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THE IEDC
Economic Development Journal
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Defining Economic Development Leadership for the 21st Century Global Economy
An Anthology of New Leadership Perspectives in Arizona

Population Growth in Arizona
The Limitations of Land and Infrastructure

Driving Arizona's Global Economy
A Statewide Partnership to Increase Foreign Direct Investment

Arizona's Collaborative Gene
Partnerships Which Changed the Course of the Bioindustry in Arizona

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The Challenge in Today's Economy and a Case Study of the Arizona Market

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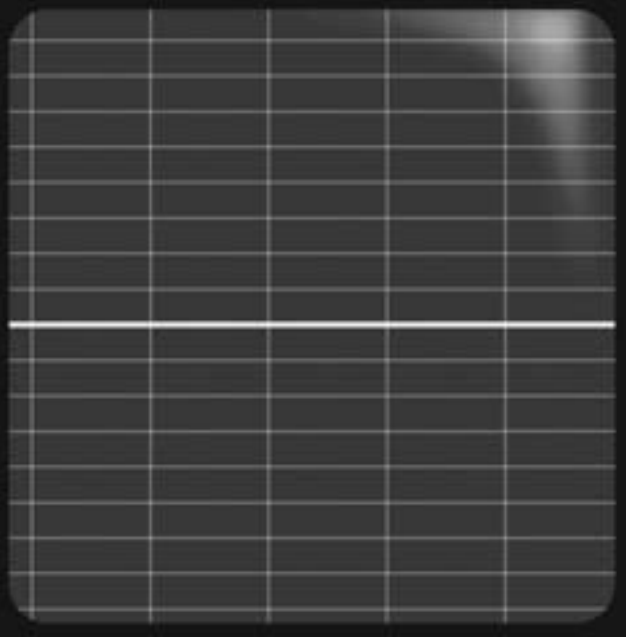

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Janet Napolitano
Governor of Arizona

welcome to arizona

It is my pleasure to welcome you to Arizona for the 2007 International Economic Development Council's Annual Conference, September 16-19, in Phoenix. The conference theme this year is "Economic Development in the 21st Century: New Leadership, New Models." Arizona is the fastest growing state in the country with a dynamic and vibrant economy that is undergoing tremendous change.

In Arizona, you will find a diversity of communities that represent all segments of the economy, from rapidly revitalizing downtowns and rural communities that are becoming suburbs to rural communities that are trying to maintain their rural economy and identity in an urbanizing state. We are at the forefront of developing strategies for integrating environmental sensitivity, rapid growth, new technologies and innovative economic strategies.

In Greater Phoenix, you will find exciting downtowns that are using universities and new research institutes to transform their economies as well as the newest and latest in sports facilities being used to launch new economic opportunities. In Tucson and southern Arizona, you will find innovative projects that integrate their unique Sonoran desert environment into thriving economic change. In our tribal communities, you will learn how Native American communities are finding economic opportunities that meet their diverse needs. Along the border, you will find communities working cooperatively with neighboring states in Mexico to grow a regional, bi-national economy. And everywhere in the state, you will find the friendly people, stunning landscapes and incredible diversity that are the hallmarks of Arizona.

With innovative universities and new academic partnerships, state-of-the-art research in genomics and bioscience, growing expertise in solar energy and sustainable technologies, Arizona is right in the middle of the most exciting global economic trends. It is the ideal location for the IEDC Annual Conference – stimulating new ideas and discovery in a beautiful and unique environment.

The IEDC Annual Conference is a wonderful opportunity to share with colleagues from around the country and around the world. We look forward to sharing our state with you – and learning from you in return.

Welcome to Arizona!

Yours very truly,

Janet Napolitano
Governor

THE IEDC
Economic Development Journal

TABLE OF CONTENTS

PAGE *18*

PAGE *26*

INTERNATIONAL
ECONOMIC DEVELOPMENT
COUNCIL

defining economic

DEVELOPMENT LEADERSHIP FOR THE 21ST CENTURY GLOBAL ECONOMY

Edited by Ioanna T. Morfessis, Ph.D.

Perhaps more than any other factor, globalization will be the single most seminal dynamic of the 21st century economy. While only time will prove or disprove this assertion, we do know that globalization and the rapid advancement of technologies are irrevocably changing how individuals, enterprises, communities, and nations do business. New opportunities and challenges have been created by the growth of capitalism, opening of new markets, and powerful new technologies that now enable governments and firms to transact business across national boundaries on a scale that is unprecedented. As trade and foreign direct investment between companies, countries, and continents continue to grow, transglobal corporations and small businesses alike are changing how they assess and develop opportunities; grow market share and allocate resources; and where they locate, create, and grow jobs.

The mandate for economic development in today's world is clear: new forms of leadership and new models and programs are essential to succeed in this competitive environment. Local, regional, state, and national economic development agencies will compete even more vigorously worldwide to offer the infrastructure, resources, and quality-of-life that employers need to support their employees and the markets they serve.

Communities once considered the best business locations for people and business now are methodically and consistently evaluated against markets in continents around the world. No longer can any community consider itself insular in the globalized world of commerce and trade. Consequently, the economic development executive has been compelled to abandon many practices of the 20th century and instead adopt new approaches to create, strengthen, and sustain global competitive advantage for the economy he or she represents.

With knowledge now the fundamental basis of competitive advantage, economic development organizations are looking for ways to grow and attract concentrations of innovative, knowledge-based business activity. The economic and quality of life attributes and amenities that drive where talented and high-skilled young knowledge workers choose to live have become paramount in the evaluation and determination of the best places for business, entrepreneurs, innovation, R&D, and virtually every type of capitalistic enterprise. Human capital development strategies, including the quality of education from early childhood through post-graduate studies, are essential to ensuring the social and economic health and competitiveness of communities. In addition to high quality earnings and employment opportunities, the quality and expan-

The mandate for economic development in today's world is clear: new forms of leadership and new models and programs are essential to succeed in this competitive environment. Local, regional, state, and national economic development agencies will compete even more vigorously worldwide to offer the infrastructure, resources, and quality-of-life that employers need to support their employees and the markets they serve.

Ioanna T. Morfessis, Ph.D., is president of IO. INC, Phoenix, AZ, which works with companies, communities, and non-profits in the areas of strategic planning and growth. Formerly, she was the founding president and CEO of the Greater Baltimore Alliance and the Greater Phoenix Economic Council.

AN ANTHOLOGY OF NEW LEADERSHIP PERSPECTIVES IN ARIZONA

Historically, communities looked to the chief elected official and top economic development executive for policy and strategic direction to create competitive advantage and economic success. Today, however, the once exclusive stage of the economic development executive is shared with new players in lead economic development roles. They influence policies and opinions that profoundly impact the economic development of our world. They constitute the new generation of economic development leadership – a hybrid of private and public interests, operating principally in the philanthropic realm, all for the greater good. Who are these leaders? How can economic developers optimize and capitalize on their talents and resources?

siveness of a community's amenity economy – including the arts, cultural, recreational, and natural environments – hold equal importance in the economic development landscape. The fusion of economic development interests with those of education, philanthropy, business, arts and culture, and other major institutions of capitalistic societies has become mission critical to economic vitality and competitiveness.

Finding that to succeed in this dynamic and ever-more complex environment, today's economic development executive is sharing the stage with new actors. Throughout the world, and at all levels of the economy, the economic development executive is but one of many prominent players engaged in the economic development process. Among these new leaders are the CEOs of foundations, colleges and universities, business and professional organizations, and other institutions. These leaders have staked their legitimate and high profile claims in the economic development arena, fusing their interests with those traditionally the exclusive domain of economic development.

As a result, new strategic alliances, collaborations, and partnerships have proliferated throughout the world – all focused on creating competitive advantage and increasing wealth generating employment.

The State of Arizona provides many promising examples of these new forms of leadership and alliances. Having the distinct advantage of a historically growth-driven economy, Arizona traditionally has been a state of economic development innovation. According to the U.S. Bureau of Census, Arizona ranked first among all states in population growth in 2005. The state added more than 213,000 new people, bringing its total resident base to approximately 5.8 million individuals. Job growth rates were equally robust; the U.S. Bureau of Labor Statistics reports that in 2006, Arizona's job growth rate was 4.5 percent, adding 116,000 new jobs to its at-place employment of 2.75 million. Even with this growth, new leaders have come to the forefront of policy making and change, sharing a widely held recognition that growth in itself is insufficient to drive Arizona to a status of global economic competitiveness.

Who are these new leaders? What role do they play on the economic development stage? What forms of alliances and partnerships have they created to create competitive advantage in the 21st century economy? In this anthology of leadership perspectives, four highly distinguished leaders provide their unique and instructive viewpoints and case studies of the roles that their respective organizations have assumed in advancing Arizona's economic standing and competitiveness in the globalized world. In each case, these individuals recognize that economic development is far more expansive than the models of the past. Based on this understanding, they have graciously agreed to share their thoughts with the economic development profession. Following are essays from four of Arizona's most influential leaders: Donald Brandt, president of Arizona Public Service Company; Dr. Judy Mohraz, president and CEO of The Virginia G. Piper Charitable Trust; Donald V. Budinger, chair of Science Foundation of Arizona and chairman and founding director of Rodel Foundations; and Dr. Jeffrey M. Trent, president and scientific director of the TGen, Translational Genomics Research Institute.

Arizona – Ensuring Bigger Means Better

By Donald Brandt
President, Arizona Public Service

Donald Brandt *is president and chief financial officer, Arizona Public Service Company and executive vice president and chief financial officer, Pinnacle West Capital Corporation. He is responsible for finance, treasury, accounting, tax, investor relations, risk management and insurance, supply chain management, financial planning, as well as power marketing and trading.*

Some people might consider the loud, repetitive pounding of giant steel girders into the ground a few hundred feet outside their office an unwelcome distraction – especially as they attempt to write an insightful think-piece about Arizona's future.

Fortunately, I find the insistent pounding of steel, the whirr of giant cranes, and the chatter of construction workers somewhat melodic. We listen to this tune often here in Arizona, and the lyrics to this song tell a tale about development, opportunity, and growth.

Arizona continues to grow at a pace three times the national average.

Bio-tech institute T-Gen, located in downtown Phoenix, could lure other bio-tech firms to Arizona.

Growth fuels the economic engines here. For our state, growth represents both a significant reality and a tremendous asset. Arizona claims the title of the fastest growing state in the country and adds new residents at a rate three times the national average. Each day, nearly 600 new residents call Arizona home.

While population expansion has been brisk throughout the state, the nucleus of this growth centers on the greater Phoenix area, where my company, Arizona Public Service (APS), has its corporate headquarters. In the last 20 years, the Phoenix area has seen its population double, from 1.8 million to 3.6 million. Phoenix claims the position of the fifth largest city in the United States.

APS will invest nearly $15 billion over the next decade to build the electric infrastructure to power Arizona's future.

However, while growth represents a tremendous economic asset for Arizona, it also poses our greatest challenge. We must fashion not merely a bigger, but a better future. Building a strong and sustainable future will require our collective attention to the following factors:

Economic Diversity – Arizona's economy must become more diverse. As much as 20 percent of new job creation in Arizona over the last five years has occurred in the construction industry. And, this does not include growth-related businesses such as lumber supply, concrete, landscaping, home furnishings, mortgage companies, etc. Without a doubt, this growth has paid dividends for the state. However, in light of the cyclicality of the construction industry, we must develop more long-term, high-paying jobs as we find in the aerospace, bio-tech, and high-tech industries. These sectors have begun to blossom as a result of the state's focus and support for science and technology at our local universities; T-Gen (the Translational Genomics Research Institute), a large biomedical research institute; and the Arizona Science Foundation. These efforts deserve and command our continued support to ensure their success.

Education – Simply stated, Arizona's educational system needs significant improvement. The current numbers paint an underwhelming picture. At the beginning of this year, the annual "Quality Counts" report from *Education Week* ranked Arizona 43rd in academic achievement and 49th for "students' chance for success." Even if some of these national surveys overstate Arizona's educational shortcomings, they point to areas requiring improvement. Moreover, we will have to work hard to change the negative perceptions such studies have created in the public mind.

Fortunately, I have reasons for optimism. In her recent inaugural address, Arizona's Governor Napolitano acknowledged the need for improvements in the state's education system and made it a top priority of her administration. The institution of all-day kindergarten throughout the state, new initiatives to reduce the drop-out rate, and increased funding for university research and development have contributed to a new wave of progress. Ideally, improvement must happen quickly given the nature of the competitive global economy. Only if Arizona achieves its goal of ranking among the best educational systems in the country will we attract the high-paying businesses and high achieving employees we require for sustainable economic growth. These improvements remain essential to retaining and attracting more of those businesses by providing a key success factor: a well-educated, future workforce. Making this happen will require the attention of many stakeholders, including state and city governments, teachers and parents...and the business community.

Infrastructure and Planning – APS ranks as Arizona's largest and longest serving electric utility. We understand growth. We understand the need to plan and put infrastructure in place to manage this growth. And we understand the high price tag that accompanies this infrastructure. Over the next ten years, APS will invest nearly $15 billion in power plants, substations, and other vital equipment necessary to ensure we continue to meet our customer growth with safe, reliable power.

This exemplifies one company's challenge in one industry. However, the necessity for planning for growth confronts Arizona and all its industries, not just APS. We must apply a long range outlook in areas such as transportation, telecommunications, and fuel pipelines. And, while I do not focus on it in this article, it is imperative that these efforts, as a central part of any decision making, carefully address environmental issues such as land preservation, water and air quality.

Growing Better – As Arizona grows in quantity, it must also grow in quality. Phoenix's downtown brims with tremendous potential, and we have gained some momentum in its development. The pounding steel I mentioned earlier emanates from the construction of a new 1,000-room downtown hotel and new buildings for a greatly expanded Arizona State University downtown campus. Other recent Phoenix victories include a $600 million expansion/renovation of the Phoenix Convention Center, a new light-rail system to relieve some of our traffic congestion, and luring T-Gen.

Other Arizona cities such as Glendale, Scottsdale, Tempe, Chandler, and Mesa have displayed equal promise in their development. Each offers an array of new unique shopping, dining, and entertainment attractions – as well as new schools and parks – for their rapidly expanding populations. These steps represent the beginning of an effort to bring more people, more attractions, more appeal and, ultimately, more businesses to the Valley of the Sun.

While further developing the Phoenix area strengthens our state as a whole, we must also work to enhance the attraction of the cities and towns outside the metro areas of Phoenix and Tucson. For smaller Arizona locales like Cottonwood, Gila Bend, and Winslow, one new medium-sized company can spur further development that may make the difference between a bustling economy and one that struggles. The task of luring businesses falls not only to the local chambers of commerce, but also on the surrounding cities and towns, as well as the state's medium and large businesses, whose interests ultimately lie in building a strong and sustainable state economy.

Teamwork and Leadership – A healthy Arizona clearly benefits all businesses in the state. Yet, too often, amid the battle for customer loyalty and the most competitive prices, companies can lose sight of big picture issues. Community involvement, economic development, support for the arts and cultural venues, and environmental stewardship comprise just a few examples of the areas in which all Arizona businesses should seek involvement.

A healthy Arizona clearly benefits all businesses in the state. Yet, too often, amid the battle for customer loyalty and the most competitive prices, companies can lose sight of big picture issues. Community involvement, economic development, support for the arts and cultural venues, and environmental stewardship comprise just a few examples of the areas in which all Arizona businesses should seek involvement.

An example of this big picture thinking took place shortly after the national tragedy of September 11, 2001. With Arizona's economy reeling, a summit of business community and political leaders gathered to address issues and concerns facing the state. Dubbed the Arizona Business Coalition, the group set forth the initial priorities which ultimately helped jump-start our economy and build for the future. Since then, the Coalition's outlook has broadened, but its holistic focus on creating a better Arizona remains firmly in place.

I take pride in the fact that my company, under the leadership of Chairman Bill Post, initiated the Business Coalition and continues to support its efforts, as well as those of other economic councils and chambers of commerce. More examples of such teamwork can and should happen if we hope to take full advantage of the opportunities inherent in Arizona's unique growth. Ensuring the success of an entire state demands the concerted efforts of many and requires a lot of heavy lifting. We must address the issues facing Arizona with the perspectives and ideas of a host of different parties. Established leaders must welcome and encourage the new. Acting together, all those people and entities with a stake in Arizona's future must work the long hours and withstand the inevitable criticisms that accompany change.

We can build and sustain a bigger and better Arizona: the kind of place we can proudly call home.

Foundations: Catalysts for Change in a Flat World

By Judy Jolley Mohraz, Ph.D.
President and CEO
The Virginia G. Piper Trust

Judy Jolley Mohraz *is the president and CEO of The Virginia G. Piper Charitable Trust, a private independent foundation located in Scottsdale, Arizona. Focused on the fields of health, education, children, arts and culture, older adults, and religious organizations, the Trust invested over $26 million in the Greater Phoenix community in 2006. Prior to joining the Trust as its first president in 2000, she served as president of Goucher College in Baltimore.*

Tom Friedman's provocative analysis of new global technological and economic forces in "The World Is Flat" reminds us of the warp speed of change in international economic development. While the philanthropic sector shifts at a more deliberate pace, foundations understand that heightened economic competitiveness, global rather than national marketplaces, and new models of business are relevant to their work as well. Recognition that foundations have a key role to play as catalysts for change in a "flat world" is one of the hallmarks of 21st century philanthropy.

Translational medicine "from bench to bedside" has forged strategic public-private partnerships in Arizona.

Organizations such as the Bill & Melinda Gates Foundation reach out globally with venture capital and audacious plans to transform health in Third World countries. Other foundations push the boundaries of genomic research that will translate into new drugs and health care delivery systems that are international, not national, in economic impact. Smaller foundations working in the local sphere seek to reinvigorate communities, lure new industries, and retool workforces for 21st century skills.

A fable circulates in philanthropic circles that explains why foundations now sit at the table for economic development discussions, whether local, national, or international. The fable is as follows: Villagers witnessed a horrible sight one day: babies were bobbing in the river, surging past in the pulsating current of the river. Villagers rushed to retrieve and save as many babies as possible. But a few in the community decided to go upstream to determine why the babies were being thrown in the water in the first place. Their task was to stop the destruction at its source. While some foundations embrace the role of retrieving the babies – a laudable effort that follows the long standing and revered tradition of compassionate charity, more foundations are moving upstream to address issues at their root causes and work toward systemic change.

