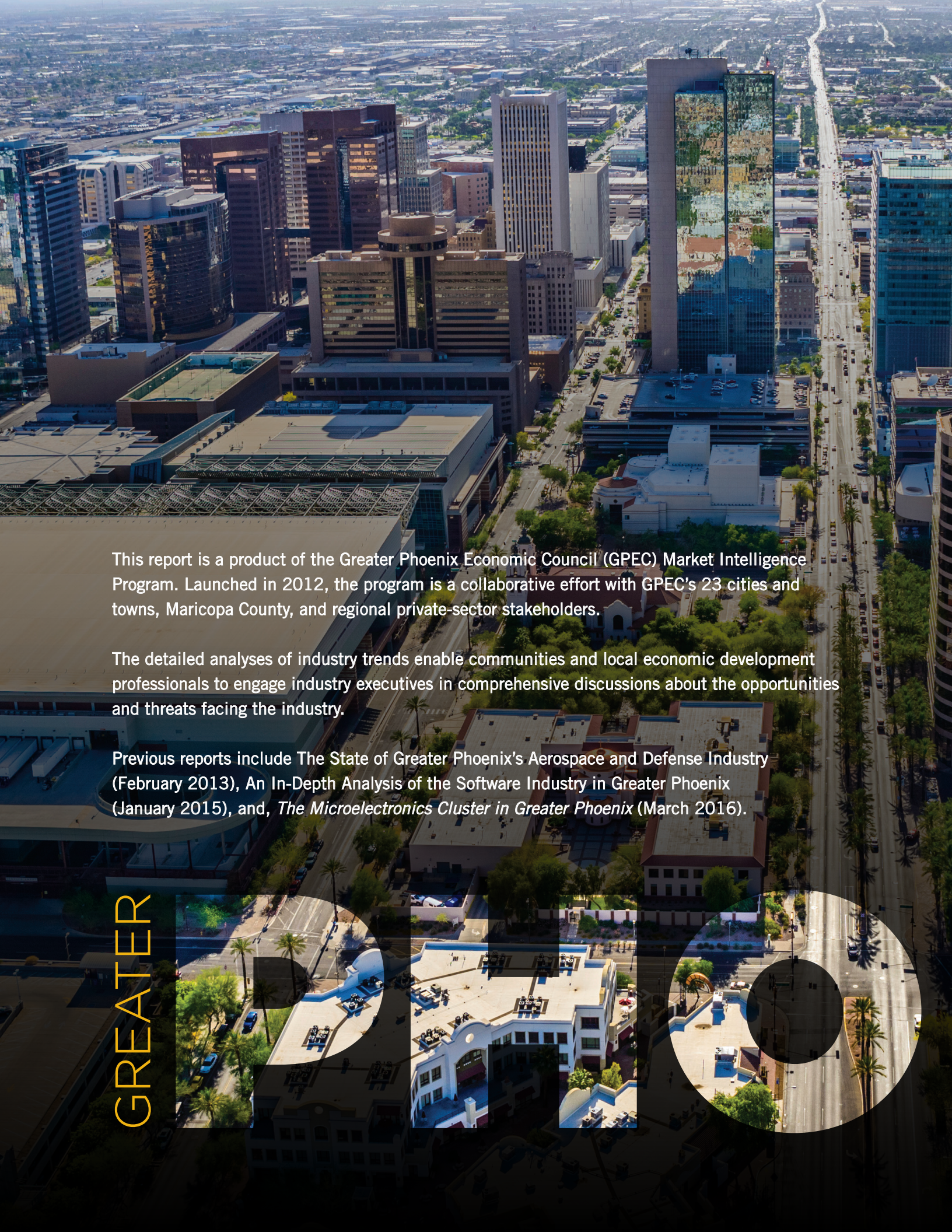


THE FUTURE OF THE
**AEROSPACE AND
DEFENSE INDUSTRY**
IN GREATER PHOENIX

FINDINGS FROM THE GREATER PHOENIX MARKET INTELLIGENCE PROGRAM



Greater Phoenix
ECONOMIC COUNCIL



This report is a product of the Greater Phoenix Economic Council (GPEC) Market Intelligence Program. Launched in 2012, the program is a collaborative effort with GPEC's 23 cities and towns, Maricopa County, and regional private-sector stakeholders.

The detailed analyses of industry trends enable communities and local economic development professionals to engage industry executives in comprehensive discussions about the opportunities and threats facing the industry.

