globally. And if they have a website, they are already open for business to the far reaches of the Internet.

Until more recently, incubators and accelerators have not included much training or resources regarding global markets. The theory—and a good one for its time—was that it is easier to be successful at home first and expand outside the country later. The times have changed, however, as have the entrepreneurs. Because interest in global markets is now ubiquitous, incubators and accelerators must incorporate more training and resources on doing business outside the U.S. at the earliest stages of their programs so startup companies can incorporate global markets into their strategic plans from the beginning.

It may still be true for some companies that success at home is best before “going global.” But for others, “being global” from the beginning is the golden ticket because of the industry, products and location of the company’s likely customers.

For both types of companies, incorporating information and timing about global markets into their strategic plans will help them be more successful globally when they are ready.

For those companies taking root in the Valley, a new resource is working with incubators and accelerators on increasing the information available about doing business globally. The Metro Phoenix Export Alliance (www.mpexa.com) is a local, nonprofit, one-stop shop for small and medium sized businesses, and is creating and delivering Export Acceleration programs and services suited to early-stage and high-growth companies. For example, on September 27th MPEXA is presenting the first seminar in the Lunch and Learn Series of the Center for Entrepreneurial Innovation (www.ceigateway.com) with the goal of helping young companies include an exporting strategy in their business plans from the start. Another example is a cooperation agreement that the Arizona Technology Council, the Arizona Business Incubation Association and Startup Mexico reached last fall to help startups in Mexico and Arizona. Even if companies do not begin exporting immediately, they will be ready to act quickly when an international customer or distributor request comes their way. MPEXA is working with other incubators to include similar programs throughout the year.

The world is getting smaller, and 70 percent of the world’s purchasing power is outside the U.S. The Arizona Technology Council, the Arizona Business Incubation Association, MPEXA and other resources are now helping early-stage companies plan strategically to take advantage of global opportunities as soon as their businesses are ready. Are you ready? 🇺🇸



KAREN DICKINSON is an international business and intellectual property attorney at Polsinelli, and chair of the Arizona District Export Council.



Participants in the recent Startup Weekend

STARTUP TUCSON

Group proves slow and steady not always the norm for entrepreneurs

For entrepreneurs, changing lives with a product or service is the ultimate reward. But when they can change their own community along the way, the rewards can be shared again and again.

That scenario is happening with Startup Tucson, a venture community started as a grassroots movement that has evolved into practically its own culture as it captures recognition—and the imagination—of Southern Arizona and beyond.

Justin Williams recalls that as director of the Southern Arizona office of the Arizona Technology Council he was charged with organizing a conference in 2010 that would bring together local members of the technology sector. While on the surface it was a success, something more happened: 20 people came forward to say they wanted to meet regularly. “These were not the traditional players in economic development; these were employees that were at the companies. These were software developers,” he recalls. That started Williams thinking differently in his approach. “Along the way, I’ve been looking for an event that we

could run that was more experiential and less networking, more learning and doing.”

A friend introduced Williams to the idea of a Startup Weekend. While organizing it, he started meeting with Derek Neighbors, who at the time was exploring opening in Tucson a branch of the Chandler-based co-working space Gangplank. As Williams started pulling together different parties to be part of the event, he discovered “this underground entrepreneurial ecosystem that have been fostered a little bit but there was not what I was calling at the time much connective tissue between them.” So he started hosting mixers leading up to August 2011’s Startup Weekend, which drew about 100 participants.

Coming off that victory and finding more people wanted to keep doing something together, Williams and others organized Startup Drinks to keep momentum going. A year later “we got to the point where we were already starting to run what turned out to be an incubator,” he says of the humble start of the Startup Tucson.

What has followed is anything but humble.



Leaving the Council, he ultimately became of founder of the new group and is now its chairman and CEO, working with a host of others infected with the entrepreneurial spirit to create a more cohesive community. “Little by little over the last five years, we started cobbling together meaningful programming that was all built around creating that connective tissue,” Williams says.

One of the more noteworthy programs has been Thryve, a combination incubator/accelerator that he and others say is better described as a venture development program. Those selected to participate are provided the tools to help turn ideas into job-creating ventures. Since launching last year, Williams says, \$3.5 million in revenue has been generated by the companies that went through the formal segment of program and more than 35 jobs have been created.