It is this belief that the issues that foundations seek to address – health, education, the welfare of the most vulnerable – demand upstream work in the realm of economic development that has prompted foundations to move into areas previously the sole domain of economic development councils.

Today, foundations commission bioscience roadmaps to chart a state's strategies in a highly competitive field, forge public-private partnerships to build research institutes, create funds to foster scientific incubators, and attract precious coveted venture capitalists. The international contest to lure knowledge workers and research stars drives foundations to fund initiatives as diverse as support for edgy mixed use urban revitalization or stratospheric sums to recruit star scientists in fields such as personalized medicine and technology.

In most cases, these efforts are collaborative, often involving several foundations, state and local governments, higher education, and economic development agencies. The foundations are not simply the funders. Often they are the catalysts, the conveners, and the knowledge brokers. For many foundations, these are new roles involving risk, new partners, and new ways of approaching age-old problems of poverty, ignorance, and suffering.

Vibrant regional arts and culture organizations contribute to a thriving economy in Greater Phoenix.

At The Virginia G. Piper Charitable Trust, a foundation focusing exclusively on Maricopa County, the theme of economic development runs through

New research about early brain development shapes programs to help children get ready to learn even in Neonatal Intensive Care Units.

As foundations forge relationships with economic developers, venture capitalists, and high tech whiz kids, they find themselves echoing the lessons businesses are learning in this period of tectonic economic shift: Collaboration, agility, and working across fields rather than in silos are essential tools for progress in the flat world of the 21st century.

major funding initiatives. Here are a few examples: Last year the Trust committed $50 million over the next five years to recruit ten of the most distinguished scientists and clinicians to the Greater Phoenix region in the field of personalized medicine. This investment in human capital focuses recruitment efforts in cancer therapeutics and neuroscience, two bioscience strengths identified in Arizona's bioscience roadmap, a strategic plan funded by the Flinn Foundation. The Trust, along with other foundations, recognizes that if Arizona's economy is to thrive in future decades, it must become competitive in fields such as bioscience.

Another Piper Trust investment in cutting edge medical research that has the potential to translate research from the bench to the bedside is a $4.5 million grant to a local hospital research unit to increase clinical trails for new cancer drugs and build alliances in the bioscience industry. This grant has clear economic development implications that are coupled with goals to cure patients and extend life.

A third example is a $6 million collaboration between Piper and the Flinn Foundation to fund a regional arts organization to foster locally a vibrant creative culture that will attract knowledge workers eager to live in a community recognized for its cultural vitality. It is not surprising that the new organization, Maricopa Partnership for Arts and Culture (MPAC), has partnered with the Greater Phoenix Economic Council on joint reports and initiatives.

These are only a few funding initiatives that have brought Piper staff shoulder to shoulder with economic development experts and public sector leaders in shaping the future of the region.

In adapting to these new roles, foundations are challenging themselves to act in ways more akin to the for-profit sector: They want to measure effectiveness and impact. They speak of leveraging investments and ROIs. And such metrics are appropriate for a sector that now represents amassed wealth unimagined even a few decades ago. While the Bill & Melinda Gates Foundation, with $32 billion in assets and an additional $30 billion coming from Warren Buffett, is the most visible symbol of the new philanthropic power, foundations with hundreds of millions and even billions of dollars in assets are springing up across the country in record numbers. As one headline recently proclaimed, "Giving back is a 'megatrend' in the world today."

As foundations forge relationships with economic developers, venture capitalists, and high tech whiz kids, they find themselves echoing the lessons businesses are learning in this period of tectonic economic shift: Collaboration, agility, and working across fields rather than in silos are essential tools for progress in the flat world of the 21st century.

The New Public/Private Partnership: How the Economic Model in the 21st Century Has Changed the Paradigm of the Public/Private Partnership

By Donald V. Budinger
Chair, Science Foundation Arizona, and Chairman and Founding Director, Rodel Foundations

Donald V. Budinger *is a founder and the former president of Rodel, Inc. – the world's largest manufacturer of high precision surface finishing chemicals used in the manufacture of computer chips, silicon wafers, rigid memory discs, and specialty optics. When Rodel was sold in 1999, a significant portion of the proceeds was contributed to create The Rodel Foundations. The purpose of the Rodel Foundations is to improve the pre-kindergarten through 12th grade public education systems in Delaware and Arizona so they will be widely recognized as two of the best in the nation.*

In the last half of the 20th century, America was perceived as the world's technological leader. We landed on the moon, helped map the human genome, and perfected the electronic brain that

drives everything from computers and satellites to cars and refrigerators. Public/private partnerships were created to leverage the resources of local economic development efforts. Back then, the emphasis was on generating immediate returns, such as attracting new factories or call centers.

Today, the qualities that form knowledge-based industries and drive the world's economy are much more ethereal. Knowledge has no physical boundaries. There is no easy way to generate returns – in terms of job creation – on a quarterly basis. There is not even an accurate way to predict the next great technology capable of creating an entirely new economic segment. Yet for the most part, we still cling to the foundations and partnership structures that built America's 20th century economy. In the meantime, other nations have embraced change and successfully made the "Great Leap Forward":

- Six of the world's 25 most competitive information technologies are based in the U.S., while 14 are based in Asia.
- The U.S. ranks 8th in the availability of scientists and engineers. India ranks 3rd.
- The U.S. ranks 37th in quality of math and science education, behind nations such as Israel, Scotland, and Korea.

Over the past two decades, developing countries such as China, India, South Korea, and others have instituted integrated programs to "catch up" with U.S. technology. In terms of education, some have invested in science and math education, modern laboratories, and an aggressive faculty-recruiting campaign. Their commitment to excellence has paid off. The U.S. trade balance in high-tech manufactured goods shifted from positive $54 billion in 1990 to negative $50 billion in 2001.

Image courtesy of ASU's Biodesign Institute

Neal Woodbury, right, a researcher with Arizona State University's Biodesign Institute, received a 2007 Competitive Advantage Award from Science Foundation Arizona to perform research that focuses on nanoscale techniques and imaging to understand gene regulatory networks relevant to health and disease.

With these changes in global market forces and the growing number of competitors, a wide technology gap between the U.S. and leading high-technology nations exists. The public/private partnerships that leveraged resources and made a significant difference in our economy in the last century cannot meet the demands of the new knowledge-based economy. These partnerships are slow and cumbersome; they fail to reach broad audiences; they lack the framework needed to build new partnerships in areas of great economic promise.

In Arizona, leaders in politics, business, philanthropy, and education are asking this question: "Can our state thrive and prosper in the 21st century economy using a 20th century model of economic development dependent on inherited assets, such as climate, inexpensive land, and precious and limited natural desert resources?" The answer is no. The future will belong to regions of the world that learn how to leverage created assets that come from human intelligence, creativity, innovation, and speed.

Photo credit: Courtesy of TGen

The Phoenix-based Translational Genomics Research Institute is among the Arizona-based research-performing institutions that received funding from Science Foundation Arizona's 2007 strategic investments.

To help grow these assets and close the technology gap, Science Foundation Arizona (SFAz) was created. SFAz, a 501(c)(3) nonprofit, was designed to be a catalyst to strengthen science, engineering and medical research and technology infrastructure. SFAz focuses on areas of greatest strategic value with the goal of increasing Arizona's global competitiveness.

While Arizona claims much success in the areas of aerospace and semiconductor industries, and continues to invest in the fields of bio-industries, pharmaceuticals, nanotechnologies, telecommunications and optics, there are gaps in federal research funding, start-up seed funding, research grants, and technology transfer to grow science and technology sectors.

SFAz was formed in 2006 by three statewide CEO groups: Flagstaff 40, Greater Phoenix Leadership, and the Southern Arizona Leadership Council. Its operating budget of $2.5 million for

the first five years is funded by these three private-sector groups. In addition, the Arizona governor and state legislature appropriated $35 million for SFAz investments.

Heading up the organization as president and CEO is William C. Harris, Ph.D., whose experience includes serving as founding director general of Science Foundation Ireland (SFI). Harris is credited with SFI's success as a global bio/information and communications technology research model.

With a commitment to raise both public and private funds, SFAz intends to partner not only with business, government, and educational entities, but with philanthropic organizations and individuals in order to meet its objectives. For example, the mission of The Rodel Charitable Foundation of Arizona, one of SFAz's partners, is to improve Arizona's education system so it is widely recognized as one of the best in the country by 2020. One of Rodel's initiatives is the Math Achievement Club, an innovative program designed to change the perception of learning math and improve the mastery of math skills among school children. While such complementary goals can be found among many public and private organizations, most are working independently and have not capitalized on the benefits of leveraging their combined resources, talents, and leadership. This need for a diverse range of partners is represented by members of SFAz's board, which includes leaders in the fields of business, education, science, and philanthropy.

The goal of SFAz is to build a research infrastructure grounded in science and engineering that will enable Arizona to compete for the world's top talent and build the state's future economy. The cornerstone programs of SFAz include:

- **Graduate Research Fellowships**, grants designed to transform competent graduate programs into world-competitive programs by retaining the brightest Arizona students in math and science and also attracting new grad students to our state by providing them with an incentive to stay.
- **Small Business Catalytic Funding**, a program that provides seed funding to university-based spin-off companies in order to allow researchers the opportunity to secure much larger amounts of funding for technology commercialization. The end result is the formation of a high-tech company that creates jobs in Arizona.
- **Competitive Advantage Awards**, designed to provide funding to collaborative research teams that have a high potential of attracting large federal grants based on an extensive peer review process.
- **Strategic Research Groups**, partnerships between research institutions and private organizations that will enhance technology transfer.
- **K-12 Teacher Discovery**, a program of research internships for high school science and mathematics teachers that will update their knowledge of modern science and allow them to bring that knowledge back to the classroom.
- **K-12 Student Discovery**, designed to broaden the participation of K-12 students – particularly those from rural and under-served neighborhoods – in scientific discovery activities.
- **Strategic Initiatives**, recognizing that today's research work could generate a solution or cure for tomorrow, these grants allow SFAz to respond quickly to ideas that may not fall into one of the above programs but hold great promise for Arizonans.

In order for SFAz to reach its ambitious goal, we need to communicate the benefits of this endeavor and make virtually everyone in our society a partner. We will need to earn the confidence of everyone from CEOs and educators to legislators, parents, and children. This can only be accomplished by an interconnecting network of public/private partners who are willing to accept change and make the strategic investments that will deliver a promising future for Arizona.

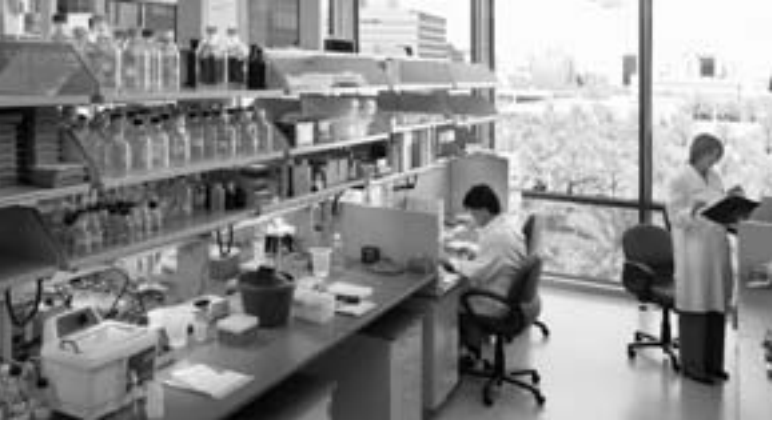
Scientific Collaboration, Education, and Research as a Model for Economic Development in Arizona

By Jeffrey M. Trent, Ph.D.
President and Chief Scientific Director, TGen (Translational Genomics Research Institute)

Jeffrey M. Trent, Ph.D. *is president and scientific director of the Translational Genomics Research Institute or TGen. TGen's mission is to make and translate genomic discoveries into advances in human health. Prior to forming TGen, he served for ten years at the world's largest biomedical research institute – the National Institutes of Health in Bethesda, Maryland. There, he founded and directed the laboratory division of the federal agency in charge of coordinating and finalizing the Human Genome Project.*

The role of the U.S. in the global scientific market has changed. In today's reality, the U.S. as a leader in science and technology is no longer a given. In the new economy, new paradigms for accelerating and translating discoveries are necessary in order to maintain our edge and improve the lives of American citizens. Arizona decided to tap into the country's existing strengths in life sciences and marry these with new opportunities resulting from the mapping of the human genome and genomic technologies.

One such paradigm-changing organization is the Translational Genomics Research Institute, or TGen (www.tgen.org). TGen was born with the simple mission of quickly translating its discoveries into new tests and treatments with the added hope of



The open and flexible laboratory environment meets the needs of TGen's diverse research programs while fostering an atmosphere of scientific collaboration and innovation. TGen is focused on personalized medicine and plans to accomplish its goals through robust and disease-focused research programs and its state-of-the-art bioinformatics and computational biology facilities.

creating new businesses to fill the gaps in the translation continuum.

Biomedical science nationally has been an essential component of knowledge-driven economic development. However, the existing successful models of technology-based new company formation are localized to a few regional centers such as Boston, San Francisco, and San Diego. Arizona, by investment in TGen, is one of a new model of public-private partnerships being developed and executed – in this case engaging universities and institutions across the region, state, and country. This new model reflects the relevance of related activities and their need to be integrated, enhanced, and expanded upon. Organizations are rethinking current best practices and working to develop plans to leverage existing expertise, resources, and facilities to accelerate, translate, and drive economic development. In essence, Arizona is seeding collaborative interactions (like TGen) to possibly leapfrog forward as a "delivery state" focused not solely on technology development, but rather upon the introduction of new technologies into clinical practice.

Arizona is one of the few states with a "Bioscience Roadmap" (www.flinn.org) and an organized state-wide Bioscience Steering Committee comprised of leadership from a cross-section of industry, academia, and government singularly focused on implementation and outcomes. The state has also formed the Arizona Commission on Medical Education and Research (www.governor.state.az.us/ACMER/) to expand the capacity of the biomedical education and research programs of the Arizona university system. Arizona is investing in its biomedical sector; the state government, the cities, the counties, the universities, the business community, the philanthropic community and even the public through support of taxes and bond drives in this area.

TGen scientists use microarray technologies to compare genetic patterns between individuals with a disease and those without. TGen investigators hope that the results of such studies will help identify the gene or genes that when altered give rise to a particular disease.

Continued investment, collaborations that leverage existing expertise and resources, and strong leadership are helping Arizona to compete globally and are critical to our future sustainability nationally. One such initiative is the Science Foundation Arizona (www.sfaz.org). SFAz was initiated in the spring of 2006 by the three statewide CEO groups: Flagstaff 40, Greater Phoenix Leadership, and Southern Arizona Leadership Council. This effort builds on the pioneering work done by the Flinn Foundation and its consultants, the Battelle Memorial Institute, in creating the Arizona Bioscience Roadmap. SFAz was created as a 501(c)(3) non profit and is a unique public-private partnership. CEO groups will fund the first five years of operating costs. Public and philanthropic funds will be used for investments that are intended to deepen Arizona's scientific, engineering, and medical infrastructure that will result in transforming Arizona's economy into one that is even more innovative and enterprising.

The economic engine that can drive the bioscience industry in Arizona will likely be founded upon three pillars of success: collaboration, education, and research. In today's world, research is no longer conducted in a vacuum. The days of a single scientist working alone in the lab have long passed. Today's research enterprise is more aligned with the idea of a "laboratory without walls". By leveraging existing resources with collaborators on a local, state, national, and international level, today's scientists includ-

Biomedical science nationally has been an essential component of knowledge-driven economic development. However, the existing successful models of technology-based new company formation are localized to a few regional centers such as Boston, San Francisco, and San Diego. Arizona, by investment inTGen, is one of a new model of public-private partnerships being developed and executed – in this case engaging universities and institutions across the region, state, and country.

ing those at TGen, Arizona's universities, and Arizona's research institutes, are able to accomplish far more, far faster in this cooperative fashion.

One of the specific ways TGen is leveraging resources is through collaborating with our excellent state universities. Without a trained, well-educated workforce in these areas, there will be a direct, immediate, and detrimental impact on future research, employment opportunities, and economic growth in these highly competitive areas.

The Translational Genomics Research Institute (TGen) is housed in a six-story, $46 million dollar building that forms the cornerstone of the bioscience and medical research campus located in downtown Phoenix.

The "translational" focus of a collaborative model enhanced by the state of Arizona as a whole offers the potential to enhance Arizona's economic development by improving health care through the development of earlier diagnostics and smarter treatments. If a disease could be caught earlier, or if a treatment could be made more effective, then the quality of health care increases, as the cost decreases.

Finally, TGen, Arizona's universities, and other research programs, are key players in leveraging existing resources to build upon and advance research discoveries made in Arizona. In addition to simply making discoveries, collaboration between research institutions and clinical provider organizations allows for the unique opportunity for independent research institutions to transition laboratory-based research into clinical care.

Through collaborations; leveraging resources; and focusing on education, health, and research, TGen and Arizona are at the forefront of a new model for economic development and advancing science is emerging.

LESSONS IN LEADERSHIP

What lessons can be learned from these four leaders? Do the alliances they have created bear relevance for other regions, states, and nations? Can an economic development executive in the United Kingdom, Singapore, Mexico or South Africa benefit from these Arizona initiatives? How does the economic developer, regardless of continent, find value in the four models presented in this anthology?

Clearly, each nation, province or state, region and city has its own unique attributes, opportunities, and challenges. What works in one place is not necessarily a formula for success in another locale. However, there are some fundamental aspects of these Arizona models that can, in fact, transcend boundaries and place. Some thoughts for consideration:

1. **Clear Sense of Purpose and Mission –** In each of these essays, it is apparent that a strong sense of purpose and mission has driven these leaders to fuse their interests with those of the economic development imperative. All of these leaders are concerned about the future of this nation, and their state, and understand that innovative approaches are needed to strengthen the U.S.'s ability to compete in the global economy. Recognizing that their respective organizations have a legitimate and important role to play, each has stepped up to provide leadership, backed up by their unwavering commitment and financial resources.

   It is reasonable to surmise that business, government, and community leaders around the world are equally concerned for the well-being of their citizens, and the ability of their governments and businesses to compete effectively in the global economy. Having leaders who understand the relationship between these dynamics, and the fortitude to do something about it, is paramount to the economic development competitiveness of any community.