Previous reports include *The State of Greater Phoenix's Aerospace and Defense Industry* (February 2013), *An In-Depth Analysis of the Software Industry in Greater Phoenix* (January 2015), and, *The Microelectronics Cluster in Greater Phoenix* (March 2016).

GREATER



Introduction

The aerospace industry in Greater Phoenix has historically been linked to military operations and defense spending. In 1941, the opening of Luke Air Force Base was a boon both to the aerospace industry and the Greater Phoenix economy, producing 17,321 fighter pilots during World War II and bringing significant attention to the region during and after the war.ⁱ

Today's industry heavyweights, The Boeing Company, General Dynamics, Honeywell, Lockheed Martin and are a product of industry growth in the 1940s and 1950s related to the dispersal of military facilities away from coastal operations. These ties to federal defense spending have continued for decades.

Luke Air Force Base remains a significant driver of economic growth for the region. Since 2014, Lockheed Martin's presence at Luke AFB has been steadily increasing in support of the 56th Fighter Wing's mission to train F-35A pilots and maintainers from around the world. Lockheed Martin currently employs close to 350 personnel in support of the F-35 program at Luke. This number is projected to increase to approximately 700 personnel as the number of international customers and aircraft also rises at Luke.

In the face of sequestration, this created challenges for this legacy industry, thus in 2012, the Greater Phoenix Economic Council embarked on an in-depth pre-sequestration analysis. The report, *The State of Greater Phoenix's Aerospace and Defense Industry*, detailed the potential impacts of the 2011 Budget Control Act, which imposed significant budget cuts and reduced federal military spending.

Now, the industry is adapting and evolving in the face of reduced spending. New opportunities have arisen in diverse sectors and overseas markets have grown. This report explores the current trends affecting the industry post-sequestration as well as future technology developments that can drive growth and continue to diversify the nature of the aerospace industry in Greater Phoenix.



Sequestration and the Budget Control Act of 2011



The Budget Control Act of 2011 instituted several measures aimed at reducing the US federal deficit. The bill authorized an increase in the debt limit in exchange for statutory caps on some discretionary spending. Additionally, it established the Joint Select Committee on Deficit Reduction, which was tasked with instituting \$1.5 trillion in spending cuts through fiscal years 2012-2021. A provision required the Committee to enact cuts by January 2012. When this goal was not met, sequestration was triggered. Under sequestration, automatic spending cuts are divided equally to defense and non-defense spending, resulting in approximately \$490 billion in defense cuts over nine years. Subsequent budget bills have increased defense spending caps, reducing the impact of sequestration. However, future effects remain uncertain.

Source: Ernst & Young, LLP, "Budget Control Act of 2011: Where do we go from here?", November 7, 2011; Congressional Budget Office, "Final Sequestration Report for Fiscal Year 2016," December 2016.

THE CURRENT STATE OF THE INDUSTRY

METRO REGION	2016 EMPLOYMENT	EMPLOYMENT CHANGE, 2011-2016	PERCENT EMPLOYMENT CHANGE, 2011-2016	LOCATION QUOTIENT
SEATTLE, WA	91,289	7,277	8.7%	11.35
LOS ANGELES, CA	69,755	-5,382	-7.2%	2.70
DALLAS, TX	36,221	-4,460	-11.0%	2.49
WICHITA, KS	29,022	-1,774	-5.8%	22.83
PHOENIX, AZ	19,980	-2,470	-11.0%	2.43
SAN DIEGO, CA	17,146	5,801	51.1%	2.83
HARTFORD, CT	18,330	-1,400	-7.1%	6.99
ST. LOUIS, MO	15,420	1,540	11.1%	2.74
BOSTON, MA	14,053	-1,825	-11.5%	1.27
PHILADELPHIA, PA	13,288	-3,010	-18.5%	1.14
UNITED STATES	616,511	-10,752	-1.7%	N/A

Source: JobsEQ 2016.3 (Four quarter moving average).

Note: Location Quotient is a measure of market specialization in an industry by comparing the share of that market's employment to the national proportion.

Since 2011, the United States has seen an overall decline in employment in the aerospace and defense industry. As seen in the above table, this trend has carried across the majority of the major metropolitan regions for aerospace manufacturing, with three major exceptions: Seattle, St. Louis and San Diego.

Both Seattle and St. Louis have seen growth related to increased commercial investments from The Boeing Company. While San Diego's growth is related to its enhanced reputation as a hub for unmanned aerial vehicles, with Northrup Grumman and General Atomics Aeronautical Systems, Inc. establishing major drone operations in the area.