GROWING IMPACT

While that would be impressive by itself, the overall activities of Startup Tucson have brought more. There’s a tremendous amount of indirect benefit, Williams says, such as people who find employment through their participation. While some organizations would consider an event a winner because well-known companies attend, for Startup Tucson “it’s not the company that came to the mixer, it’s the job that was created because of that. And it’s the coffee shop that gets paid by that job.”

There are other benefits of involvement. Some volunteer or mentor in a program while others start their own businesses such as Metropia and Moves the Needle. Add to that the launch of programs in the community that are tied to fostering an entrepreneurial economy. “There’s a bunch of cool stories that have come out of this,” Williams says. “Building vision that’s shared, building momentum among the population to go lead and do is a huge part of what we’re trying to achieve.”

For Startup Tucson, the vision is expanding. The latest chapter includes the upcoming TENWEST Festival. To get a quick picture

of what that is, think South by Southwest, the annual mega-festival in Austin. Williams says a visiting high school friend observed during a visit to the Old Pueblo that “Tucson has exactly the same vibe that Austin did 20 years ago.” Williams remembers thinking, “Wow, I never heard anyone say that.” However, over the past five years he’s heard that more and more. He came to understand Austin didn’t start as a tech community but rather a university town with a music and art scene that stemmed from that creative environment. What grew from that beginning was a tech and entrepreneurial economy for which it is well known.

Comparing Tucson to Austin, “there’s a lot of similarities—and a lot of differences. We’re not going to build Austin but it’s not a bad role model to be looking at and thinking about,” Williams says. The same goes for the TENWEST Festival. “We can build a festival that paints our own future and paints the story we want to become. It’s a forward-looking festival that’s focused on technology, entrepreneurship, arts and community.”

Also on the plate is Startup Tucson’s launch of a Thryve program in Mexico, thanks to a \$50,000 grant from the U.S. Small Business Administration (SBA). “There is an enormous opportunity that’s made up of the ingredients of the cultural and the geographic relationship that Arizona and Mexico have,” Williams says. Helping is The University of Arizona’s relationship with Universidad Nacional Autónoma de México, the university system in Mexico, and Tucson’s having strategic and special geographic ties stemming from being just 60 miles from the world-class manufacturing hub in Nogales. Therefore, the SBA proposal for Thryve Latin America, he says, “really focused on how do we develop a strategy to maximize our location as a border community around the emerging economy there, specifically around the emerging tech and startup community.”

Consider this one more opportunity for Startup Tucson to share its culture of success. 📺



THE NEXT LEVEL

*Arizona's thriving
incubators another sign
of startup success*

a

Arizona has no shortage of entrepreneurs with big ideas. But even the best among them need the right combination of resources to make a meaningful impact in the marketplace.

Without the strategy and expertise behind it, an idea is ... *just an idea*.


That's where Arizona's surging incubator community comes in—those entities that help innovators and early-stage companies commercialize those ideas. And in Arizona, this community has grown at a breakneck pace.

In fact, just five short years ago, you could count on one hand the number of incubators in Arizona. Today, there is a community of more than 70 incubators, accelerators and co-working spaces in the state.

The Arizona Commerce Authority maintains a database of them on the Start Up page of its website, which is intended to help entrepreneurs and innovators access the tools, resources and programs they need to go from startup to success story.

It's no wonder that Arizona's incubator ecosystem is on the rise. Led by Gov. Doug Ducey, Arizona is embracing this evolving marketplace, supporting a modern economy by streamlining regulatory burdens and rewarding innovation and entrepreneurialism.

"Under Gov. Ducey's leadership, Arizona has reached new levels of economic activity," says Sandra Watson, president and CEO of the Arizona Commerce Authority. "Gov. Ducey has made it his No. 1 priority to be



the best state for business, and the results are impressive. Our state's strong startup culture continues to thrive and we are being recognized as a dynamic and innovative business hub that embraces his vision for a modern economy."

The evolution of these groups has been organic, many carving out a niche in a specific sector or high-growth area. There are incubators that specialize in medical devices, bioscience, Conscious Capitalism, social impact, veteran entrepreneurs, information technology and much more.