2. **Social Responsibility –** Arizona is fortunate to have many business and philanthropic leaders who have a strong sense of duty and responsibility to others. In each case, these Arizona leaders are using their unique talents, strengths, and positions of influence to advance the greater good of the state. Linking social responsibility to the economic development agenda has provided a platform for the advancement of these new and bold initiatives. In the case of Arizona Public Service Company, community stewardship and corporate social responsibility are integral dimensions of their business operating philosophy, and have been so for decades. The TGen model of social responsibility transcends place and focuses on the well-being of humanity. For the Virginia G. Piper Trust and Science Foundation of Arizona, the underlying premise of their organizations is to foster the health and vitality of Arizona's society and economic future. Economic development executives can and should continuously inform and educate the leadership of their communities, and link doing good with the health of the community and economy.

3. **Teamwork –** Collaboration and cooperation are by-words in contemporary economic development parlance. Yet nothing is more difficult than unifying a group of disparate individuals and organizations to constructively work

together toward the achievement of a common goal. What makes these models so instructive? In each instance, there was recognition of the unequivocal importance of teamwork to advance the economic development agenda. While economic development executives have long recognized that teamwork is essential to their success, all these models underscore the fundamental need for collaboration in advancing the competitiveness of a community.

4. **Foundations as Catalysts for Change** – In the last two decades, philanthropy in the United States, and increasingly in the rest of the world, has emerged as a dominant change agent in the areas of economic development, work force development, education, technology, entrepreneurship, and other sectors vital to the health and welfare of people and nations. In Arizona, philanthropy is deployed with a distinct edge – a penchant for trying the untried in addressing a broad range of opportunities and challenges. Dr. Mohraz of The Virginia G. Piper Trust uses her benevolence in a very deliberate manner to forge change and progress in many areas of the community – again, with the recognition of the important role she and her institution play in advancing the economic development competitiveness of the State of Arizona. As a "retired," successful CEO, Mr. Budinger of the Science Foundation of Arizona demonstrates the imperative for change, and leverages his resources to this end. In most communities around the world, there is at least one major benefactor who has the same passion and commitment to making his/her world a better place, and can uniquely set into motion the forces of change for the good.

5. **Economic Development Competitiveness as Fusion Agent** – Finally, and certainly not the least important is the crucial role that economic development competitiveness plays in spurring alliances between and among business, government, education, philanthropy, and society in general. While some may assume that it is relatively easy in Arizona to get people together for economic development and growth, the fact is that it is probably more difficult to do this in Arizona than most other states. Why? Because the inexorable growth of the state frequently obviates a sense of urgency to address Arizona's competitive position in the global economy. Without a true sense of crisis, it often is challenging to convince leaders, especially elected officials, that action is essential to the future of the state. Clearly, the race to remain competitive in the 21st century global economy is the primary unifying factor for all of these bold endeavors.

population growth
IN ARIZONA

By Marshall A. Worden and David A. de Kok

Downtown Tucson, Arizona's second largest city.

Marshall A. Worden is director of the Office of Economic Development, The University of Arizona, Tucson, Arizona. David A. de Kok is the program director for the Metropolitan Tucson Land Use Study in that office.

Over six million people now live in Arizona. With a population increase of more than 200,000 during the 12 months ending July 2005, Arizona had the fourth greatest gain and fastest rate of growth in the United States during that period, ranking only behind Florida, Texas, and California. Arizona, with the 17th largest population among all the states, has since 2000 surpassed Missouri, Wisconsin, and Maryland in size. The Phoenix metropolitan area gained 83,200 jobs during 2005, an increase greater than all other places in the United States including Washington, D.C. with 81,600 new jobs, Los Angeles with 69,200, New York City with 64,300, and Las Vegas with 59,200. These remarkable growth measures foreshadow equally impressive expectations for the future. This article first examines the recent quickening pace of population growth and looks forward to the probable size of Arizona and its counties in 2030. Following that review, three major issues regarding the accommodation of anticipated growth are discussed: the provision of land, transportation, and water.

POPULATION

The population of Arizona grew from approximately 3.7 million in 1990 to 5.1 million in 2000 and is projected to be 10.3 million in 2030, an increase of 102 percent between 2000 and 2030. Table 1 summarizes Arizona's actual and projected population growth between 1990 and 2030. This snapshot not only illustrates growth over the years but also the unabating acceleration of growth as the number of people added to the state's population increases each decade. During the final decade of this 40-year span, Arizona's population will grow by 2.25 million – an extraordinary figure, if not also a disturbing one. Due to the growth in the state's total population, however, the percentage change for each period falls after the decade of the 1990s, which registered a remarkable 40 percent increase.

Arizona is an urban state that is dominated by the Phoenix metropolitan area (Maricopa County)

TABLE 1

ARIZONA'S ACTUAL AND PROJECTED POPULATION GROWTH, 1990-2030

Decade	Population Growth	Percent Change
1990-2000	1,465,404	40
2000-2010	1,506,749	29
2010-2020	1,819,067	27
2020-2030	2,255,949	27

Sources: U.S. Department of Commerce, Bureau of the Census, 1980-2000; U.S. Census Bureau, Interim State Population Projections, 2005.

THE LIMITATIONS OF LAND AND INFRASTRUCTURE

The allure of a vibrant economy and the sunny deserts of the American Southwest have made Arizona one of the fastest growing states in the nation. This growth is occurring despite limited amounts of private land, a severe shortage of water, and an antiquated and underdeveloped transportation system. A variety of institutional mechanisms and engineering feats has allowed the state to grow while coping with these challenges. Accommodating this continued high rate of growth into the future will require increasingly complex and costly fixes.

and, to a much smaller extent, the Tucson metropolitan area (Pima County). Seventy-six percent of all Arizonans live in these two metropolitan areas. All counties in Arizona (Figure 1), with the exception of Apache and Greenlee Counties, experienced significant population growth between 1990 and 2000. The mostly rural counties (Cochise, Coconino, Gila, Graham, La Paz, Navajo, and Santa Cruz) showed the smallest increases, but even these were in the range of 20 to 30 percent over their population levels in 1990. Mohave and Yavapai Counties registered the greatest percentage increases, with 66 percent and 56 percent respectively. These counties, while not classed as metropolitan, are nevertheless rapidly urbanizing. The driving force behind the 40 percent statewide increase in population over this decade was found in the two metropolitan counties, Maricopa and Pima. Pima County, even with an increase of 178,866 people in the last decade of the 20th century, however, was a distant second to Maricopa County in terms of growth during that same period. Maricopa, on its own, added more than 950,000 people, increasing its population by 45 percent.

Table 2 illustrates the continuation of these trends between 2000 and 2005. Maricopa County added well over half a million residents, Pima County well over 100,000, and growth in Yavapai, Yuma, and Mohave and especially in Pinal County also was impressive. Phoenix metropolitan growth dwarfs everything else in the state. Population growth in Arizona is an urban phenomenon and the Phoenix metro area, as the most highly urbanized region of the state, experienced the greatest population growth during the first half of this decade. It is in fact one of the most rapidly growing urban areas in the entire country.

Figure 1
Arizona Counties, Major Cities, and Native American Reservations

Figure prepared by ESI Corporation of Phoenix, Arizona.

TABLE 2
POPULATION OF ARIZONA'S COUNTIES, 2000-2005

	2000	2005	Growth 2000-2005	Percent Change 2000-2005
Apache	69,423	73,775	4,352	6.3
Cochise	117,755	131,790	14,035	11.9
Coconino	116,320	130,530	14,210	12.2
Gila	51,335	54,445	3,110	6.1
Graham	33,489	35,455	1,966	5.9
Greenlee	8,547	8,350	-197	-2.3
La Paz	19,715	21,190	1,475	7.5
Maricopa	3,072,149	3,648,545	576,396	18.8
Mohave	155,032	188,035	33,003	21.3
Navajo	97,470	109,985	12,515	12.8
Pima	843,746	957,635	113,889	13.5
Pinal	179,727	246,660	66,933	37.2
Santa Cruz	38,381	44,055	5,674	14.8
Yavapai	167,517	205,105	37,588	22.4
Yuma	160,026	189,480	29,454	18.4
Arizona	**5,130,632**	**6,044,985**	**914,353**	**17.8**

Sources: U.S. Department of Commerce, Bureau of the Census, 1980-2000; and Arizona Department of Economic Security, Population Statistics Unit, 2006.

Table 3 shows how robust growth in the Phoenix metro area has been and is projected to be. The table compares the six largest counties in Arizona for the contribution each makes to the state's overall population. The counties are Maricopa and Pima, the proxies for the Phoenix and Tucson metro areas, and the major non-metropolitan, but rapidly urbanizing, counties of Pinal, Yavapai, Yuma, and Mohave. Maricopa County accounted for 60 percent of Arizona's residents in 2000 and is projected to remain at 60 percent in 2030. Over the same years, Pima County's share is expected to shrink (while of course still growing in absolute

terms), declining from 16 percent in 2000 to a projected 14 percent in 2030. Pinal County, in contrast, is projected to increase from a share of four percent in 2000 to eight percent in 2030. The population shares of Yavapai, Yuma, and Mohave Counties show a more or less stable pattern.

As unbalanced as these data are, however, they understate the dominance of the Phoenix metro area. There are two reasons for this, both having to do with Pinal County. First, much of the projected growth in Pinal County will take place in the northern part of the county that abuts Maricopa County. Many people buying houses in this area are commuters who drive to jobs in the Phoenix metro area. Although these new developments lie in Pinal County, they are part of the metropolis. Second, because this area has started to develop seriously only in the last five years, the population projections in Table 3 for Pinal County are understated.[1]

TABLE 3

LARGEST COUNTIES' SHARE OF ARIZONA'S POPULATION, 2000-2030

County	Percent Share of State (Population) 2000	2030
Maricopa	59.9 (3,072,149)	60.0 (6,207,980)
Pima	16.4 (843,746)	13.9 (1,442,420)
Pinal	3.5 (179,727)	8.2 (852,463)
Yavapai	3.3 (167,517)	3.4 (355,462)
Mohave	3.0 (155,032)	3.2 (330,581)
Yuma	3.1 (160,026)	3.0 (316,158)

Sources: U.S. Department of Commerce, Bureau of the Census, 2000; Arizona Department of Economic Security, Population Statistics Unit, 2006.

Cheaper land will lure large numbers of metropolitan workers out to this peripheral area where they can buy more house for their money. The projections in Table 3, to repeat, show Maricopa County with a 60 percent share of the state's population in 2030. Taking account of growth in northern Pinal County over the next quarter century, it may be more accurate to say that 68 percent of all Arizonans will be living in the Phoenix metro area by 2030.

Pinal County's southern reaches, which abut the Tucson metro area, also are poised for rapid urbanization. By the middle of this century, if not earlier, it is likely that there will be continuous urban development from north and west of Phoenix to south and east of Tucson – an urbanized linear swath of 250 miles.

What are the sources of this exceptional growth? About one-third of Arizona's population growth is due to *net natural increase* – the extent to which births exceed deaths. The other two-thirds of population growth is attributed to *net migration* – the extent to which incoming population exceeds the outgoing population. Historically, the Midwest was the greatest source of in-migrants to Arizona, but California is rapidly gaining on the Heartland. The Midwest provided 191,000 in-migrants between 1995 and 2000, and California supplied 186,151. The other leading states behind California were Illinois (47,597), Texas (44,739), Washington (38,112), and New York (31,258). Undocumented migrants are a population that has not been successfully enumerated, but the Pew Hispanic Center puts that population at about a half million in Arizona, or about one-twelfth of all residents.

The reasons people choose to move to Arizona are, of course, many and varied, but three factors are most important. Since World War II, Arizona generally has had unemployment rates below the national average: new residents typically have more easily found jobs in Arizona than elsewhere. The relatively low cost of living in Arizona also has been a draw to the state. This factor is behind much of the recently increased in-migration from California. Arizona's climate has long been a major attraction for people with health problems in other parts of the country and for retirees with the means to choose their retirement homes.

Three long-term and persistent challenges stand out to this enormous population growth in Arizona: the availability of land and water and the adequacy of the transportation system.

LAND FOR THE FUTURE

New York Times columnist David Brooks has dramatically described the growth that is taking place on the western edge of the Phoenix metropolis:

> The flow of people moving into cities is but a trickle compared with the torrent moving out to exurbia. . . When you study this torrent, you realize it is actually several torrents running in the same direction. It's active seniors looking for communities tailored to their needs. It's young singles looking for townhouses (there are more single-person households in suburbia now than two-parent families). It's rich people looking for a country club and poor people looking for affordable housing. Most of all, it's immigrants who are skipping gateway cities and buying homes twice as quickly as earlier immigrant groups.[2]

David Brooks' description of these new waves of growth is a reminder that land is the indispensable prerequisite for accommodating long-term population growth in Arizona. While many observers

imagine Arizona as large and empty, the state has an intricate pattern of land ownership that adds significant complexity to the problem of making land available for development. Forty-two percent of the land base (Table 4) is managed by various federal agencies, mainly the U.S. Forest Service (Department of Agriculture) and the Bureau of Land Management (Department of the Interior). Twenty federally recognized Indian tribes own another 28 percent of the land. Thirteen percent is owned and managed by the state, leaving just 18 percent in private hands.

Arizona has the second lowest percentage of land in private ownership in the United States; only Nevada has less. Whereas no state east of the Rockies has more than 13 percent federal lands, none of the continental states west of Texas has less than 25 percent federal lands. Nevada's 82.9 percent federal ownership far outstrips Arizona's federal lands, but Arizona's high percentage of reservation and state lands reduces its private ownership to nearly that of Nevada. Arizona has the greatest extent of Indian reservations in the United States. Arizona also has one of the highest percentages of state land ownership in the country.

Private land is at a premium in Arizona, especially land located at the edges of cities where it is most needed for development. Maricopa County has both the greatest need for private land and the greatest absolute amount of private land in the state – 2,767 square miles. While there is no immediate land constraint, even this huge land expanse is likely to be challenged by future growth, particularly if growth remains at relatively low density and highly land-consumptive. Ninety-three percent of the county's residents already reside in incorporated places that contain two-thirds or 1,838 square miles of all private land in the county.

Portion of the 336-mile long Central Arizona Project aqueduct as seen at Picacho Peak in Pinal County.

Private land has until recently been the only land usually available for urban development, but Arizona State Trust Land[3] is more and more available through auctions and land swaps. Of the 14.5 million acres of state land, 9.2 acres are Arizona State Trust Land. These lands are managed by the

TABLE 4

LAND OWNERSHIP BY COUNTY, 2003
(square miles)

	Total	Private	Percent Private	Federal	Percent Federal	State	Percent State	Tribal	Percent Tribal
Apache	11,219	1,458	13	1,234	11	1,012	9	7,515	67
Cochise	6,181	2,486	40	1,553	25	2,142	35	-	-
Coconino	18,556	2,423	13	7,270	39	1,780	10	7,083	38
Gila	4,791	192	4	2,635	55	48	1	1,916	40
Graham	4,681	465	10	1,766	38	777	17	1,673	36
Greenlee	1,831	147	8	1,414	77	270	15	-	-
La Paz	4,515	226	5	3,523	78	405	9	361	8
Maricopa	9,420	2,767	29	5,164	55	1,028	11	461	5
Mohave	13,446	2,292	17	9,301	69	909	7	944	7
Navajo	9,929	1,791	18	895	9	578	6	6,665	67
Pima	9,983	1,745	17	2,847	29	1,350	14	4,041	44
Pinal	5,327	1,343	25	1,021	19	1,889	35	1,074	20
Santa Cruz	1,231	469	38	667	54	95	8	-	-
Yavapai	8,152	2,031	25	4,143	51	1,978	24	-	-
Yuma	5,544	608	11	4,639	84	297	5	-	-
Arizona	**114,806**	**20,443**	**18**	**48,072**	**42**	**14,558**	**13**	**31,733**	**27**

Sources: Arizona State Parks, Arizona Statewide Comprehensive Recreation Plan, 2003; and The University of Arizona, Arizona Statistical Abstract—2003.

Arizona State Land Department to the highest and best use in order to maximize revenues for the beneficiaries, with the K-12 schools being the primary recipients of the earnings.

Unlike other states, Arizona has retained most of its original Trust Land and, instead of selling, has leased the land, much of which historically was usable only for livestock grazing. Now, however, and fortunately for the beneficiaries, many hundred thousand acres of grazing land have become urban land on the expanding edges of the Phoenix and Tucson metropolitan areas. Consequently, even if the lack of private land constrained growth, the abundance of State Trust Land provides the necessary land resource for the long term. Unfortunately, the state constitution and the federal enabling legislation provide no flexibility to manage the Trust Lands for non-monetary growth management, conservation or open space purposes.

While developable land is necessary to sustain Arizona's expanding low-density urban form, conservation and protection of the natural and historical landscape is essential to sustain Arizona's quality of life. During recent years in Pima County, for example, approximately ten square miles of raw land annually are converted to development. In response to that phenomena as well as a 1997 conflict between an endangered species listing and economic development, Pima County adopted in 2001 the Sonoran Desert Conservation Plan (SDCP). This plan is one of the most comprehensive and ambitious conservation and urban planning efforts in the United States. SDCP covers a multi-million acre region, seeks to enhance and protect the natural and cultural environment, and combines bio- and urban planning.

Voters approved a $174.3 million bond program in 2004 for the purchase of open space, the hallmark of which is the creation of large working landscape reserves in contrast to small and isolated species-specific refuges found in other states. Past and recent acquisitions have resulted in reserves of 77,000 acres, with $120 million in bonding authority remaining. The future shape and form of the Tucson metropolis is being defined by the SDCP.

TRANSPORTATION

Explosive population growth has put intense pressure on Arizona's transportation system. A basic and important fact about Arizona is that it is a large state, tremendously rural in area, but overwhelmingly urban in population. Improvements to the state transportation system have not kept pace with either urban or rural growth. Freeway construction in the metropolitan areas has followed growth and, consequently, land use planning in the urban areas particularly has not been thoughtfully coordinated with highway infrastructure and transit needs. Arizona is not yet adequately planning for the transportation systems required to meet the population and spatial growth that is projected for the next 25 years. Current plans essentially address growth that has already occurred.

There are two major fixed-route bus transit systems in Arizona: Valley Metro in the Phoenix area and Sun Tran in Tucson. While ridership has shown strong growth in recent years, average daily ridership in both metro areas is relatively modest given the size of the populations. Sun Tran ridership did increase 6.5 percent during 2004 while transit ridership declined nationally.