The global aerospace and defense market is constantly in flux as large orders can swing overall output up or down in any given year. As the defense sector has slowed, the commercial market has boomed due to increased passenger traffic, particularly overseas in developing countries that are seeing an increase in leisure travel due to a growing middle class.

Commercial growth is expected to continue as new technology development and innovation drives global competition in an industry traditionally dominated by a few large firms. Future defense sector growth will depend on U.S. military spending. However, foreign defense funding, acquisitions and new product development is driving some increased sales in the sector.ⁱⁱ

The aerospace and defense industry in Greater Phoenix is diverse, with a legacy defense sector and growing communications, satellite and space sectors. This diversity can allow for a shield against changing economic fluctuations, but can also create challenges for discerning overall industry trends and providing consistent messaging. Aligning the distinct needs of each sector and uncovering potential new areas for growth will serve to support the aerospace and defense industry in Greater Phoenix.

AEROSPACE AND DEFENSE
SECTOR EMPLOYMENT IN
GREATER PHOENIX



5,231
Communications
Systems and
Instruments



12,193
Aircraft, Engines
and Parts



1,633
Missile and Space
Vehicles, and Parts

*Source: JobsEQ 2016.3 (Four
quarter moving average).*

Methodology

The following findings and recommendations are based on meetings, roundtables and questionnaires with 24 aerospace and defense companies in Greater Phoenix. Interviews were conducted with C-level and market executives; key topics included the impacts of sequestration, export activity, research and development, and workforce.

Meetings were facilitated and attended by economic development professionals from GPEC's member communities as part of their business retention and expansion activities. The meetings took place between June and December 2016.

Companies ranged in size from less than 10 employees to 8,000 employees and came from a variety of subsectors of the aerospace and defense industry.

Firm subsectors included defense weapons systems manufacturing; defense protection products manufacturing; aircraft manufacturing; satellite manufacturing; communications systems development and manufacturing; aircraft maintenance, repair, and overhaul; and, aerospace engineering and systems training.

Key findings were categorized into four major themes that cut across sectors and produced recommendations for policy and program development to address the challenges presented for each theme.

Key Themes

Findings were categorized into four major themes that cut across sectors. Recommendations for policy and program development to address the challenges are presented for each theme.



Arizona was hit hard by sequestration, but firms are adapting to federal funding uncertainty.

FINDING

Decreased military spending has encouraged cost savings and new technology development, while the unpredictability of federal funding has created challenges.



RECOMMENDATION

Increase support for federal funding and develop programs to help small businesses produce efficiently and compete for government contracts.



Industry growth is being fueled by international military and consumer spending.

FINDING

Exports are growing due to increased international military spending and new emerging commercial markets overseas.



RECOMMENDATION

Promote global recognition of the Greater Phoenix region's aerospace and defense industry to grow exports and foreign investments.



Emerging technologies are transforming the industry through product development and process improvement.

FINDING

Space exploration, additive manufacturing and sensors represent the next phase of technology development, and Greater Phoenix companies are competing in these sectors.



RECOMMENDATION

Market the innovative research, development and manufacturing taking place in the region and encourage new projects by modernizing the economic development tools available to firms to invest in technology.



Automation in manufacturing presents new workforce opportunities and challenges.

FINDING

Manufacturing job growth has stalled, the industry's aging workforce lacks entry level workers, and increased automation will require new and different skills.



RECOMMENDATION

Support Arizona's educational institutions to grow the region's engineering talent, while leveraging career and technical education programs.



Arizona was hit hard by sequestration, but firms are adapting to federal funding uncertainty.

FINDING

Between 2012 and 2015, U.S. Department of Defense (DoD) prime contract funding in Arizona fell by 35 percent. Once ranked fifth in military spending, the state is now 10th, earning just three percent of DoD dollars in 2015. The nationwide value of DoD contracts has decreased by 24 percent over the same time period.

TOP 10 STATES FOR DEPARTMENT OF DEFENSE PRIME CONTRACT DOLLARS

STATE	2012	2015	2012-2015 PERCENT CHANGE
California	\$38.0 B	\$30.6 B	-19%
Virginia	\$35.8 B	\$29.6 B	-17%
Texas	\$30.2 B	\$29.5 B	-2%
Maryland	\$12.6 B	\$12.8 B	1%
Connecticut	\$12.1 B	\$12.1 B	1%
Pennsylvania	\$11.5 B	\$10.3 B	-10%
Florida	\$11.2 B	\$10.0 B	-10%
Massachusetts	\$10.7 B	\$9.5 B	-12%
Alabama	\$8.6 B	\$8.5 B	-2%
ARIZONA	\$12.3 B	\$8.0 B	-35%

Source: USAspending.gov, Place of Performance in Arizona, (downloaded Nov. 18, 2016); Office of the Under Secretary of Defense, National Defense Budget Estimates for FY2015.