The Kauffman Foundation this year rated Arizona as the third best state for entrepreneurial growth. Forbes ranked the Grand Canyon State as third in the nation for tech and info jobs, behind only San Francisco and Silicon Valley. These are just a few examples of a growing list of accolades bestowed upon Arizona in recent months.

"Just in the past couple of years, the programs that are out there for entrepreneurs have just skyrocketed. All of this activity has really lit a fire under our angel (investor) groups," says Russ Yelton, CEO of Phoenix-based Pinnacle Transplant Technologies and past board member of the National Business Incubation Association. "Economic developers have discovered that (creating specific incubators) is a very effective way to create jobs in their communities—and the exact types of jobs that they want."

Derek Distenfield of Bunker Labs agrees. He is director of strategy and expansion for the national incubator organization that helps entrepreneurial military veterans.

Besides a robust veteran population, Distenfield sees the Phoenix area as a place for his group's expansion in the near future. This is due, he says, to a number of positive factors: an excellent university system, corporations that are "involved and invigorated" in the startup scene and the support of political leaders.

"It starts with the people who are there. Clearly, when we were down there for (Phoenix) Startup Week, there was a group of individuals who were excited about veteran entrepreneurship and working together to really bring the city to the next level," he says.

Because the business models vary, it's difficult to measure the impact of the overall incubator community in Arizona. But one thing is certain: Incubators are resources for startups to gain education, expertise, support—as well as valuable, creative space—so they have a better chance of success in the marketplace.

Once a company comes out of an incubator, that's when investors start looking at them seriously because they've gone past the ideation stage. It allows these companies to go onto the next round, which can involve lucrative business competitions like the ACA's Arizona Innovation Challenge and Invest Southwest, says Philip Bradstock, City of Phoenix Business Attraction program manager.

"Think of it as a pyramid. You have a hundred different ideas at the bottom but as you start working your way to the top, you start to get the more crystallized companies where the investors are taking a serious look," Bradstock says.

Tom Rainey, president of the Arizona Business Incubation Association, attributes the growth, in part, to favorable demographics—a youthful population, low cost of doing business and a good transportation network, among other factors.

"There are a lot of things that really point to Arizona being a very dynamic place for this kind of thing to happen," he says. "We've even passed up other technology hotspots like Boston and California in terms of the growth of high-tech companies.

"It's difficult even for those of us in the industry to keep track of everything happening right now," Rainey says of Arizona. ☐



Rest of Nation Puts Arizona on the Map

if you've scanned the economic-development headlines in 2016, you've probably noticed Arizona is receiving an impressive amount of national attention for creating an environment where businesses are thriving.

As Arizona's governor and an entrepreneur, it's invigorating for me to see startup companies making a positive impact on our economy and quality of life. We are experiencing an entrepreneurial explosion that is unmatched in the state's history—and the nation is taking notice.

Just this year alone, Arizona has been recognized as a top state in a variety of business rankings: Kiplinger ranked Arizona the **second-**

hottest job market the country, the Kauffman Foundation rated Arizona as the **third-best state for entrepreneurial growth**, Forbes put us as **No. 3 in the nation for tech and info jobs**, and Chief Executive magazine ranked the state the second best in the Southwest for business and the **sixth best in the entire country**.

This entrepreneurial ecosystem is supported by dozens of incubators, accelerators and co-working spaces that are helping early-stage companies advance from idea to commercialization. The Arizona Commerce Authority estimates there are more than **70 of these spaces throughout the state**—places where innovators can share knowledge, expertise,

creative space and resources.


The growth trajectory of these incubators has been remarkable to watch. Not too long ago, there was only a handful in the state. Now, Arizona's incubator community is not only thriving, it is responding to market needs and being driven by private-sector innovation. Many of these groups are carving out a niche in high-growth areas, such as in bioscience, medical devices and technology.

My administration is doing everything it can to support this thriving ecosystem. Since Day One, I have made it a priority to modernize government and put into place **common-sense reforms** to ease overbearing regulations and barriers to business success.

We are continuing to move our state toward innovation by embracing the sharing economy

and 21st century business models. Phoenix has emerged as **the nation's best city for automotive technology**. This has created a welcoming and innovative environment for autonomous-vehicle testing by global giants such as Google, General Motors and Uber.