Theodore Roosevelt Dam and Lake is located on the Salt River in central Arizona.

Both metro areas have considered light rail transit alternatives during the last decade. The Valley Metro light-rail system is currently under construction in Phoenix, funded as part of a transportation plan adopted in a voter-approved November 2004 ballot (Proposition 400). The initial segment will be 20 miles long and will begin operation at the end of 2008. Also approved as part of the proposition were about 30 miles of extensions to the initial segment.

The Highway User Revenue Fund (HURF) is the major source of funding for the construction and improvement of the state's highways and bridges. The HURF serves as the central collection point for state taxes and fees related to the operation of motor vehicles. These taxes and fees are: gasoline taxes, currently 18 cents per gallon; vehicle license taxes, based on the value of the vehicle being taxed; use fuel taxes, a tax on diesel fuel that varies from 18 cents per gallon for passenger cars to 26 cents per

gallon for commercial trucks and buses; and motor carrier fees. Unfortunately, of these sources for the HURF, only one, the vehicle license tax, is indexed to the rate of inflation, and that rate has been reduced in recent years. Repeated efforts to increase the gasoline tax – a flat tax subject to the negative effects of inflation and increasing fuel efficiency – have during the last decade been rebuffed by the state legislature. The HURF remains severely underfunded to meet the construction and maintenance needs of the state's highways.

Several metropolitan areas in Arizona have voter-approved Regional Area Road Fund (RARF) programs that meet the needs for transportation improvements through sales taxes. Maricopa, Yavapai, and Pinal Counties have RARFs and the Flagstaff metropolitan area also is raising funds for specific transportation projects through local taxes,

One local source of transportation funding in Arizona is particularly noteworthy. Maricopa County voters in 1985 approved a one-half cent transportation excise tax for the construction of controlled-access highways. This resulted in the near doubling of the freeway system in that county and the addition of nearly 1,000 new lane-miles. Maricopa County voters in 2004 similarly approved the extension of this tax for another 20 years, which will raise approximately $9 billion, allow for the expansion of the freeway system by another 50 percent, and add well over 1,000 new lane-miles. Under the voter-approved plan, 56 percent of the tax revenue is allocated to freeways; public transit receives about one-third, to be split almost equally between bus and light rail; and nine percent for streets. The remainder is dedicated to safety planning, bike paths, and walkways.

Residents of Pima County in May 2006 approved a 20-year Regional Transportation Authority Expenditure Plan, based on a one-half cent transportation sales tax. The $2.1 billion plan allocates 58 percent to roadway improvements (200 new lane-miles), 27 percent for transit improvements, nine percent for safety improvements, and six percent for environmental and economic vitality. Even with the infusion of these new monies, the percentage of vehicle miles driven in the region under the conditions of either severe or heavy congestion will double in the 2000 to 2025 period, increasing from 27 percent to 54 percent.

WATER

Water availability and water management decisions have strongly controlled Arizona's settlement and development patterns. The historic settlement pattern reflected locations determined by direct access to surface water streams, but the ability to mine, store, and transport water over long distances has dramatically changed development patterns. As a result, current population centers also are located where water is relatively plentiful, but the sources of that water are quite different than those that determined the early settlement pattern. There are four sources of water in Arizona: Colorado River water, other surface water, groundwater, and effluent. Separate rules and definitions are used to manage each source, resulting in considerable complexity to the water rights systems in Arizona.

Colorado River water is available to users adjacent to the river and to Central Arizona Project (CAP) contractors who transport the water to more distant locations such as the Phoenix and Tucson metropolitan areas. About 39 percent of Arizona's water comes from the Colorado River and the CAP delivers about half of that to central Arizona. The Phoenix metro region also is served by surface water from the Salt, Verde, and Agua Fria Rivers (Figure 2). Approximately 19 percent of the water in Arizona comes from surface water other than the Colorado River.

Forty percent of the water used in Arizona comes from groundwater. Groundwater is the sole source of water for much of rural Arizona but, while relatively plentiful, it is often located at great depths in large alluvial basins. The Colorado Plateau to the north as well as the southeastern part of the state are both dependent solely on groundwater. Arizona, starting in 1945, adopted several groundwater management regulations, but only the 1980 Groundwater Management Act (GMA) established meaningful regulation of groundwater. The GMA created the Arizona Department of Water Resources and centered groundwater management activity in

Figure 2

Figure prepared by ESI Corporation of Phoenix, Arizona.

Arizona Major Streams and Rivers

Figure 3

Figure prepared by ESI Corporation of Phoenix, Arizona.

Arizona Active Management Areas and the Central Arizona Project

what are now five Active Management Areas (AMAs): Phoenix, Pinal, Tucson, Prescott, and Santa Cruz (Figure 3).

The GMA established water management goals for each of the AMAs so as to limit the overdraft of groundwater. A new water rights system stopped the development of new irrigated agricultural land, set up a well-measuring and reporting system, and mandated a conservation program.

The water issues facing the state are daunting, despite significant improvement in water management over the last 25 years. The most important changes came with implementation of the GMA, which put in place a long-term water-planning strategy for the state that focused on long-term water supply. For example, one major policy innovation, the Assured Water Supply (AWS) program, is the nation's most far-sighted regulatory program connecting water supply and municipal demand. This program requires that all new subdivisions in the AMAs demonstrated, prior to subdivision approval, that a 100-year water supply of adequate quality is available. No other state requires a 100-year renewable water supply prior to development.

The AWS program has defined a strategy for the municipal sector in the AMAs to move away from groundwater to renewable water supplies. The AWS rules require the use of renewable supplies and expect that municipal and industrial demand will continue to grow while the demand of other sectors, *e.g.* agriculture, will diminish over time.

The Central Arizona Project (CAP) is the backbone of Arizona's renewable water supply system and is critical to achieving a sustainable water supply for the central portions of the state. The CAP is able to bring 1.5 million acre-feet of Arizona's 2.8-million acre-foot Colorado River allocation into central and southern Arizona. The CAP aqueduct, built at a cost of $4 billion, is 336 miles long, includes 15 pumping stations that lift water from the Colorado River to its terminus south of Tucson, and has the capacity to annually deliver a total of 1.8 million acre-feet of water. The CAP service area is limited to Maricopa, Pinal, and Pima Counties. It is operated by the Central Arizona Water Conservation District, which has taxing authority and a board elected by the citizens within its three-county service area.

The CAP system, along with its storage, flood control, and delivery components, is an essential investment in water supply sustainability for the state. It provides a renewable supply to replace dependence on mined groundwater and, at the same time, reduces groundwater overdraft and provides water supplies during periods of drought.

The use of renewable water supplies from the Colorado River as an alternative to dependence on mined groundwater has required the development of new institutions as well as major financial investments. For example, soon after the adoption of the GMA it became clear that recharge would be a major component of storing and utilizing renewable water supplies. In 1986, the Underground Water Storage and Recovery Program was adopted to allow individual entities with surplus supplies to store their water underground and then recover it later for use. This program has been very successful and, as of 2005, had resulted in the development of 76 storage facilities, primarily in the AMAs, and storage of over four million acre-feet of water in the state.

Another innovation is the Arizona Water Banking Authority (AWBA), which was established in 1996 to store excess Colorado River water, to ensure reliable municipal water deliveries during future shortages on the Colorado River and CAP system failures, and to support other water management objectives as well as interstate water banking. Annual water use is strongly affected by agricultural demand and the availability of other surface water supplies within the state. The AWBA, in combination with incentive pricing programs to encourage short-term use of CAP water for agriculture and underground storage, has enabled the full use of Arizona's allocation.

Neither the availability of land nor the character and performance of the transportation system are significant growth constraints when compared to the availability of water. Demand for CAP water is projected to exceed available supply by 90 percent

by mid-century. The thirsty Phoenix and especially Tucson metropolitan areas will find it extraordinarily expensive as well as legally and politically difficult to acquire additional water, including water from other parts of the state. Some parts of the state, confronted with severely limited water supplies, may need to sacrifice environmental quality in favor of population growth or engage in unsustainable groundwater depletion or limit growth.

CONCLUSION

Despite its limited water supply, constrained land availability, and underdeveloped transportation system, Arizona has successfully managed to become one of the fastest growing states in the country. Although population growth shows no signs of slowing, the solutions to land, water, and transportation limitations will come with increasingly higher price tags. These higher costs may erase one of Arizona's chief draws – its relatively low cost of living. However, a vibrant economy and unparalleled climate should continue to attract those seeking a better quality of life.

ENDNOTES

1 In 1997 the Arizona Department of Economic Security (DES) projected Pinal County's 2030 population to be 255,700. In 2006 DES estimated Pinal County's 2005 population to be 246,600—a figure approaching their earlier projection for 2030. In 2006, DES also issued a new 2030 population projection of 852,463 for Pinal County, an increase of 246 percent over the 1997 projection.

2 David Brooks, A Boom on the Fringes, *The Arizona Republic*, 2006.

3 When Congress passed the Northwest Ordinance in 1787, which called for the survey and sale of lands west of the Appalachian Mountains, one section of land (one square mile or 640 acres) out of each 36 square mile township was reserved for the benefit of common schools. Over the next few decades as the survey and sale of lands moved westward, the amount of reserved school land was doubled and consisted of sections 16 and 36 in each township. The Arizona State Enabling Act of 1910, which allowed the Territory of Arizona to prepare for statehood, allocated two additional sections, 2 and 32, for the benefit of common schools. An additional two million acres were allocated for the benefit of The University of Arizona, the state's land grant institution of higher education, and other state entities.

driving arizona's GLOBAL ECONOMY

By Barry Broome

Downtown Phoenix, Arizona

Barry Broome is the president and CEO of the Greater Phoenix Economic Council.

INTRODUCTION

Arizona's economic development community and state leadership are shifting the paradigm for the state's economic development strategy. Critical investments in science and technology, new programs to create high-wage, innovation-based jobs, and support for policy that increases competitiveness are at the heart of the changes taking place. Competitiveness consists of a number of elements, one of which is the international performance of a region. The Arizona Global Network (AGN) is a statewide effort designed to increase Arizona's international economic performance by attracting foreign direct investment[i] (FDI) in key industries. This article examines the AGN, its role in driving the state's international competitiveness, and the changing landscape of economic development in Arizona.

COMPETITIVENESS

Competitiveness has emerged as a central topic among Arizona's economic development community. How are we competitive? How are we not competitive? How do we become more competitive? The process of examining and understanding competitive strengths and weaknesses brings to light the gaps in a region's economy and creates the opportunity for economic developers to design targeted programs that address those gaps.

The competitiveness of a market lies in the junction of a number of factors. Those that result directly from local policy make up the foundation of a region's economy, including health and education, safety, infrastructure, and fiscal and environmental policy. They shape both productivity and the quality of the inputs feeding the economy. Program-driven factors are a step beyond the foundation, and in effect, measure the quality of the economy's output. These include technological sophistication and innovation, and capacity to successfully launch new businesses.

A final aspect of a region's economic performance is its international presence and connectivity. This could be considered both an input, in terms of foreign-born population and international investment, as well as an output, in terms of exports, jobs, and other measures of production.

True international cities are magnets for world-class talent and innovation. They experience a flux

A STATEWIDE PARTNERSHIP TO INCREASE FOREIGN DIRECT INVESTMENT

The Arizona Global Network (AGN) is a statewide program designed to attract foreign direct investment into Arizona. It is an important component within a body of new programs and investments to create high-wage innovation-based jobs and increase the competitiveness of the state's economy.

of diverse people and ideas, creating synergies that generate art, cultural diversity, and commerce. Whereas some cities are natural hubs for international trade and investment, such as port cities like Tokyo, Hong Kong or New York, the international role of other cities is subtler and requires more effort to build. However, an increasing reality is that globalization – travel, instant access to information, economic integration across borders – is erasing the barrier of geographic distance and reducing location premium. Developing a world-class regional economy now hinges on talent, strategy, and cooperation.

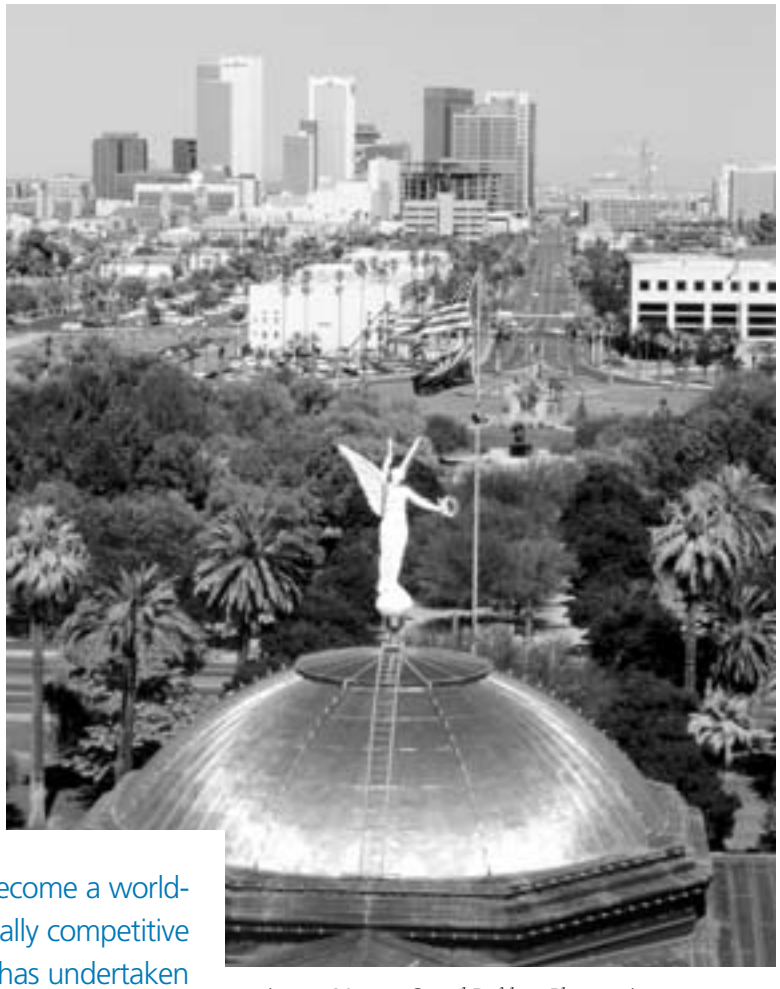
ARIZONA GLOBAL NETWORK

In this push to become a world-class, globally competitive region, Arizona has undertaken an aggressive international program. The Arizona Global Network (AGN) is an unprecedented grassroots effort aligning a wide array of interests statewide behind increasing Arizona's international economic competitiveness. The initiative emerged over time as interest grew around the state's international economic performance. Previously, there was diverse international expertise scattered around the state, however, experts had never convened around the topic of FDI to develop a concerted strategy.

In 2005, the concept of the AGN was created. Observing the strong correlation between annual exports and capital investment stock of foreign-owned affiliates among the 50 states in any given year, Arizona economic developers identified FDI as a relative gap in the market, and thus an important programmatic focus. The questions then became, given this priority, who do we engage, how do we engage them and how do we execute against our goal?

It was fairly intuitive that AGN needed to be a statewide program. While over 60 percent of the state's population and 70 percent of economic activity is concentrated in the metro Phoenix area, important industry clusters are centered outside of Greater Phoenix, such as optics in Tucson and medical devices in Flagstaff. Other areas of the state like Yuma and Prescott have strong competencies in natural resource and sustainability-related industries.

A statewide approach brings the best and the brightest to the table, both urban and rural, and widens the pool of resources and assets we have to offer to potential foreign investors. With that in mind, the AGN Executive Committee was formed to include the Greater Phoenix Economic Council (GPEC), Tucson Regional Economic Opportunities (TREO), Greater Flagstaff Economic Council (GFEC), Greater Yuma Economic Development Corporation (GYEDC), and the Arizona Department of Commerce (ADOC), effectively representing the whole state's regional economic development agencies. In addition to the Executive Committee, the International Economic Developers Team (IEDT) convenes on a regular basis to help guide the development and implementation of the program and involves public- and private-sector partners, university representatives, and a number of other stakeholders.



Arizona Museum Capitol Building, Phoenix, Arizona

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Operationally, the Executive Committee and other participating communities are linked in a virtual network to facilitate the exchange of information. The AGN utilizes contracted representatives abroad as a mechanism for lead generation, a best practice used by some of the top programs in the country. In addition, the AGN has built a broad web of contacts so as to best accommodate the needs of potential investors. Those contacts include business service providers that specialize in assisting international clients such as accountants, lawyers, and banks. In addition to being service providers, these contacts can also serve as avenues for lead generation based upon their regular contact with foreign clients. All of this is overseen by the AGN's executive director who serves as a central point of contact for the entire network.

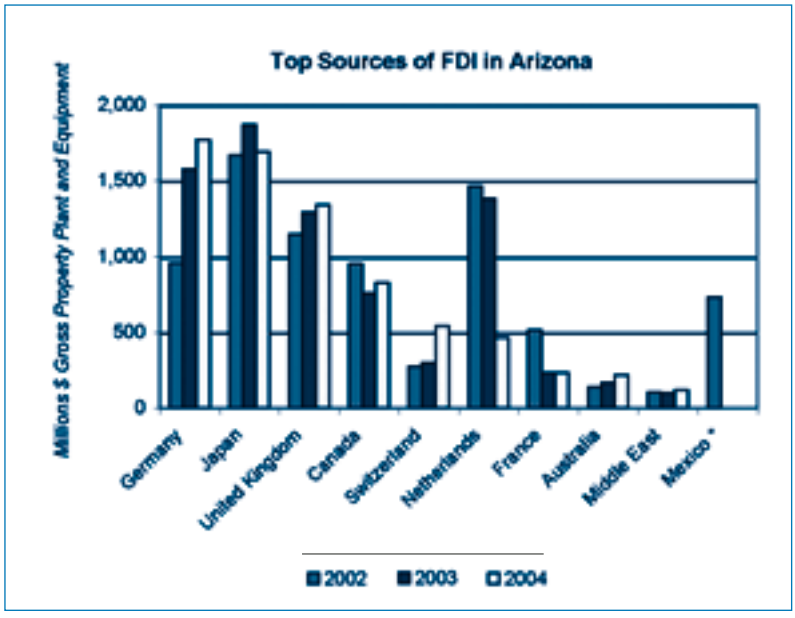
The AGN is designed to integrate smoothly into the day-to-day operations of local economic development groups. Leads generated by foreign contractors are distributed to communities statewide, in effect adding an extra conduit for deal flow. In addition, the AGN is a resource for communities in that it is a forum for information sharing, connecting partners, and developing further sources of FDI leads.