Only 13 states saw an increase in the amount of dollars allocated from Department of Defense contracts between 2012 and 2015. Many of these states have not traditionally received a large share of DoD funding, therefore one or two large contracts can have a significant impact.

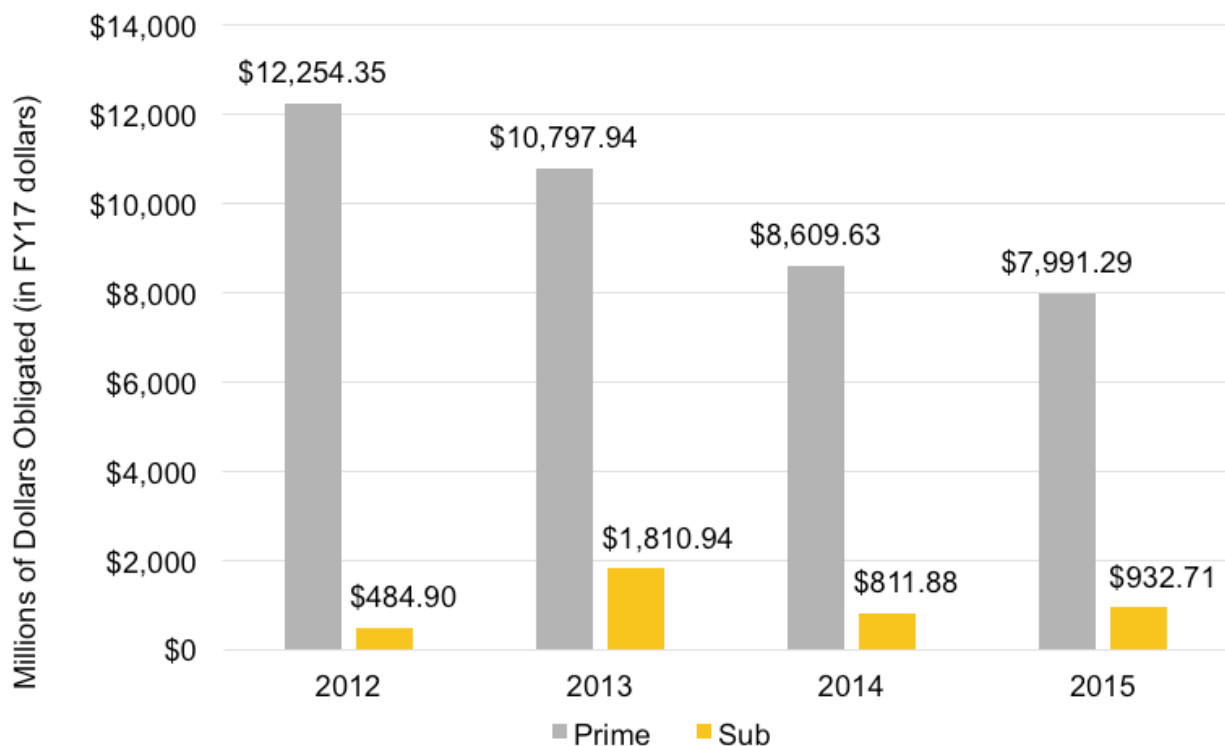
Maryland and Connecticut were the only states in the top 10 for overall dollars allocated that saw their DoD dollars grow during this time period. In Maryland, Lockheed Martin and Northrop Grumman operations both saw over a billion dollars in contract funding in 2015. Connecticut's General Dynamics' Electric Boat Division was allotted nearly \$5 billion, more than all of General Dynamics' operations in the state in 2013.

Although these drastic changes in federal spending have impacted firms in Greater Phoenix, trends in military operations foretold decreased spending long before budget cuts took place. This allowed many companies to plan for the future and diversify their business ahead of time.

Post-sequestration, firms competing for government contracts are focusing on improving supply chain management and vertically integrating processes in order to find cost savings. As larger companies increasingly complete contracts in-house or partner with other large contractors, the number of sub-awards to smaller companies has decreased.

Between 2012 and 2015, the value of sub-contract awards in Arizona has varied, increasing significantly in 2013, but dropping by 55 percent in 2014. Major joint ventures between companies are becoming more common, with well-publicized contracts being awarded to Raytheon and Lockheed Martin. Joint ventures also offer a unique avenue for foreign firms to establish operations in the United States by partnering with established American companies.