In this edition, you'll be reading about the creative spaces and creative people helping entrepreneurs succeed in the marketplace. The two go hand-in-hand.

The headlines and accolades we have received are exciting but what's most important is Arizona's long-term economic growth and quality of life. In that sense, we are certainly on the right track. 

What others are saying about entrepreneurship here

THE NEW YORK TIMES:

"Bay Area Start-Ups Find Low-Cost Outposts in Arizona"

"Three years ago, Kate Rogers was caught in the Bay Area struggle. She paid the astronomical rents. She did the crushing commute. She lived the frustration of always thinking about money even though she was a well-paid professional in the booming technology industry. And then, just like that, the stress went away. All she had to do was move to Arizona."

(Conor Dougherty, *Bay Area Start-Ups Find Low-Cost Outposts in Arizona*, 8/21/2016)

MEDIUM:

Arizona: "There's no place better to start and grow a business"

"Phoenix is thriving because its people are dedicated to

fostering its community and gives entrepreneurs and small-business owners the opportunity to go out and build sustainable success. We've taken the Silicon Valley concept and made our community the go-to destination for those who want to choose to look at the bright side. If that's you, I invite you to come join us because in my book, there's no place better to start and grow a business."

(Clate Mask, *The Silicon Valley Concept*, 8/9/2016)

INC. MAGAZINE:

"Supportive environment and 'work-life balance' can't be topped in Arizona."

"According to think tank the Tax Foundation, the 2016 corporate tax rate in California is 8.84 percent, significantly higher than Arizona's rate of 5.50

percent. Additionally, California's maximum individual income tax rate is a whopping 13.3 percent (the highest in the nation), meaning that both entrepreneurs and their employees don't get as much to take home. (In Arizona, the maximum individual income tax rate is only 4.53 percent.) In addition to the low cost of living, some of the most frequent reasons that the Inc. 5000 entrepreneurs gave as to why Phoenix was a great place for startups included proximity to the Bay Area and the Western United States (it's a 90-minute flight from San Francisco), the supportive environment of the entrepreneurial community, and the work-life balance."

(Anna Hensel, *As Silicon Valley's Prices Explode, More Entrepreneurs Head to the Silicon Desert*, 8/24/2016)

The Center for Negative Carbon Emissions' novel air-capture technology features a plastic resin that captures carbon dioxide when dry and releases it when moist. The process has promising new applications in creating carbon-neutral liquid fuels, a greener alternative to fossil fuels.

LIKE MAGIC

WRITING BY × ROSE SERAGO

ASU researchers aim to pull fuels out of thin air



Photographer: Jessica Hochreiter/ASU

nonrenewable fossil fuels give liquid fuels a bad name. But all liquid fuels aren't fossil fuels and fuels don't have to be dirty.

Fuels are considered dirty when they put new carbon dioxide into the atmosphere, which causes pollution and the buildup of environmentally detrimental greenhouse gases.

But what if we could create fuels that recycle carbon dioxide from the atmosphere rather than using fuels that add carbon dioxide? Researchers at Arizona State University are exploring the idea of creating carbon-neutral liquid fuels. Think of them as fuels created from air.

The endeavor builds on the advances being made at ASU's Center for Negative Carbon Emissions (CNCE), which is developing a technology that collects carbon dioxide from the atmosphere using an air-capture technique that literally scrubs the gas from the air then captures it so it can be reused at an affordable cost. Think of it as a carbon dioxide recycling program.

This would help close the carbon cycle, which means making sure no new carbon dioxide ends up in the atmosphere. It's essential for ensuring concentrations don't surpass unsafe limits for life on Earth. In addition to the environmental benefits of removing carbon dioxide, excessive amounts of it can be turned into carbon-neutral liquid fuels, making it a renewable energy source.

How exactly can fuel be pulled from thin air? First, CNCE researchers generate hydrogen by using a renewable, carbon-free electricity source such as wind energy or solar power to split water through a process called electrolysis. Second, this gaseous hydrogen is combined with the carbon dioxide captured from air.

What does this mixture produce? Methanol, an alcohol fuel similar to ethanol. Voila! Fuel from air.