The AGN is a unique initiative for Arizona. While diverse interests have aligned behind certain initiatives in the past, seldom has there been a sole economic development program that brings statewide partners together as AGN is currently doing.

The importance of engaging partners with specific expertise and knowledge of their local markets cannot be overstated. FDI can be difficult to track on the local level, especially in large metro areas where inventories of foreign-owned businesses tend to be piecemeal and incomplete. Furthermore, the role of the AGN in the economic development strategies for different regions around the state will look very different from one community to another, especially among rural and urban communities. Local knowledge is necessary to best leverage the program in support of local strategic initiatives. That said, the program can be and is being implemented statewide as a supplement to existing economic development efforts. Communities from all corners of the state are expressing interest and enthusiasm toward international attraction, recognizing the benefits such a strategy has to offer.

IBM Local Headquarters, Tucson, Arizona

An international attraction program has a number of impacts on a region's economy. It is an excellent opportunity to attract small technology firms in search of entrance into the U.S. market or collaborative relationships with public or private research institutions. AGN targets emerging technologies that share links to Arizona's most competitive industries. FDI attraction is also a way of in-sourcing jobs that tend to be high-wage on average – U.S. foreign-owned subsidiaries pay a mean annual wage of $63,428, 32 percent higher than the mean annual wage among U.S.-based companies.[ii] Given the identified need for increased international attraction efforts and the opportunity for high-wage jobs in high-tech industries, AGN is a force for driving competitiveness and quality growth in Arizona.



* Zero values indicate data not available for country in given year

Source: Bureau of Economic Analysis, Gross Property, Plant, & Equipment of Affiliates, 2002 - 2004

ARIZONA'S INTERNATIONAL PERFORMANCE

Arizona has a history of strong international economic performance, primarily relating to trade. The state is well suited to export activities, especially with Mexico due to a shared border and close cultural and economic ties. Mexico is Arizona's top export market, representing around a third of exports in any given year ($4.7 billion in 2005). Canada and Malaysia follow with $1.6 billion and $778.6 million respectively.

Arizona's leading industry clusters drive the state's exports. For example, the number one and two exports, computers and electronic products and transportation equipment, are fueled by the large semiconductor and aerospace industry clusters located primarily in the Phoenix and Tucson metro areas. A number of major employers anchor these clusters, including Intel, Freescale Semiconductor, and Microchip Technologies (semiconductors); Raytheon, Honeywell, Boeing, and Bombardier (aerospace); and IBM and Texas Instruments (IT).

As mentioned before, there is a strong statistical correlation between exports and FDI among the 50 states in any given year. In other words, states that export more tend to attract more FDI and vice-versa. While this relation is complicated by the fact that both exports and FDI are also correlated with state population and gross state product, it can still be illustrative to examine the data points.

Certain states clearly out-perform and under-perform in FDI based upon the value of their exports. Arizona's position is telling of the state's past economic development priorities. Export promotion has seen strong support on both the state and local levels with programs to encourage and educate businesses on how to export. FDI promotion, on the other hand, has only received limited attention from economic developers and political leadership.

Research has been a major component of developing and implementing the AGN. Gaining a deeper understanding of the state's current FDI performance revealed that Arizona has seen consistent significant levels of FDI from five countries – Germany, Japan, the United Kingdom, Canada, and the Netherlands, or in general, Western Europe and East Asia (see graph). Though emerging markets such as India and China represent considerable potential, the reality is that prospect mining in markets with a proven record in the state is likely to yield a higher return on investment and thus is a top priority. Using this knowledge, the next step was to identify industry links between Arizona and these established investing countries. The AGN and its partners compiled research on foreign markets that share existing and potential links with Arizona's core industries. Those studies zeroed in on Western Europe, East Asia, and Canada as strategic locations for attraction efforts given industry concentration and regional knowledge assets.

INDUSTRY FOCUS

Based upon the research carried out, the AGN targets markets that share Arizona's core industry competencies – aerospace, next-generation electronics, life sciences, sustainability industries, and information and communications technology.

Aerospace is one of the longest established industry clusters in the state. Most aerospace employment is focused within the Phoenix and Tucson metro areas. Tucson in particular has an especially high concentration of aerospace employment – the city is headquarters to Raytheon's missile systems division, employing over 11,000 individuals, making it the city's largest employer. Honeywell is located in both Phoenix and Tucson with over 10,000 employees between the two metros.

Unmanned Aerial Vehicle testing on Yuma Proving Ground, Yuma, Arizona.

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Apache Longbow Helicopter manufactured by Boeing, Mesa, Arizona.

$11 million service and maintenance center at Williams Gateway Airport in Mesa, in the southeast valley of the Phoenix metro region.

Life sciences is a rapidly growing industry in Arizona. Four years after launching the Arizona Bioscience Roadmap, a strategic plan to advance biosciences in Arizona, the state has seen impressive progress, including 10,700 new jobs, a 30 percent increase in research grants, and 33 new bioscience-related businesses.[iii] Arizona's bioscience industry is characterized by its collaborative spirit and that collaboration is already leading to success.

TGen (Translational Genomics Research Institute), working in partnership with the Muscular Dystrophy Association headquartered in Tucson, recently discovered around 50 genetic abnormalities associated with Lou Gehrig's disease. Covance, a leading drug development company, recently located a new $100 million 50-acre research site in Chandler.

Leaders in the bioscience industry recognize Arizona as one of the fastest-growing biotech hot spots in the nation. This is a result of an aggressive, collaborative, statewide effort and commitment to the vision set out by the state's Roadmap.

Next-generation electronics, especially semiconductor design and manufacture, is a core competency in Arizona. The Greater Phoenix metro region in particular has a high concentration of semiconductor manufacturers, including Intel, as well as other semiconductor manufacturers mentioned earlier.

Tucson, often referred to as the "Optics Valley," has distinguished itself as home to one of the world's top optics clusters. The University of Arizona's College of Optical Science is at the root of the city's excellence in the industry. Tucson's optics industry has an active relationship with Canadian optics leaders and numerous other international ties.

Arizona's infamously sunny climate makes it an ideal region for the development of photovoltaic technologies (solar power). The state has a strong sustainability cluster, including solar energy technology, hydrology, ecology, and agriculture. Arizona State University's Global Institute of Sustainability is involved in cutting edge research on urban ecology and other sustainability issues and has partnerships in China to assist as they confront the challenges of rapid industrialization.

Texas Instruments Local Headquarters, Tucson, Arizona

By specifically targeting these industries, the AGN aims to bring the greatest possible benefit to the state by strengthening local clusters, attracting capital investment, and adding high-wage jobs to the economy. More importantly, however, is that these industries offer the greatest value propositions to potential investors.

NEW ECONOMIC DEVELOPMENT LANDSCAPE

AGN is a closely integrated piece of Arizona's new economic development landscape. During her first term in office, Governor Janet Napolitano invested over $1 billion in science and technology around the state. Her dedication to building a knowledge-based economy is revolutionizing the state's public higher education institutions, business

climate, and overall economic strategy. She established the Governor's Council on Innovation and Technology (GCIT) to develop and advocate programs and policies that foster innovation, creation, and entrepreneurial expansion of technology-based companies throughout the state. GCIT helped pass legislation establishing the Angel Investor's Tax Credit, which provides tax incentives for investment in start-up companies.

Science Foundation Arizona, another program launched under the Napolitano administration, is modeled after Science Foundation Ireland, a program that played a critical role in turning around Ireland's economy and spurring the rapid growth of its high tech industries. Science Foundation Arizona's mission is to attract world-class talent to Arizona to support industry, research, and education. The AGN will be a key player in fulfilling the mission of the Science Foundation by forging new international relationships and attracting innovative high technology companies to the state from around the globe.

The state's public universities have also been making impressive achievements. The Biodesign Institute, housed within Arizona State University's Macro Technology Works, is on the cutting edge of biotechnology research. ASU's Flexible Display Center is a collaborative venture among ASU, government, and private industry to develop flexible display technologies with applications ranging from defense to consumer electronics. Google recently located operations near ASU's campus to capture some of the synergies taking place.

The University of Arizona's Bio5 is another bio leader bringing together specialists in five fields – agriculture, medicine, pharmacy, basic science, and engineering – to conduct collaborative research to solve complex problems. The University of Arizona and Arizona State University have teamed together to launch the University of Arizona College of Medicine-Phoenix located in Downtown Phoenix. As well, they collaborate in forming research partnerships with the private sector. Collaboration is a distinguishing characteristic of Arizona's knowledge-based economy and undoubtedly a driver of its success.

If the progress currently being made is any indicator, the best is yet to come for Arizona. Many of the programs mentioned here are still in their infancy. Hard work is being done from the local to the state levels to foster talent, attract employers that support an innovation-based economy, and realize foundational improvements that increase the state's competitiveness.

Flagstaff Air Park, Flagstaff, Arizona.

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CHALLENGES AND OUTLOOK

The development of the AGN has not come without considerable challenges, the greatest of which is garnering political support for the program. In the context of job outsourcing and offshoring trends on the national level, there is an undercurrent of opposition to investing money into attracting foreign companies. More specific to Arizona, however, is the difficulty of pushing economic development initiatives forward in a market that is independently growing at a dizzying rate.

The explosive population and employment growth of the last decade has been a mixed blessing. While there is a consensus among the economic development community that programs to attract high-wage jobs to the state are necessary to ensure the long-term sustainability of the economy, law-

makers do not fully appreciate the urgency of doing so.

Arizona recently overtook Nevada as the fastest-growing state in the nation in terms of population and Greater Phoenix ranked as the fastest-growing MSA with over 1.5 million people both proportionally as well as in terms of net job growth.[iv] Taking this growth for granted, however, is running a serious risk. In order for high growth rates to be sustainable, the growth needs to be anchored by quality jobs that don't cost the state money in terms of housing, healthcare, and other subsidies. Implementing effective programs can take a number of years. If you wait until a serious slow-down hits, it's already too late.

The difficulties presented by rapid growth are inevitable, but while transition can be a time of challenge, more than anything, it is a time of opportunity. As one can see, Arizona's economy is building strong momentum. The AGN is evidence of the economic development community's leadership in leveraging the momentum of this transition period for the state in order to shift the paradigm. Gradually, the state is building an integrated, multi-faceted economic development strategy that promises to push Arizona to the forefront of competitiveness as one of the most desirable places to live and do business.

ENDNOTES

i Foreign direct investment (FDI) is an investment by a foreign firm in an enterprise in a country other than the one in which it is based. The investment must be such that the foreign-parent has control of the investee in order for it to be considered FDI. Direct investment refers to investment in operations (facilities, equipment, property) as opposed to investment in stocks.

ii Organization for International Investment, http://www.ofii.org/az.htm

iii Nolan, Kate. "Bioscience effort off to a big start". *The Arizona Republic*. December 13, 2006.

iv U.S. Census Bureau, U.S. Bureau of Labor Statistics

arizona's collaborative gene

By Michele Pino, CEcD and Paul Katsenes, CEcD

Mayo Clinic. One of the facilities that has close collaboration with TGen.

INTRODUCTION

Arizona's strategic efforts to become a national leader in bioscience and develop a world class research base are a result of using textbook economic development principles and practices, those of collaboration and stewardship. Five years later, many would agree one of the catalysts for Arizona's success in this endeavor occurred in 2002 when it launched an unprecedented community-based effort to form the Translational Genomics Research Institute (TGen) and attract the International Genomics Consortium (IGC) to Phoenix. Nearly every aspect of the state became involved including the governor's office, the city of Phoenix, academia, business, economic development, and the philanthropic community. This cooperation model has translated to successful partnership efforts throughout the state and in particular, downtown Phoenix, to create a center of bioscience excellence.

LAYING THE FOUNDATION

For years, the economic development and business community had diligently sought ways Arizona could be more competitive in bioscience, a fast-growing segment of the knowledge-based economy. For a decade, Arizona had been a leader in population growth and job creation, but despite its strong economic growth, a few cornerstone institutions, and previous attempts to coordinate efforts, there had been no formidable approach to growing the bioscience sector.

Beginning in 2000, however, new opportunities began to emerge. Arizona voters passed an initiative, the first of its kind, to give $1 billion over 20 years for state university research. This much needed funding would eventually help build research centers of excellence throughout the university system, such as the Biodesign Institute at Arizona State University and BIO5 at the University of Arizona, both of which would ultimately partner with TGen.

In 2001, a policy research paper authored by Arizona State University's Morrison Institute entitled "Five Shoes Waiting to Drop on Arizona's Future" helped public leaders take a sobering look at areas Arizona needed to improve in order to be competitive, which included areas such as clear leadership, the attraction of talent, and a defined economic identity (http://www.asu.edu/copp/morrison/APC01New.pdf). In that same year, the

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Contributors: Saundra Johnson, vice president of strategic affairs and Brad Halversen, assistant vice president for communications at the Flinn Foundation.

PARTNERSHIPS WHICH CHANGED THE COURSE OF THE BIOINDUSTRY IN ARIZONA

This article discusses the state's unified effort in 2002 to attract Translational Genomics, a world class research facility, to Phoenix, Arizona. It explores the historical context in Arizona that put it in a unique position to be successful. It also looks at practical economic development principles, those of stewardship and collaboration, that assisted the industry in this endeavor and Arizona's overall progress today in building its bioindustry assets.

Phoenix-based Flinn Foundation made a decision to devote its healthcare resources toward Arizona becoming a national leader in bioscience, and planned a comprehensive study of the state's biomedical assets and needs, a vital step for the state's needed stewardship efforts.

Arizona was positioned, therefore, to take action when it learned that Dr. Jeffrey Trent, one of the leading genome researchers at the National Institutes of Health, was looking to form a new private research center to call home.

Dr. Trent was on the team charged with mapping the human genome for the National Institutes of Health. In April 1, 2000, the team produced the detailed genome map for global scientific use. Dr. Trent had roots in Arizona, attending Arcadia High School in Phoenix and the University of Arizona. With the completion of the genome mapping, he began thinking about where he and several of his colleagues could continue their research in the private sector and put the map to widespread use to improve diagnosis and treatment of human disease.

About TGen

TGen is a nonprofit organization focused on developing earlier diagnostics and smarter treatments. Translational genomics research is a relatively new field employing innovative advances arising from the Human Genome Project and applying them to the development of diagnostics, prognostics, and therapies for cancer, neurological disorders, diabetes, and other complex diseases. (www.tgen.org)

THE COOPERATIVE EFFORT

The challenge for Arizona was the attraction of both Dr. Trent's conceptual research center and the International Genomics Consortium, a newly organized nonprofit with complementary ties to Dr. Trent and his vision, whose premise was to set up human tissue collection sites and analysis to provide a public database for use by major pharmaceutical companies in the treatment of disease. Despite Dr. Trent's roots in Arizona, attracting this top talent required putting forth a concerted effort and a substantive incentive package that would prove Arizona could compete with other states that offered considerably more institutional resources and financial support.

With ties to Arizona, Dr. Trent was called on through the years to speak in Arizona. On an individual basis, several organizations, such as Arizona State University, the city of Phoenix, and Flinn, had learned of his desires and, as good economic developers, were trying to lure Dr. Trent back to Arizona with creative ideas, such as working with a proposed tri university collaborative that later became known as the Arizona Biomedical Collaborative (ABC, see sidebar). Dr. Trent had also been talking to other states that were offering more comprehensive packages. In hindsight, the collaborative learned that Arizona had little time to act and an individual approach would not have been as swift, extensive, or competitive as it needed to be.

On one occasion when Dr. Trent was in Arizona, the bioindustry representative for the Arizona Department of Commerce (ADOC) , Lauren Wright, hearing the buzz in the community and understanding its significance to the state, arranged for Dr. Trent to meet with Arizona's Governor, Jane Hull. It was this meeting that served as the catalyst to creating a statewide, collaborative approach. As a result, Governor Hull quickly gathered an overarching coalition of business leaders, foundations, economic and university leaders for their influence and input and tasked ADOC to coordinate the effort. With the number of different disciplines involved that were critical to the initiative, its success depended on continual input and coordination on a day to day level and the development of a meaningful incentive package that would include some of the individual efforts previously underway.

Arizona Biomedical Collaborative

The Arizona Biomedical Collaborative, located in downtown Phoenix, is an Arizona Board of Regents endorsed collaboration of the three state universities: the University of Arizona, Arizona State University, and Northern Arizona University. Its primary goal will be to provide a vehicle and venue for collaborative biomedical research, with an emphasis on translational research.

The coalition put in place a daily work group that kept the project on task comprised of Tim Lawless, commerce advisor from the governor's office; Margie Emmermann, the director of ADOC; Sheryl Sculley, the assistant city manager from the city of Phoenix; Mike Berens, a scientist at Barrow Neurological Institute, then chair of the Bioindustry cluster, and a friend of Dr. Trent; and Steve Roman, a public affairs professional who would assist in the fund raising efforts.

The work group understood early on the importance of support from government and industry leaders in this effort. At the behest of Mayor Skip Rimsza, the group, with delegates from the state legislature and industry, traveled to Bethesda, Maryland, to tour Dr. Trent's lab in order to gain an understanding of the future impact of genome research. This trip was critical to formalizing a plan that would take into account how Arizona could be a meaningful player in genomics research and later to winning success in the proposed legislative funding initiatives.

The task force coalition charged the work group with several objectives that had to be accomplished to put forth a credible package. Using ADOC funding from the Commerce and Economic Development Commission (CEDC), the group hired Gerry McDougall, a consultant with PricewaterhouseCoopers, who communicated daily with Trent to create a model of his vision and to prepare a business plan in support. The analysis considered not only what the new research facility would look like, but how it could support research efforts already in existence at the state's three universities and identification of revenue and grant sources to generate initial operating income both from state resources and research partners. In addition, the group relied on advice and support from the medical community such as Dr. Ray Woosley, former vice president for the University of Arizona Health Sciences Center (AHSC) and director of ABC (now president of the Critical Path Institute (C-Path) in Tucson), in assessing the impact of what a research center like TGen could mean for the state and how to package it.

The City of Phoenix Builds a Bio Campus – On a local level, a confluence of factors were taking place at the city of Phoenix that would allow Phoenix to provide the needed facilities and support to collaborate in the effort and build on it.