Like ethanol, methanol can be blended with gasoline or further processed into gasoline. It also can be converted into plastics that would be carbon negative or into other fuels such as diesel and jet fuel.

The big impacts of this technology are threefold. First, unlike fossil fuels, carbon-neutral liquid fuels do not add greenhouse gases or generate a net carbon footprint. Second, unlike other renewable solutions, carbon-neutral liquid fuels work within society's current infrastructure and energy systems. Third, carbon-neutral liquid fuels can be stored long-term and used when needed.

Additional niche applications of the air-capture technology would make it possible to use it to carbonate beverages, create high-value chemicals and sequester carbon in products such as graphene, plastics and carbon fiber.

"Making sure that our mobile sources of carbon dioxide emissions, such as cars and airplanes, are running on carbon-neutral fuels represents a powerful way of achieving carbon neutrality," says Arvind Ramachandran, an environmental engineering doctoral student working with CNCE Director Klaus Lackner, a professor at the Ira A. Fulton Schools of Engineering.

"Our search for a sustainable future is likely to involve a combination of technologies—and fuels from air will play an important role," Ramachandran says. 📺

ROSE SERAGO is on the Communications staff of the Ira A. Fulton Schools of Engineering at Arizona State University.



HOME OF SUCCESS

WRITING BY < ANITA BELL

Arizona Center for Innovation a critical partner for Southern Arizona

Great business ideas are generated everywhere—while sipping coffee, while conducting research in a lab, while figuring out a solution to an engineering problem. Once the business idea has taken shape in the mind of an entrepreneur, passion is the driver to get out and do the necessary work to launch that idea. Transferring the idea from concept to invention takes commitment, work, support and resources.

Where do entrepreneurs find the resources and support they need to be successful? Incubators and accelerators provide crucial assistance. Startups need valuable insight from industry experts across the spectrum, including financial, legal and business expertise. The more support new entrepreneurs can get through experienced technology commercialization organizations with deep backgrounds, the greater their chance for success.

Tucson was ranked as one of the Top 5 cities for entrepreneurs, by Entrepreneur Magazine in August 2013 because there is a robust entrepreneurial ecosystem in Southern Arizona.

Various spaces and programs have cropped up to programmatically launch businesses into the marketplace and prepare them for funding opportunities to support growth.

Created in 2003, the Arizona Center for Innovation (AzCI) is the longest-standing business incubation program in Arizona. It is a component of Tech Parks Arizona, which

serves as “interactive ground,” a place that connects The University of Arizona, community and industry in the pursuit of technology innovation and commercialization. Tech Parks Arizona is part of Tech Launch Arizona, the office that commercializes inventions stemming from university research.

Located at the UA Tech Park, one of the nation’s top-rated research parks, AzCI sports an 18,000-square-foot managed facility that includes offices, wet and dry laboratories, a videoconference room, prototyping center and meeting spaces.

AzCI fosters startups and emerging technology companies from both the university and the general community, helping them to develop their ideas, discoveries, and next evolution of products through customized programs. This mix of both university and community technologies creates a rich and diverse collaborative culture that inspires and encourages further innovation. AzCI also works closely with

HOME OF SUCCESS *continued on page 019*



AzCI's Mentored Launch program provides hands-on assistance to move ventures to the next level of business development.



Dr. Paul Keim, director of TGen's Pathogen Genomics Division

WORKING **TOGETHER**

WRITING BY ✕ STEVE YOZWIAK

TGen and NAU get critical approvals that will save lives



Valley fever, a potentially deadly dust-borne fungal disease, should be easier to diagnose and treat, thanks to a testing technology developed by the Translational Genomics Research Institute (TGen) and Northern Arizona University (NAU).

The test is now protected by a patent issued Aug. 2 by the U.S. Patent and Trademark Office. Also, TGen and NAU have exclusively licensed this technology to DxNA LLC, a company based in St. George, Utah, that plans to make it

commercially available to hospitals and clinics upon approval by the U.S. Food and Drug Administration (FDA) later this year.

Valley fever is endemic to Phoenix and Tucson but also is spreading throughout the arid regions of North and South America. It is an infection caused by the microscopic fungus *Coccidioides*, a pathogen that lives in desert soils and typically enters the body through the lungs.

“Currently, there is no definitive test for valley fever. Our new rapid, one-hour, genetic-based



test will provide physicians and patients with a precise diagnosis, enabling prompt treatment and preventing this disease from becoming more serious,” says Dr. Paul Keim, director of TGen’s Pathogen Genomics Division (TGen North) based in Flagstaff.

“For the past decade, TGen has worked to develop better tools and technology to address valley fever, and we think it is critical to be able to apply our cutting-edge science to problems in our own backyard,” says Keim, who also is the Cowden Endowed Chair of Microbiology at NAU and director of NAU’s Center for Microbial Genetics and Genomics (MGGen).

Valley fever most commonly causes a progressive lung infection but also can spread to other parts of the body, including the skin, bone, brain and the rest of the nervous system.

Nearly 60 percent of those infected by valley fever—including other vertebrates, especially dogs—develop no significant symptoms. However, some patients develop highly debilitating symptoms, such as cough, fever and fatigue. These symptoms are similar to other respiratory diseases caused by bacteria or virus, and often lead to delayed diagnoses and inappropriate treatment. Very severe valley fever can require lifelong treatment with antifungal drugs and even result in death.

The new genetic-based test can precisely identify both strains of valley fever: *Coccidioides posadasii*, found in Arizona, New Mexico, Texas and much of Latin America; and *Coccidioides immitis*, which is found in California, Washington and Baja Mexico.

Most infections occur in central and southern Arizona. Each year on average there are an estimated 150,000 cases in Arizona, resulting in more than 1,700 hospitalizations at a cost of more than \$86 million.


PATENT FOR MRSA TEST

TGen and NAU on May 12 received the first of several anticipated patents from the nation of Australia for a genetics-based test for antibiotic-resistant “superbugs” such as Methicillin-resistant *Staphylococcus aureus* (MRSA) a Staph bacteria that annually kills more Americans than HIV. Similar patent approvals for this MRSA test are expected soon from the U.S., Canada, European Union, Japan, Brazil and other nations.

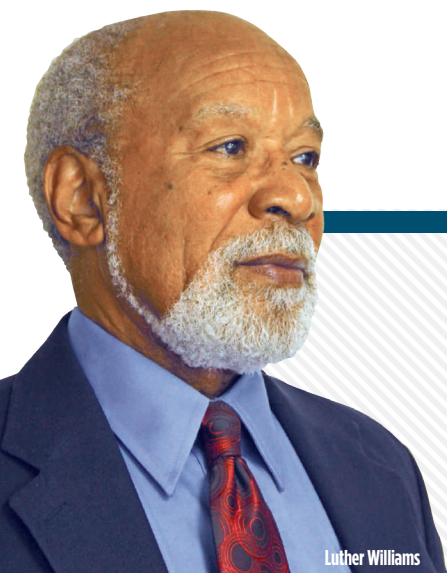
While MRSA technically refers to one particular strain of Staph, the genomics-based test developed by TGen and NAU and licensed to DxNA can precisely detect multiple types of drug-resistant Staph bacterial infections, including drug resistant coagulase negative staphylococcus (CNS), an infection much more common than MRSA.

Staph infections are the most common hospital-acquired or associated infections. While most of the focus over the past few years has been on MRSA, strains of Staph other than MRSA are a much more common problem in terms of incidence and total cost.

Due to the increasing use of implantable biomaterials and medical devices, infections are increasingly caused by CNS. This is a type of Staph that is often resistant to multiple antibiotics and has a particular affinity for these devices.

“We hope this technology will be adopted worldwide by hospitals and clinics, and will help identify and isolate these dangerous and difficult-to-eliminate infections that have come to plague our medical institutions,” Keim says. “The result should be more rapid diagnosis, improved treatment of patients and reduced medical costs.” 

STEVE YOZWIAK is the senior science writer for the Translational Genomics Research Institute (TGen). Connect at www.tgen.org.



TAKING THE LEAD

Chief education officer arrives as new computer effort starts

Luther Williams

as Science Foundation Arizona (SFAz) expands its efforts into the field of education, the group has taken the additional step of bringing on a leader with the credentials to serve him well as the group's first chief education officer.