Needs identified — As early as 1999, Mayor Skip Rimsza and Phoenix Economic Development (ED) staff sought to improve their city's business conditions. On the heels of hosting a top software company in his conference room, the mayor was told that the technology company could not find enough engineers. Turning to the ED staff in the room he stated, "Get me a Harvard 'West' or an MIT 'West' campus downtown. Phoenix is the largest city in the United States without a downtown university. Please make this happen."

The push to create a downtown center of excellence had some important seeds already planted. ED staff quickly reconvened to determine the existing university presence in Phoenix and learned Northern Arizona University had a long history of both administrative and development offices already in downtown Phoenix.

The staff also knew that the University of Arizona's College of Medicine had offices in Phoenix in order to arrange with local hospitals for their medical residents to finish their residencies. At that time, Tucson, Arizona, housed the state's only medical school. The Phoenix city team began meeting with College of Medicine faculty to determine how best to meet their needs for further expansion in Phoenix and to host "Sneaker Tours" to better acquaint university executives with Phoenix' downtown and surrounding medical community. Numerous conversations continued within the medical community to communicate the outlines of a new medical school approach to education and service to the community.

Finally, Arizona State University, located in Tempe, also had a downtown Phoenix degree presence which focused on the Master of Public Administration. At this time, however, the universities were not actively collaborating.

The beginnings of collaboration — In November 2002, the incoming president of Arizona State University, Dr. Michael Crow, personally asked Dr. Peter Likins, then president of the University of Arizona, to be the keynote speaker at his inauguration, signaling a new relationship of cooperation between the two universities. This, coupled with diminishing state revenues needed to fund three state university programs and budgets in 2002, made it clear to the university presidents that these cuts were probably not temporary. The presidents began intensive collaboration leading to "deregulating the three universities." The "deregulation" they proposed was first based on "there isn't enough money to duplicate all programs" and secondly, each of the universities had developed over time unique centers of excellence compared to each other.

Phoenix raises money — In November 2000, the citizens of Maricopa County approved the Arizona Sports and Tourism Authority new Hotel Bed Tax of one percent and the Rental Car Tax of 3.25 percent. These new funds were projected to create up to $1 billion which were directed to build a new football stadium for Arizona's NFL team currently housed at Arizona State University and looking for a new home. Working with the Downtown Phoenix Partnership and Phoenix Community Alliance, Phoenix economic development staff and city management identified a former Phoenix Union High School site with three historic buildings remaining as a potential place for the new stadium. In the spring of 2002, however, the city of Glendale won the stadium. Later, the Phoenix Team would offer this site and funds to complete a proposal for a new home (headquarters office and research lab) for Dr. Trent.

The plan comes together — In April 2002, the task force presented the completed proposal to Dr. Trent to build a new research laboratory at the former Phoenix Union High School site with funds previously allocated in support of the NFL Football Stadium. The proposal also outlined using the three historic high school buildings for the proposed expansion of the University of Arizona, College of Medicine. In addition, the universities were now working together to create what would be called the Arizona Biomedical Collaborative (ABC).

Biodesign Institute at Arizona State University in Tempe.

By April of 2002, in only a few months, the task force had raised $80 million: $15 million from the Flinn Foundation, $5 million from the Virginia G. Piper Charitable Trust, and donations from health care providers such as Banner, private contributors, local corporations as well the universities and colleges that pledged faculty and resources.

There followed the relatively smooth bipartisan passage of two legislative initiatives due to the backing of numerous key parties that included health care lobbyists, the governor, Senator Sue Gerard, and House Speaker Jim Weiers, who had been a delegate on the trip to Maryland to visit Dr. Trent's lab. The first initiative, Senate Bill 1270 signed in May, by Governor Hull, provided for $5 million over 10 years for genomic research. It proposed dedicating some of the funding from tobacco money identified within the Arizona Disease Control Research Commission. While not of the magnitude of the later budget appropriation, it was significant because it was contingent on matching funds from the private sector and a first state backed milestone toward the $120 million goal. Later that month, the governor signed a second bill providing $25 million over five years from the state budget.

These appropriations would have oversight through the Arizona Disease Control Research Commission and would not have been possible without the daily attention from the workgroup identifying avenues for funding, constant communication with the legislature from the governor's office, and the support of the coalition. In addition, the timing was right. Proponents of the bill presented information from a report authored by Ernst & Young in 2000 stating that the bioindustry had gone from an $8 billion industry in 1999 to a $20 billion industry and that this was needed funding for Arizona as an economic development initiative.

The final contribution came in June when the Salt River Pima-Maricopa Indian Community pledged $5 million after identifying a potential link between their health interests and the work of TGen in the treatment of diabetes. This brought the total funding for the project to over $100 million.

The city of Phoenix, a main participant in the task force and the daily work group from the start, played an integral (if not synchronistic) role in pledging facilities and funding to construct office and lab space that would eventually be Dr. Trent's lab and the beginnings of a bioscience center in downtown Phoenix (see sidebar).

In June 2002, in only five short months, Dr. Trent accepted the state's proposal of a new home for his research center in Arizona. Today, the $46 million, 28-acre, Phoenix Biomedical Campus has a 170,000-square-foot, six-story research laboratory facility which is home to TGen and the International Genomics Consortium as well as Phoenix Molecular Biology Laboratories of the NIH, National Institute of Diabetes and Digestive & Kidney Diseases, and the Molecular Profiling Institute. Additional tenants include Catholic Healthcare West – St. Joseph's Hospital and Medical Center, the University of Arizona College of Medicine in collaboration with Arizona State University, and ABC.

THE COLLABORATIVE WEIGHS IN

For the first time in the state's history, industry leaders, economic developers, foundations, and academia came together for a single cause. They made it their priority to stay the course to attract this prospect, putting aside parochialism and earlier paradigms that raising money, particularly from state sources, was not possible. There follows some of their thoughts on this endeavor and what it meant for Arizona.

"With no precedent, it seemed unfathomable that state leaders could come together and accomplish what they did over a few months," said Margie Emmermann, the former director of ADOC (now director of the Arizona Department of Tourism). "Many pieces of the puzzle had to work in tandem, a good plan, intense lobbying and fundraising

TGen facility in Phoenix.

efforts, and most importantly the collaboration of multiple public sector disciplines. At any given time if one of them collapsed, the effort would fail. I believe it worked because everyone knew that this project would make or break our entree as serious players in the bio world. The time was right to join forces in light of past experiences and now we have the recipe that works."

"The effort to recruit TGen/IGC was unprecedented in Arizona," said Saundra Johnson, the Flinn Foundation's vice president for Strategic Development and Communications. "Top officials from across the public and private sectors quickly gathered around the same table, hammered out a solid plan, and raised $100 million at the eleventh hour. It demonstrated the power of unselfish collaboration and sparked the beginning of what's become known as the 'collaborative gene' in Arizona."

"Collaboration continues to be the key ingredient that has carried forward the Flinn Foundation's study, launched in 2002 by Battelle," says Johnson. "Much more than a point-in-time assessment, the effort outlined a 10-year plan to fast-track Arizona to success in the biosciences. The initiative, known as Arizona's Bioscience Roadmap, is now in its fifth year of implementation and is driven by nearly 20 committees of 300 statewide experts from science, business, academia, government, education, and philanthropy."

"We were charting new territory here," says Sheryl Sculley, the second in command of the city of Phoenix's workforce of 14,000 people and 25 city departments (now the city manager in San Antonio, Texas). "Certainly there are biomedical science clusters around the country, mostly on the coasts. We studied some of those models in terms of putting together a consortium to be able to attract and fund IGC and TGen here in Arizona." The former mayor of the city of Phoenix, Skip Rimsza, agrees. "The terrific progress in bio-medical development in partnership with the governor and state staff is my highest economic development accomplishment as mayor."

"I think we're on a trajectory to have a world-class academic medical center in Phoenix that will be integrated with Arizona State University, University of Arizona, and Northern Arizona University – an approach to healthcare education that will be a model for the rest of the nation. The opportunity to develop innovative collaborative programs for the AHSC in Phoenix is one the reasons I came to Arizona in early 2002," said Dr. Ray Woosley, putting into context the value of the university collaborative effort and TGen.

"Instead of creating programs as traditional departments, we want to have interdisciplinary teams of clinician scientists and basic scientists bringing a broad range of expertise to problems like melanoma, Alzheimer's, Parkinson's, cancer, and heart disease," Woosley said. "We want to grow the faculty based on teams. It's an opportunity to teach medicine, nursing, and pharmacy students in the same environment so that everyone appreciates each discipline's unique contributions and works more effectively as team members. The presence of TGen on the campus will give the students an appreciation for how to incorporate contemporary science into their clinical practice and to establish a clear reason for life-long learning."

RESULTS THAT CONTINUE

Putting aside university competition, institutional proprietary agendas, and competing economic agendas, this collaborative effort generated over $100 million in five months from a number of sources, such as the Indian Community, which would directly benefit from TGen's initial core research areas. Not only did the state attract a new research center but other partnerships, such as with the three universities, were evolving which would later only build on this endeavor.

BIO5 at the University of Arizona in Tucson.

In December 2006, four years after the start of operations, TGen released results from an independent economic impact study prepared by Tripp Umbach, a nationally known economic forecaster. The study showed that TGen returns more than $21 million of its total operational expenses to the state, or four dollars for every one dollar invested. In addition, TGen has generated 220 jobs and $1.9 million in total tax revenue. Its future is even more promising. In 2010, it is expected that TGen will generate 889 jobs and $6 million in total tax revenue. The analysis projects the impact of the research commercialization up to 2025, which will remain strong.

The Flinn Foundation continues to steward the statewide process and the ongoing partnerships.

Major Arizona Bioindustry Achievements

2000	• Arizona voters pass Proposition 301, in part providing $1 billion over 20 years for science and technology at the state's universities
2002	• TGen formed and International Genomics Consortium moves to Arizona • Arizona's Bioscience Roadmap launched
2003	• Legislation authorizes $440 million for construction of university research facilities
2004	• Arizona State University and University of Arizona agree to partner on an expansion of the UA medical school in Phoenix • Voters approve $100 million for bioscience and healthcare training and facilities at Maricopa Community Colleges
2005	• University of Arizona, Federal Drug Administration and Stanford Research Institute, International found The Critical Path Institute in Tucson with a $10 million community funding commitment over five years
2006	• $50 million committed for Piper Chairs in personalized medicine • Science Foundation Arizona Launched - to use public and philanthropic funds for investments that are intended to deepen Arizona's scientific, engineering, and medical infrastructure • Legislature creates Arizona 21st Century Fund, to be administered by Science Foundation Arizona

Without its formalized approach, the momentum would have been lost. By commissioning Battelle to facilitate, monitor, and report on the Bioscience Roadmap, the participants throughout the state have the chance to see tangible results. The Roadmap is on track to meet most of its ambitious goals to boost research grants, talent, firms, and other bio assets which continue to strengthen as a result of this early work. (www.flinn.org)

Other partnerships and collaborations have developed and continue. These include the formation of Science Foundation Arizona (SFAz) in 2006, the Critical Path Institute in 2005, TD2, TGen's drug development partnership with Mayo formed in 2005, a more organized and formal Arizona BioIndustry Association, and enhanced university research institutions (ABC, Biodesign Institute, C-Path, BIO5, and others) that partner with private industry. Many of the Arizona cities where some of these institutions are located such as Chandler, Flagstaff, Tempe, Tucson, and Scottsdale are growing their bioscience centers of excellence with this collaborative mentality and synergistic approach, furthering evidence that in Arizona partnerships are the way to get things done.

housing affordability

AND WORKFORCE HOUSING INITIATIVES

By Ronald J. Gunderson, Ph.D.

Rio Homes offers affordable townhomes as part of a public-private partnership with the city of Flagstaff. Units are deed restricted to keep them permanently affordable.

Affordable housing is typically defined to occur when families do not need to spend more than 30 percent of their incomes to meet their mortgage or rental payment plus utilities. In many markets today, this threshold is not met by large numbers of the working population. Nevertheless, the words 'affordable housing' often conjure up images of a low income, unstable population that is prone to move in and out of homes quickly accompanied by a fear that property values will be negatively impacted both by their presence and by their actions. The increasing use of the phrase 'workforce housing' instead of affordable housing is designed to alleviate part of the negativity surrounding this issue. In this article, these terms are used interchangeably and are meant to express the same intent.

These and other myths regarding affordable and high density housing are the subject of a report published by the California Planning Roundtable in May 2002.[1] The report points out that in many

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THE CHALLENGE IN TODAY'S ECONOMY AND A CASE STUDY OF THE ARIZONA MARKET

The housing market in Arizona has been fueled by low home mortgage rates and high levels of population growth. Home prices in Arizona have appreciated by 74 percent since 2000; however, median family income rose by only 15 percent. The problem is particularly acute in cities and towns that have a limited supply of privately held land. High home prices have impacted the ability of some localities to recruit and retain a sufficient workforce. This article addresses housing affordability topics across the U.S. and offers suggestions that have been proposed to address this issue in Arizona.

Railroad Springs offers newer manufactured homes as well as townhomes within a 142-acre master planned community in Flagstaff, AZ

locations housing production has lagged behind job and household growth since the 1970's while at the same time, the federal government has scaled back its support for local governments thus shifting a greater portion of the burden from the federal to the local governments. The situation has become critical in localities where voters have approved expenditure limitations and/or frozen the level of property taxes at current levels.

Given today's fiscal realities as well as public perception surrounding affordable housing, there is little mystery as to why this issue has become one of the top concerns in the profession as well as for communities, businesses, and households in many localities.

DEMAND AND SUPPLY SIDE FACTORS

Although the market for affordable housing worsens when the difference between income levels and the amount of income needed to obtain adequate housing widens, the differential is most often attributable to the pre-existing value of land in many communities. The California Roundtable Report states that "the truth is the single most significant factor affecting property values is the pre-existing value of the land in a given community or area. This in turn is based on supply and demand, proximity to major urban centers, nearby attractions (beachfront property, panoramic views), and negative factors such as environmental contaminants, and availability of adequate infrastructure and services."[2]

Entrance to Railroad Springs Development – a master planned community offering affordable housing in Flagstaff.

Thus the market for housing is no different from the market for most goods. The supply of available land (both the quality and quantity of land) where people wish to live simply does not match existing demand, thus property values are bid up and an increasing number of households find that they cannot afford to either buy or rent properties under these circumstances.

CHALLENGES FACING TODAY'S MARKET

In addition to the perception problem regarding who we are talking about when we identify households in need of affordable or workforce housing, several additional challenges must be faced before this issue can be successfully addressed. A report released by the University of Georgia Housing and Demographics Research Center concludes that the lack of available workforce housing is influenced by a host of factors each posing their own challenges.[3] The factors listed in the report are:

- Credit worthiness of potential buyers,
- Low profit margins in the development of affordable housing,
- Relatively small size of local housing markets,
- Inadequate infrastructure to support housing development,
- Lack of knowledge about housing assistance programs,

- Lack of available land, and
- Land development codes such as zoning and subdivisions.

The general unawareness of existing housing programs along with a lack of knowledge of available resources pose significant challenges, yet the Georgia report concludes that if workforce housing is not addressed many counties will fail to reach their economic development potential. Furthermore, existing market incentives are insufficient by themselves to attract private sector builders and developers, while publicly financed incentives are limited and inadequate.[4] Similar conclusions may be drawn for localities across the nation. What can be done?

POTENTIAL STRATEGIES TO ADDRESS WORKFORCE HOUSING

Several states have engaged the participation of task forces or have relied upon various public or private agencies and partnerships to generate policy options that address workforce housing. Although individual situations and solutions have been proposed in different states and localities, a number of the task force reports focus on increasing the *supply* of quality low-to moderate-income owner occupied housing. The options presented in the Georgia study[5] are typical of those proposed in other regions and include:

- Establishing a development fund to supplement existing public and private resources [to develop and redevelop] workforce single family housing in rural areas of the State.
- Encourage employer-assisted homebuyer programs through state down payment tax credits and matching down payment assistance funds.
- Establishing a public-private consortium to encourage the development of well-planned manufacturing housing developments.

The recommendation to establish employer-assisted housing (EAH) has surfaced in many regions and is touted as providing a significant means to address this issue. The Wisconsin Partnership for Housing Development released a study based on the outcomes of a series of round-table discussions held in November 2004.[6] This report contains a description of demand-side and supply-side employer assisted housing mechanisms that can be extended to any community.

Some of the mechanisms proposed in this report were:

Demand-Side Mechanisms[7]

- Employers inform employees regarding housing options (marketing & outreach)
- Employers provide free meeting space and provide in-house counsel as well as engage non-profit agencies to provide additional services for employees (homebuyer education and counseling)
- Employers pay points and closing costs on mortgages via grants, matching grants or deferred loans (down payment and closing costs)
- Employers work with lenders to provide large groups of people who want mortgages while lenders lend at lower interest rates for the group (group mortgage origination)
- Employers bridge the gap between mortgage cost and employee ability to pay using a gap financed second mortgage in order to reduce carrying costs (mortgage buy down)
- Employer guarantees repayment of loans in case of employee default (mortgage guarantees)
- Employers buy mortgage bonds at below-market rates, and upon sale of the bonds, offer employees below-market interest rates (purchase of securities)

Urban growth in Coconino County is nearing public lands currently maintained by the U.S. Forest Service.

Supply-Side Mechanisms[8]

- Employers provide equity in projects by offering low-cost loans for predevelopment cash grants (cash participation)
- Employers donate land, sell land below market rates or lease land for development (land)
- Employers donate in-house accounting, architectural, legal, and engineering services to developers (donation of services)
- Employers provide lower cost financing or financing guarantees (construction financing)
- Employers rent units and then lease them to employees as well as remaining responsible for making payments when units are vacant (master lease)

Each of the proposed demand and supply side mechanisms has associated benefits and costs (pros

and cons) that will vary with the size of the employers and the specific needs of the employees. Several of the pros and cons are presented in the Wisconsin report along with the results of the roundtable discussions in communities across the state that eventually lead to a series of recommendations made to the Wisconsin Department of Commerce. Those recommendations included a down payment assistance component, an education component, a grant or loan component for predevelopment costs, and a capacity building component to maintain programs once established.[9]

APPROACHES TO DEVELOP WORKFORCE HOUSING IN ARIZONA

The challenge to providing workforce housing in Arizona is summarized in two recently released reports – *The Final Report from the Arizona Incentives for Affordable Housing Task Force* (June 2006) and *Arizona's Housing Market…a Glance* prepared for the Governor's Housing Forum (September 2006.)