Luther Williams has agreed to accept the appointment, bringing a national and international perspective to the position as a provost, dean, professor and researcher at Purdue University, Massachusetts Institute of Technology, Washington University, University of Colorado and Tuskegee University. He also served as deputy director of the National Institute of General Medical Sciences and chaired the White House Biotechnology Science Coordinating Committee, Council on Competitiveness.

Williams was selected to serve as the assistant director for education and human resources at the National Science Foundation to lead the pioneering effort to incentivize systemic change—an educational approach to STEM education that includes all essential teaching and learning components for all students. He is regarded widely for his ability to affect collective impact in STEM communities, advance a common STEM agenda and contribute to the AZ STEM Network led by SFAz.

The new chief education officer will play a critical role as SFAz and Grand Canyon University (GCU) join forces in a new initiative to bring computer science to every school and

every student in the state, especially women and underrepresented students of color.


GCU and SFAz have been recognized by Code.org (www.code.org) as a Professional Learning Partner. All three have made a commitment expected to help build a strong computer science pathway toward college and career ready students.

For elementary schools in the Greater Phoenix area, GCU is providing free one-day Computer Science Fundamentals Workshops throughout the year. This workshop will prepare teachers to introduce computer science basics in their classes or in school STEM-related programs in a format that's fun, accessible and relevant to elementary learners. Participants will receive free curriculum, lunch and six professional development hours. To register for a free six-hour workshop at GCU, visit www.gcu.edu/codeorg.

For elementary schools outside of the Phoenix area, Code.org facilitators can come to them anywhere in the state. Teachers will receive the same free six-hour workshop at their school or district if at least 25 elementary educators can attend.

For middle schools, Computer Science Discoveries, an introductory computer science course, will empower students starting in spring 2017 to create authentic artifacts and engage with computer science as a medium for creativity, communication, problem solving and fun.

For high schools, SFAz and GCU are supporting 10 high school teachers from across Arizona in their instruction of AP Computer Science Principles for 2016-17. Teachers will make immediate application of this new curriculum organized around seven ideas at the foundation of studying computer science: creativity, abstraction, data and information, algorithms, programming, the Internet and global impact.

To learn how your school can participate or how to advocate for computer science in Arizona, contact Linda Coyle at SFAz (lcoyle@sfaz.org) or Kathryn Scott at GCU (Kathryn.scott@gcu.edu). 

other entrepreneurial support organizations in town as well as across the state to provide a more robust ecosystem.


AzCI guides companies systematically through a business growth path to attract grant funding and investments, and to support building a team and customer base while ultimately establishing new products in the marketplace. This disciplined approach uses programs and one-on-one support to guide companies to the next level of success.

At AzCI, companies develop and execute a successful business strategy, receive mentorship from successful entrepreneurs and take a product from idea to market—all the while connecting to the resources of the university and the Tucson community. AzCI client companies also have access to state-of-the-art facilities and equipment so they can focus on developing the company.

More than 100 startups have participated in the AzCI program. All told, they have raised more than \$30 million in funding over the past 12 years.

Unlike a typical accelerator, AzCI accepts companies into its programs year-round. But like an accelerator, the core program is offered once or twice as a cohort-based program.

With the addition of co-working space, other acceleration programs and promotion of entrepreneurship in Tucson and around the state, AzCI over the last few years has seen an increase of quality in startups and emerging companies. Also, the successful start of Tech Launch Arizona has greatly enhanced the transfer of technologies out of the university into the commercial space. AzCI's clients are now about 50 percent based on UA technology in addition to student and local startups going through the program.

Economic developers refer to this approach as economic gardening because the local economy is grown from within. Its premise is local entrepreneurs create the companies that bring new wealth and economic growth to a region in the form of jobs, increased revenues and a vibrant local business sector. The bottom line is that the more successful the startup and emerging companies are, the more successfully the region is as a whole. 

ANITA BELL is acting director of the Arizona Center for Innovation.



AzCI hosted a CEO boot camp workshop where entrepreneurs used interactive and role-playing activities to learn how to run their startups.

NEW MEMBERS

To join the Arizona Technology Council, a member-supported group that represents the interests of the state's technology community, go the www.aztechcouncil.org.

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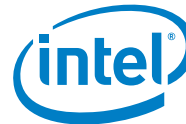
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