The fact that Arizona housing prices have skyrocketed over the past seven years is not surprising.

The Arbors is a 310 condo-conversion project in Flagstaff which includes providing assistance to qualified first time homebuyers.

These increases have been driven by both demand and supply side considerations. Arizona's year over year population growth is now the fastest in the U.S. and this increase in population has directly contributed to the greater demand for housing. At the same time, low mortgage interest rates have encouraged an increase in the number of second home purchases as well as generated increased sales activity resulting from heightened investor speculation in the housing market. On the supply side, the amount of land available to support affordable housing has been dwindling as increased pressures have already pushed development far into formerly uninhabited areas as urban sprawl and general population increases have transformed huge tracts of land from rural to urban uses in all directions.

Figure 1 Annual Home Price Increases (1st quarter 2005 – 1st quarter 2006)

State	Annual Price Increase
Arizona	32.81%
Florida	26.62%
Hawaii	24.99%
Oregon	20.96%
District of Columbia	20.84%
Maryland	20.46%
U.S. Average	**12.54%**

Source: Office of Federal Housing Enterprise Oversight; Reported in *Arizona's Housing Market …a Glance*, 2006. p. 4.

The combination of these influences resulted in an annual price increase of 32.8 percent in the Housing Price Index (HPI) for Arizona in early 2006 when compared with prices a year earlier.[10] Annual home price increases for selected states are shown in Figure 1. Arizona's increase was considerably above the change in Florida which was the second-ranking state in terms of home price increases and approximately 2.5 times the overall national increase of 12.5 percent.

The fact that Arizona housing prices have skyrocketed over the past seven years is not surprising. These increases have been driven by both demand and supply side considerations. Arizona's year over year population growth is now the fastest in the U.S. and this increase in population has directly contributed to the greater demand for housing.

In 2000, the median home price in Arizona was $140,600 while the median family income was $47,800. By 2006, these numbers were $244,000 and $54,900, respectively. This translates into a 74 percent increase in home prices compared to a mere 15 percent increase in family income levels.[11] If we use the standard affordability assumption that no more than 30 percent of income should be devoted to housing payments, the hourly wage needed to buy a home in Arizona in 2006 would have been $35.40. On the other hand, the average hourly wage across all Arizona occupations was $13.31 during the same period.[12] In the period since 2000, the ratio of home prices to income levels in Arizona has increased from 2.94 to 4.44 – an increase of over 50 percent, thus putting the average priced home out

of reach of more and more workers across all industries in the state.

The affordable housing issue is a concern across all of Arizona – in urban as well as in rural areas. The problem also extends to the rental markets. Figure 2 provides information for renting a two bedroom apartment and compares the hourly wage needed to rent an apartment in selected Arizona counties using the generally accepted affordability standard when compared to the median hourly wages earned in these counties. In most regions, the hourly wage earned is less than 75 percent of the amount needed to rent a two bedroom apartment in these locations.[13]

The numbers presented above were influential in Arizona Governor Janet Napolitano creating a statewide task force in 2005 in order to identify solutions for creating affordable housing opportunities in Arizona. The task force was convened by the Arizona Department of Housing and the Arizona Housing Commission and included a wide range of stakeholders drawn from state and city governments as well as from private agencies across the state. The guiding principles for the task force were that 1) the burden of addressing the growing affordability challenge must be shared by multiple stakeholders and 2) all types of housing are important when looking at expanding available affordable housing opportunities.[14]

The task force met over the first half of 2006 and adopted 19 recommendations that were sent to Governor Napolitano. The recommendations were placed into four separate categories and were further classified as being of a short-term or a long-term nature. The four categories are:

- Finance,
- Barriers and Incentives,
- Education, and
- Land/Land Planning.

In the ensuing months, the Arizona Housing Commission presented the task force to numerous stakeholders around the state as a means to arrive at a consensus regarding how to address affordable housing in Arizona. Their suggestions were shared at the Governor's Housing Forum in September 2006.

Five key suggestions that emerged from this process:

- Develop and expand Employer Assisted Housing (EAH) strategies throughout the state and institute tax benefits for participating employers and employees.
- Permit beneficiaries of the sale of State Trust Land to use the earnings to finance EAH programs for their employees. (Note: The primary beneficiary of these sales is the Arizona public schools system.)
- Create financial incentives for municipalities and counties as a means to encourage the establishment of local housing trust funds.
- Streamline procedures at the local level including processing time, development standards, and financial requirements in order to reduce housing costs.
- Permit the State Treasurer to authorize a portion of the state's Permanent Fund dollars to be invested into loans for affordable housing.

DISCUSSION

Employer Assisted Housing models are emerging as an increasingly popular means to address the issue of workforce housing. Examples of existing programs in several states were cited in the Task Force Report as well as specific recommendations for Arizona. These include employer assistance with down payments and closing costs of home purchases or payment of rent and utility deposits.

In order to encourage employer participation, tax relief would be granted similar to what has occurred in other states. In Illinois, employers are eligible for a $.50 income tax credit for each $1 dollar of cash, land or property donated for EAH purposes.[15] Employee participation would be encouraged by

Figure 2 Hourly Wages Needed to Rent Compared to Hourly Wages Paid Selected Arizona Counties, 2005

County	Hourly Wage Needed to Rent	Median Hourly Wage Paid in County
Coconino	$17.44	$ 8.41
Maricopa	$14.81	$10.04
Pinal	$14.81	$ 8.76
Yavapai	$13.38	$ 9.60
Pima	$14.35	$ 9.72
Mohave	$12.56	$ 9.99
State Average	**$12.96**	**$ 9.80**

Source: Arizona Department of Housing and Arizona Department of Economic Security; Reported in *Arizona's Housing Market …a Glance*, 2006. p.7.

eliminating the requirement that such assistance would be subject to state tax. In both instances, legislation would be required in Arizona to implement these policies.

Similar impacts can be generated by allowing school districts and other beneficiaries of the State Trust Land sales to use a portion of these earnings for EAH. Use of this approach would also require legislation but it would provide considerable assistance to teachers and staff employed in Arizona schools.

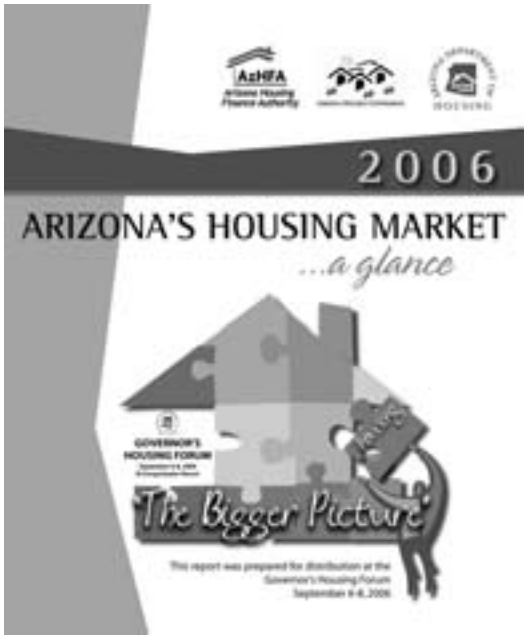
A longer term solution may occur with the establishment of local housing trust funds at the municipal and county levels. Industrial Development Authorities along with the Arizona Department of Housing or Arizona Department of Commerce could offer incentives to supplement local dollars. This recommendation states that "Incentives would scale down over time as adequate housing is secured. Cities, towns, and counties would receive such incentives if they established a dedicated source of revenue for the purchase, construction, or rehabilitation of affordable housing within their respective jurisdictions. The match could be on a sliding scale, as localities establish a steady funding stream."[16]

The Homes for Arizonans Initiative is the product of a joint effort between the Arizona Housing Finance Authority (AzHFA) and the Arizona Department of Housing (ADOH) and provides assistance to first time homebuyers in the form of down payment and closing cost assistance. The program is available to buyers in rural counties of the state (residents of the Phoenix and Tucson areas are not eligible).

Housing costs can be decreased by reducing barriers to construction that exist in numerous communities, particularly regarding the time it takes to process applications, and the processes which currently must be followed. Additional cost savings can be achieved by granting allowances for greater housing density as well as addressing other financial and market issues that are peculiar to each community. Voluntary changes by municipalities in these areas can generate savings both to the developer as well as to the home buyer.

Some of the primary recommendations in the report for places where cities and counties can implement specific strategies were to:[17]

- Defer development fees until certificates of occupancy are issued thereby increasing upfront cash flows to the project.
- Accelerate the processing and approvals procedures in cases where the housing project and the developer already meet certain established minimum performance requirements.
- Review existing regulatory and zoning processes as a means to identify their impact on housing affordability.
- Identify underutilized and vacant sites for the purpose of providing affordable housing.



This report was prepared for the Governor's Housing Forum in September 2006. Report cover, courtesy of the Arizona Dept. of Housing.

- Incorporate new technologies to facilitate the timeliness of the development process.
- Clarify the development process so all stakeholders fully understand the "ground rules" and other expectations with respect to development in an area.

Finally, following the example of California, the state treasurer could be authorized to invest portions of the proceeds of state land sales into loans for affordable housing. Currently, proceeds from state land sales are deposited into the state's Permanent Fund and the expectation of land sales continuing in future years provides a reliable source of financing for affordable housing. Care would be taken to insure comparable returns accrue to the Permanent Fund after accounting for the usual risk and security issues. This procedure is similar to the process in California where portions of the Public Employees Retirement System Fund have been invested in affordable housing activities.[18]

ONGOING ARIZONA INITIATIVES

The Homes for Arizonans Initiative is the product of a joint effort between the Arizona Housing Finance Authority (AzHFA) and the Arizona Department of Housing (ADOH) and provides assistance to first time homebuyers in the form of down payment and closing cost assistance. The program is available to buyers in rural counties of the state (residents of the Phoenix and Tucson areas are not eligible).

Funding sources are available from the Mortgage Revenue Bond (MRB) Program and the Mortgage Credit Certificate (MCC) Program. The MRB program offers qualified buyers mortgage financing at one percent below market rates while the MCC allows certificate holders to receive a tax credit of up to 20 percent of annual mortgage interest payments as long as the property is used as the principal residence of the borrower. Beneficiaries under each of these programs remain eligible for down payment and closing cost assistance at the same time.

Another program entails Fannie Mae working in partnership with the Arizona Association of REALTORS® and other entities to provide Employer Assisted Housing under the auspices of the Housing Arizona's Workforce campaign. Fannie Mae offers free technical assistance to participating employers. Under the program, employers then provide access to free home-buying workshops designed to help employees locate affordable housing as well as provide housing-related counseling and education along with direct financial benefits including loans and grants for the purchase of a home. Details of this program are discussed on the Fannie Mae Arizona Partnership Office website.[19]

Arizona universities are beginning to investigate employee housing programs that could be designed to increase retention rates among faculty and staff at their campuses. The University of Arizona Drachman Institute commissioned a survey of university faculty and staff in 2006 to assess interest levels in affordable housing. The survey found overwhelming support among respondents for a proposal that includes providing new housing on university-owned land near the campus. The plots would become part of a land trust which would allow buyers to purchase homes without having to purchase the land, thus removing a significant cost from the transaction.[20]

Finding affordable housing is of particular importance in Flagstaff where housing costs have skyrocketed over the past few years. Northern Arizona University in Flagstaff is currently reviewing options that could assist in faculty attraction and retention.

An alternative to building university housing on Arizona's campuses could include the use of equity sharing. Under this type of program, a university would offer assistance with financing the purchase of a home and would assume an ownership interest in the property. If the property was later sold, the university would share in the capital appreciation at that time. The benefits of this type of program include a lower capital commitment than what is required for university constructed housing and it does not restrict employees in terms of the types and locations of homes from which they may choose to purchase.

Affordable housing remains a significant problem in Arizona and in many locations across the nation. The production of affordable housing is not confined to finding ways to increase the construction of affordable units, but must also incorporate alternative solutions on the demand side.

In other developments in Flagstaff, condo conversions are occurring at various locations within the city. Buyers of deed-restricted, owner occupied properties are eligible for down payment assistance from the developers who have established pools of money for this purpose.

THE FINAL ANALYSIS

Affordable housing remains a significant problem in Arizona and in many locations across the nation. The production of affordable housing is not confined to finding ways to increase the construction of affordable units, but must also incorporate alternative solutions on the demand side. This can be accomplished through creation of partnerships to include the private sector as well as local governments and universities. Strategies have been proposed that include equity-sharing, down payment assistance, below-market interest loans, and providing better access to information.

The burden must be shared by multiple stakeholders as this is a problem that not only exists in more and more communities, but also impacts the ability of employers across all industries to attract sufficient numbers of workers to these communities due to an inadequate number of affordable housing units to support the labor force. It is here where the economic development profession is able to assist. Without a solution to this problem, we all lose.

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September 13-14, 2007
Phoenix, AZ

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Economic Development Credit Analysis
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Real Estate Development and Reuse
November 6-7, 2007
Atlanta, GA

Economic Development Strategic Planning
November 13-14, 2007
Baltimore, MD

economic and workforce

DEVELOPMENT – K THROUGH 12 EDUCATION ISSUE

By Richard K. Delano and Katherine C. Hutton

Several workforce trends are converging which could represent a "perfect storm" for the economic growth of unprepared communities.

- 21st century workplace and technical skills have become more important than land and buildings. Critical, trained human capital must be developed through a complex educational system.
- 21st century workplace skills are becoming as or more important than basic technical skills. Educators are starting to recognize this and determining how to teach these skills.
- The retirement of baby boomers in key occupations is impacting the job market, resulting in potentially disruptive labor shortages.
- Many high-tax, high-cost communities will have to "grow their own" critical skilled workers as their markets become uncompetitive.
- Workforce and economic development is increasingly a K – 12 issue and many communities lag behind in understanding how business and schools must work together to make the K – 12 workforce connection.

This article will focus on workforce development and K – 12 education. It describes a leading high school redesign strategy called "career academies" and illustrates how economic and workforce development organizations are lining up behind this 21st century education redesign strategy.

Business partners are an invaluable resource for career academies. High school students from Cathedral City, CA, were paired with adult mentors from the Coachella Valley Economic Partnership who arranged special programs like this tour of USC.

THIS IS NOT YOUR FATHER'S VO-TECH EDUCATION

Forty years ago, the subject of K – 12 education would arise in economic development circles when discussing school quality for relocating managers. Then, employment demands were focused on line workers with a reasonably good work ethic. The workforce development system, largely vo-tech and On-the-Job-Training, accommodated these needs.

In 2007, the global economy has clearly redefined the workforce skill set required for the 21st century workplace. Critical thinkers and problem solvers with attainment in reading and math are required for high-wage, high skill careers. Workforce development must be focused on literacy requirements needed to manage innovation through teams using advanced communication and problem-solving skills. Today's workforce development system in most communities has not been fully mobilized and aligned to produce the employees with 21st century skills that expanding or relocating companies need and expect.

In many communities, business leaders and economic development officials are concerned about why the educational system can not deliver to the workplace job-ready employees or college-ready

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Katherine C. Hutton is economic development manager for the City of Scottsdale, Arizona, and is a Certified Economic Developer.

SMART DEVELOPMENT GROUPS ARE MAKING THE CONNECTION

The career academy is one of the most successful education-based models for developing the skills required for today's workforce and developing a workforce that meets the needs of the local business community. The market's need for high skilled, technology savvy workers and the exodus of boomers from the workplace sparked economic developers to become the catalyst for the creation of career academies. Economic developer driven, educator driven, and business partners models of career academies are examined with best practices for building and maintaining a career academy. Career academies are in 2,000 high schools nationwide and are viewed as key to education reform for both low performing schools and students.

students needed for our companies who are engaged in global competition and faced with a retiring workforce. This is particularly challenging because it is difficult to define and clarify a solution. Employers often blame education in general; colleges blame high schools, who blame middle schools, who blame elementary schools, who blame parents. The education establishment often looks at the business community, wondering why it is not doing more. Business points to the substantial investment it makes in remedial training for employees.

CAREER ACADEMIES SUPPORT ECONOMIC DEVELOPMENT AND WORKFORCE GOALS

Career academies differ from traditional academic and vocational education high schools by preparing students for both college and careers. Academies provide broad information about fields such as biosciences, finance, engineering, media, or health care. They weave the career themes into academic curricula that qualify students for admission to four-year colleges or universities and prepare them for the associated workplace. Students self select for the program and are typically moderate or marginal students in terms of academic performance. Studies have found that students in career academies perform better in high school and are more likely to continue into post secondary education, compared to similar students in the same schools.

Career Academy programs have a number of success stories in meeting the challenges previously described. Three examples of career academies illustrate how passionate educators along with business leaders can build this educational model necessary for the demanding 21st century workplace, achieve No Child Left Behind mandates, and reduce the remediation burden for schools and business alike. These examples illustrate how relevance and relationships can drive student engagement and success and are a clear option to remediation.

Each case is unique but all three build on several common themes:

- Urgency of the workforce situation. There is no greater motivator for prompting change than demand. These three communities realized the importance of fundamental change.
- Senior-level business and academic engagement. Certain roles can not be delegated. Leadership is one of them. In each case, leaders made a personal commitment.
- Alignment of business, institutional and philanthropic investment toward requirements defined by the school system's redesign strategy. Funding for effective programs can be redirected within the system toward a set of needs that K – 12 and post secondary leaders define.
- Selection of a successful secondary-school redesign strategy. Business and education need to come together around a redesign model proven to help educators meet the educational goals that local, state, and federal authorities define for them.

Coachella Valley Economic Partnership

The Coachella Valley Economic Partnership, located in the southern California desert, received a grant from the James Irvine Foundation to fund a career pathways initiative aimed at increasing the number of talented work force and college ready high school graduates in three fast-growing business clusters. Working closely with its three area school districts, it embarked upon improving the future workforce needed to attract its desired business base.

According to the Partnership's chairman, Bob Marra, "we found ourselves in a situation where we were outgrowing the capacity of our workforce here. It is hard to both fill the jobs that are needed to make this economy continue to tick, and to also attract the new companies we need to continue to grow. We need to do both."

With the grant, the Coachella Valley Economic Partnership is expanding the number of students learning in three high wage, high skill pathways that have been identified as essential to the valley's continued growth. These pathways are: health, energy and environmental technology, and multimedia.

Career academies are playing a central role in forging the link between the region's business community and its three school districts. According to Marra, "career academies are exactly what we need here in the Coachella Valley because young people in the region are looking for something where they can really dig into these career pathways…to see what it is like to be a nurse, to be an engineer."

High school students explore health careers at Eisenhower Medical Center, Rancho Mirage, CA.

Nashville Area Chamber of Commerce

The goal of Alignment Nashville in Tennessee is to create a system to bring community organizations and resources into alignment so that their coordi-

nated support to Metropolitan Nashville Public School's and District priorities has a positive impact on student achievement and public school success and the success of the community as a whole.

According to Tom Cigarran, operating board chair of Alignment Nashville and chairman of Healthways Inc., "aligning all this good will, people power, behind strategies of the school system will have a major impact on the success of our public schools."

This alignment of support behind Nashville Metro schools preceded a more recent development, the receipt of a $6.75 million five-year Small Learning Communities grant from the US Department of Education. The grant provided the impetus for the creation of the Office of Redesign and Innovation.

One of this office's main charges is developing and implementing plans for the creation of career academies and other small learning communities in their comprehensive high schools. The Nashville Area Chamber of Commerce is responsible for economic development within the region and has defined target industries that, through Alignment Nashville, will assist Nashville Metro's Office of Redesign and Innovation in defining the types of career academies it will select.

Mesa School District

In Mesa, Arizona, Xan Simonson, a biology teacher at Mesa High School, saw the need for training high school students in biotechnology following the Translational Genomics Institute (TGen) decision to choose metropolitan Phoenix as its home in 2002. Arizona's bioscience efforts were accelerating at a significant pace with TGen's location decision and studies warned of a shortage of a qualified workforce in this now accelerated industry.

Simonson started a biosciences academy program at Mesa High School believing that her students' education should align with the state's biosciences initiatives and the increase in demand for workforce in the biosciences. In three short years, the program has grown from her grassroots efforts into a singular biosciences career academy in her classroom to biotechnology programs at three other Mesa district high schools and $5.2 million in new labs and wet lab space being built by the district to support the biotechnology program.

The construct of the program allows for students, after two years, to make the transition to a two-year or four-year program. Mesa graduates may continue studies at Mesa Community College or one of the three Arizona universities. Recent studies conducted in conjunction with the state of Arizona show an immediate need for qualified bioscience laboratory technicians with demand outstripping supply by four-fold. Studies also reveal that the lack of skilled technicians coincides with the lack of a true "2+2+2 program" in which high school students are introduced to biotechnology and follow a seamless transition from high school to community college to universities.

Brittany Johnson, a senior at Mesa High School, works on cloning tissue from a fern in the school's biotechnology academy lab.

Additionally, it was announced in late 2006 that some Mesa students in the academy will be working on a research project that involves decoding the genome of a bacteria and publishing the results. This project is a result of a $900,000 grant from the National Science Foundation that will be conducted in conjunction with Arizona State University's Biodesign Institute and Polytechnic campus and Mesa Community College.

CAREER ACADEMIES

It is not enough for business and education to want to work together. They need a concrete plan built around a well-researched redesign strategy to make their time and energy pay off through a process they can manage. Each of the examples of business and academic engagement is being built around the career academy redesign model. Career academies bring together the dual benefits of a smaller learning community where students become part of a family with contextually-rich career themes that answer the question all high school students ask at one time or another:"Why do I need to know this stuff?"

Statistical evidence indicates that career academies improve high school attendance, grades, graduation rates, college going, and economic success after high school and college. Career academies are also believed to raise test scores, reduce remediation, and increase English language proficiency. Academies can be scaled up to any portion of or all of the student population.

The balance of this article provides an overview of career academies, describes the statistical improvement that is possible, and introduces a set of best practices for scaling up and sustaining a network of career academies. These "indicators of success" were developed by Social Marketing Services in 2006 with support from Ford Motor Company Fund and are being adopted by economic development agencies, chambers of commerce, and their education partners in communities across the country. In adopting these best practices, communities can qualify for a Ford Fund Career Academy Innovation Community (CAIC) status which brings technical support and modest grants. Career academy networks provide a new perspective and rich possibilities for communities regardless of location, size, or economic condition.

Career academies differ from traditional academic and vocational education high schools by preparing students for both college and careers. Academies provide broad information about fields such as biosciences, finance, engineering, media, or health care. They weave the career themes into academic curricula that qualify students for admission to four-year colleges or universities and prepare them for the associated workplace.

THE EVOLUTION OF THE CAREER ACADEMY

The Academy Model was developed in Philadelphia in 1969 by Charles Bowser, the executive director of the Philadelphia Urban Coalition in alliance with the Philadelphia Electric Company and Bell of Pennsylvania. The goal was to create a program that would provide a new paradigm for students relative to the social and racial discontentment sweeping the community of Philadelphia and nation at that time. Career academies were implemented in order to create employment opportunities for students in Philadelphia's disadvantaged ethnic groups and income groups while providing local employers with a qualified entry level workforce.

The original academy model reduced the scale of a high school student body into smaller learning communities – a school within a school. Course work is coordinated around a career theme and designed to prepare students with a full curriculum that supported the student in their career endeavors. This in-school effort was coupled with the creation of a linkage between the schools and area employers – proving employers with a skilled, localized workforce. Students self selected themselves for the program; additionally, the students were typically at-risk or marginal students. The academy environment proved itself out as enrolled students improved and excelled.

In the past three decades, academies have both grown and evolved. There are active career academies in an estimated 25 percent of high schools according to the federal Department of Education. The nature of the curriculum has expanded to include everything from auto mechanic training and machine tooling to the biosciences, engineering, finance, and law. Today, academies exist not only in inner city schools but suburban schools in relatively affluent areas as well. In fact, an increasing number of elite high schools are adopting the academy model to improve the college/career choices their university-bound students are making.

CAREER ACADEMIES TODAY

Career academies need to be organized around trade and professional themes relative to the needs of and as defined by the community, with students self-selecting for application to academies. Most academies teach between 100 and 300 students in grades 9 or 10 to 12. Academy students are scheduled together with a team of teachers each academic year. In the best career academies, the team of academic and career teachers work together to enrich the academic courses through the integration of contextual projects and themes. Students enrolled in the academy typically participate in career-related experiences such as internships beyond the classroom instruction.

In 1995, career academy experts and their respective organizations agreed upon a common definition for career academies with three critical components:

- Small, safe, and supportive learning environments that are personalized and inclusive of all students.
- Challenging, rigorous, and relevant curriculum that prepares students for college, careers, and productive citizenship.
- Collaborative partnerships among educators, parents, businesses, and other community resources that broaden learning opportunities.

Several institutions support schools, districts, and businesses in developing career academies in their communities. The Career Academy Support Network at the Cal Berkeley's Graduate School of Education (http://casn.berkeley.edu/), the National Career Academy Coalition (www.ncacinc.org), the National Academy Foundation (www.naf.org), and Career Academies (http://www.careeracademies.net) provide resources, information, advice, and support for career academies to utilize, access and contribute. An integral value to academies is the absence of hard rules for their creation, development, and management. Academies are designed to comply with local standards and policies defined by state education departments and local school districts. While this

design model is flexible, its success rests on fundamentals that must exist:

- Common planning time for academy teachers to discuss their students and how to integrate academic courses.
- Academy leaders should be provided release time to plan the activities of the academy students and build external relationships.
- Academy students should be scheduled together to the extent possible and consistently taught by the academic team in at least two academic courses.

The next horizon in career academy evolution is the creation of high-quality, integrated curriculum units. These units should be designed to teach appropriate academic standards for academic teachers through contextually based projects built around the career pathway.

STATISTICAL EVIDENCE OF SUCCESS

The academic challenges and need for change in today's high schools is part of today's social and political fabric. Low graduation rates and college-going rates are only two of the fault lines in public education. The promise of career academies can be measured by accounts from several career academies. Active since 1969, roughly 10 percent of Philadelphia's students attend 34 career academies. These students regularly achieve a 90 percent graduation rate with 60 percent moving on to college, year after year.

A study of Bay Area, CA, career academies by Maxwell and Rubin found that students enrolled in academies had the following success compared with non-academy students in the same schools:

- GPA nearly .5 of a grade higher
- Test scores 30 – 40 percent higher
- Drop out rate 50 percent lower
- 8.2 percent more continue to two- and four-year colleges
- 15.9 percent more go to four-year colleges

In the Sacramento City district, a Gates/Carnegie grant supported a district-wide system wherein nearly all students learn in small learning communities and career academies. What makes the following results particularly impressive is that all students, not just those who self select, learn in academies. We have the opportunity to observe the career academy "effect".

	2000/01	2004/05
Dropouts	24%	14%
Graduation Rate	79%	84%
Suspensions	1,852	1,292
Expulsions	44	5
Students sitting for the SAT	718	1,489

MDRC, a non-profit, research organization based in New York, determined that career academies substantially improved the labor market prospects of young men, a group that has experienced a severe decline in real earnings in recent years. Through a combination of increased wages, hours worked, and employment stability, the young men in the Academy group earned over $10,000 (18 percent) more than those in the non-Academy control group over the four-year follow-up period. The sample of 1,400 students are 85 percent black and Hispanic. Full results can be obtained at: http://www.mdrc.org/publications/366/overview.html

STRATEGIES AND BEST PRACTICES

The best practices in career academies were observed in how education and external partners are working together in active career academy communities. The more successful career academies programs exist, the more defined the best practices are - providing a stronger foundation for developing a more effective design for and more effective career academies.

The strategies and best practices identified in career academies serve as the underpinning for the Ford Career Academy Innovation Community (Ford CAIC) recognition program designed to support academy communities. This Ford Motor Company Fund hopes, through its actions, to increase the number of students engaged in career academies and to sustain the students' career academies.

By focusing on communities and not on individual schools or districts, Ford Fund believes business, civic, and educational leaders can be engaged in the shared objectives of workforce and economic development. In 2005, Ford Fund provided the resources to determine strategies for building and sustaining career academies and best practices for career academies to provide guidance and information to existing and emerging career academy programs.

12 Best Practices for Scaling Up and Sustaining Career Academy Networks

1. **Ensure the Establishment of a Career Academy Master Plan.**

   Career academy success requires the creation of a master plan that sets forth career academy annual and five-year growth goals. The master plan should be advised by economic development and community infrastructure needs and developed with the participation of the external and education partners.

2. **Look to the Career Cluster Framework to Prioritize and Standardize Career and Technical Education**

   The State Directors for Career and Technical Education have organized all job specialties into 81 career pathways and 16 career clusters that

provide a useful framework for prioritizing career academy theme selection and helping students decide on career pathways. The framework provides the opportunity to clearly and visually explain the workplace to parents, students, educators, and business people.

3. **Aim High – Seek out Growing Array of Academically Challenging Career and Tech Curricula**

   Take advantage of new developments in academically rigorous curricula. Ford Partnership for Advanced Studies and Project Lead the Way are excellent examples. Dubbed "new CTE", these challenging new curricula provide a real opportunity to both integrate contextual content in academic courses and teach 21st century workplace skills.

4. **Make Sure Career Academy Entrepreneurs Are Part of Master Plan**

   Career Academy Entrepreneurs are hired by the district or the local business community to fundraise for the career academies and ensure business participation. As career academy networks evolve, these entrepreneurs also balance support among academies and offer business a single point of contact.

5. **Use Career Academy Evaluations for Continuous Improvement**

   A career academy evaluation rubric will ensure academies are successful. Academy leaders use the rubric to guide improvement. On-going evaluations also serve as a professional development tool for academy leaders, their administrators, and the business advisory community.

6. **Centralize Magnet, Choice, Small Learning Communities, Career Academy and Career Technical Education Operations under One Leader**

   A career academy system should align all Career Technical Education and choice programs under a single district leader to focus reform energies toward a unified set of goals. Networks have failed because multiple points of contact within a district provide conflicting communication channels and unneeded competition within a district for business attention.

7. **Prioritize Funding Sources to Expand the Number of Career Academies and Increase the Quality of Existing Career Academies**

   Direct Perkins monies, small learning community grants, and foundation funding to launch of new career academies. Invest available new funding toward the expansion of your career academy system.

8. **Look to Growing List of National Career Academy Supporters – Look for Resources from National Employer Associations**

   A growing set of National Employer Associations and leading businesses are supporting the career academy high school redesign strategy, providing a community with a set of prospective partners.

9. **Develop Career Academy Marketing Plan**

   Everyone in the community needs to know about the academies…parents, students, business leaders and educators, particularly early in the academy's evolution. Great marketing plans reach down to elementary and middle schools, are presented in a variety of languages, and support academy visits by younger students.

10. **Maintain Business Leaders Engagement**

    Keep business leaders at the table after the master plan is constructed. They have a vital role to play in creating a sustainable "culture" for academies. Great career academy networks need ongoing, steady leadership from companies who understand the value of staying involved with educational leaders who value their commitment.

11. **Understand, Defend, and Fund What Makes Career Academies Special**

    Develop a funding plan to ensure key academy ingredients remain a part of the career academy such as common planning time, release time for academy leaders, professional development, and priority scheduling. The improvement in graduation rates and all other measures is ultimately worth the minor "diseconomies of scale" which

Career academy success requires the creation of a master plan that sets forth career academy annual and five-year growth goals. The master plan should be advised by economic development and community infrastructure needs and developed with the participation of the external and education partners.

are likely when large, efficient, but often failing schools evolve into career academies.

12. **Ensure Career Academy Provides Students with College Credit**

    A carefully designed plan provides students with a clear path to their future by ensuring that each high school career academy is affiliated with a post-secondary institution that will reward students with college credit. Encouraging close bonds between high schools and post secondary is a primary strategy in addressing our cycle of remediation.

A carefully designed plan provides students with a clear path to their future by ensuring that each high school career academy is affiliated with a post-secondary institution that will reward students with college credit. Encouraging close bonds between high schools and post secondary is a primary strategy in addressing our cycle of remediation.

CONCLUSION

Workforce and economic development are likely to face some of their most serious challenges in the next 10 years as the baby boom retires and global competition grows. A 21st century US workforce ready to meet this challenge is unlikely to evolve from a 20th century school system in which so many students are failing and even successful students are not making smart choices about the career choices when they go to college. The examples noted here provide solid evidence that business and education can unite around a high school redesign model that both prepares students for smart college and career choices and prepares a workforce locally that businesses can count on.

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- The Greater Conroe Economic Development Council of Conroe, Texas
- The Coordinating and Development Corporation of Shreveport, Louisiana
- The Roanoke Valley Economic Development Partnership of Roanoke, Virginia
- The Laredo Development Foundation of Laredo, Texas

The AEDO program is a comprehensive peer review process that evaluates economic development organizations and recognizes excellence. Maintenance of the AEDO status is required every three years.

RONNIE L BRYANT, IEDC BOARD CHAIR, SPEAKS AT WAIPA WORLD INVESTMENT CONFERENCE

Ronnie L. Bryant, CEcD, FM, IEDC's chairman of the Board, recently attended the WAIPA World Investment Conference 2007, "The New Sources of FDI: Emerging Economies on the Rise," in Geneva, Switzerland. In the session, "Globalization and the New Protectionism: Is There a Backlash against FDI in the Making?," he spoke on the relationship between outsourcing and the development of the backlash as well as the backlash against FDI in the U.S.

Mr. Bryant also participated in the workshop on "Private Sector Involvement in Investment Promotion Agencies," which offered several international examples of private-sector engagement models. He presented an overview of private-sector engagement in the U.S. in general, and a more specific look at the Charlotte Regional Partnership's model.

IEDC SIGNS CONTRACT WITH THE UNIDO-ITPO CHINA OFFICE

IEDC signed a contract with the UNIDO-ITPO China Office to provide consulting on best practices in industrial improvement, business innovation, and SME development for Wendeng City in Shandong Province. The IEDC/NBIA team includes Bob Farley, Ken Dobson, Paul Carroll, Ed Gilliland, CEcD, Carrie Ridgeway, and Chuck Wolfe as a representative of the National Business Incubation Association (NBIA) (a subcontractor).

The team, which has conducted a site visit to China, will give a final presentation in August. The project also includes a U.S. study tour of high-tech industrial parks (July) and a tour to facilitate cooperation between the US and China (October).

IEDC PROVIDING FREE TECHNICAL ASSISTANCE TO WEED AND SEED COMMUNITIES

The Department of Justice (DOJ) Operation Weed and Seed is a comprehensive, community-based approach to law enforcement, crime prevention, and community revitalization. IEDC is a DOJ designated provider of technical assistance services in economic development and neighborhood restoration to weed and seed communities. Through this grant since 1997, IEDC has helped various communities develop sound economic development strategies focused on small business development, workforce, business attraction, neighborhood rehabilitation, and retail development.

Recent weed and seed communities utilizing IEDC services include Utica, NY; Lima, OH; Milville, NJ; Columbus, OH and Birmingham, AL. For more information, contact Swati A. Ghosh at sghosh@iedconline.org or 202-942-9477.

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CEcDs must apply for recertification every three (3) years and accumulate 12 credits to maintain their designation. Earn your recertification credits by attending professional development activities, while furthering your expertise in the field with new techniques and tools for the changing marketplace.

LEVELS	LEVEL I IEDC Events	LEVEL II National And Accredited Events	LEVEL III Regional, State and Local Events
Credits	Three (3) Credits Each Minimum of Six (6) Credits Required Maximum of Nine (9) Credits Allowable	Two (2) Credits Each Minimum of Two (2) Credits Required Maximum of Eight (8) Credits Allowable	One (1) Credit Each Optional Maximum of Four (4) Credits Allowable
Activities	1. Attendance at an IEDC conference 2. IEDC training course or advanced training course 3. Facilitation or instruction of an IEDC training course	1. IEDC conference speaker 2. A week of the Economic Development Institute (EDI) or at an EDI advance symposia 3. Grader/proctor for the CEcD exam 4. A minimum of three (3) IEDC web seminars and/or pre/post-conference seminars 5. Professional training held by a nationally accredited partner 6. Approved national organization professional training 7. Instruct a Basic Economic Development Course, Economic Development Institute, a semester course or equivalent 8. An article in IEDC's Economic Development Journal	1. Speak at a regional/state economic development organization conference 2. An article presenting an innovative approach to economic development 3. A board member/committee position for an economic development organization 4. Attendance at a recognized regional/state economic development membership organization conference

INTERNATIONAL ECONOMIC DEVELOPMENT COUNCIL

The Power of Knowledge and Leadership

For more information contact
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or kenwemnwa@iedconline.org


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