VALUE OF DEPARTMENT OF DEFENSE CONTRACTS IN ARIZONA



Source: USASpending.gov, Place of Performance in Arizona, (downloaded Nov. 18, 2016); Office of the Under Secretary of Defense, National Defense Budget Estimates for FY2015.



Both prime and sub-awardees have dealt with delayed delivery orders on contracts. Some government contracts are classified as indefinite quantity and/or indefinite delivery, which guarantees a government purchase of product, but not the amount or timeline. When Department of Defense funding is tight, the Pentagon may delay orders and payments to companies with this type of contract.

This unpredictability is hard for many large firms, but poses significant problems for small companies with sub-contracts. Firms farther down the supply chain can be given stop work orders that create planning and production problems, budget concerns, and lead to a reduction in employment.

Overall, the uncertainty inherent in federal spending is a concern for large and small government contractors. The frequency of short-term appropriations bills in Congress has led to increased instability for the defense industry that remains a growing concern for major manufacturers.

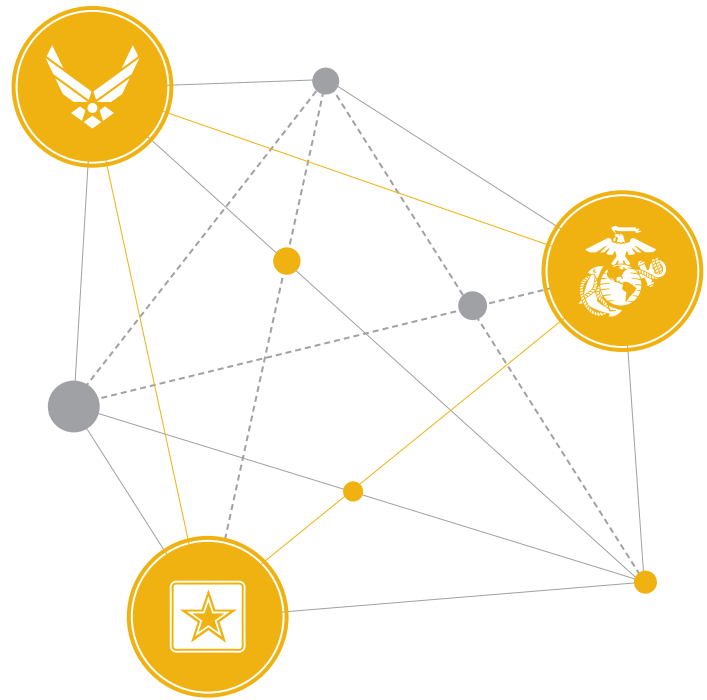
Increasingly, sequestration has encouraged some companies to diversify operations through commercial and international markets. Faced with the reality of decreased U.S. spending in the industry, some firms have accepted the need to find other sources of revenue and sales.

➡ **RECOMMENDATION**

The diverse supply chain in Greater Phoenix is particularly attractive to companies in the defense sector. However, the decrease in military funding has increased competition, not only for companies but also for states and regions to receive federal dollars that can produce more jobs.

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The cluster of defense companies in the region should support a coordinated and collective advocacy effort on behalf of the industry.



In order for Arizona defense companies to remain competitive, the industry must collectively coordinate and advocate for policies that enhance their ability to compete with other defense centers. The cluster of defense companies in the region should support a coordinated and collective advocacy effort on behalf of the industry. However, the region and state more recently produced disjointed efforts, and industry groups have struggled to gain significant traction with local firms.

In 2012, a state-led aerospace commission was tasked with building a proposal for establishing unmanned aerial vehicle test sites in the state, but these efforts have struggled to get consistent support from state and industry leaders in recent years. Other organizations, such as Aerospace Arizona, and smaller industry groups have tried to promote the industry at the local level.

A unified industry association in the state could better leverage Arizona's resources to support national visibility for defense companies in the region. By aligning on the industry's key needs, an association could also ensure congressional leadership at the state and federal level are aware of the issues and challenges facing aerospace and defense companies in the state and advocate for policies that would help firms continue to grow in Arizona.

Additionally, the region needs to better support small businesses by developing programs that help companies apply for government contracts or teach management skills and cost saving techniques. These programs can help retain and grow small firms locally by enhancing their ability to compete, and create local success stories that will attract more companies to the region and grow the Greater Phoenix aerospace and defense brand both nationally and internationally.

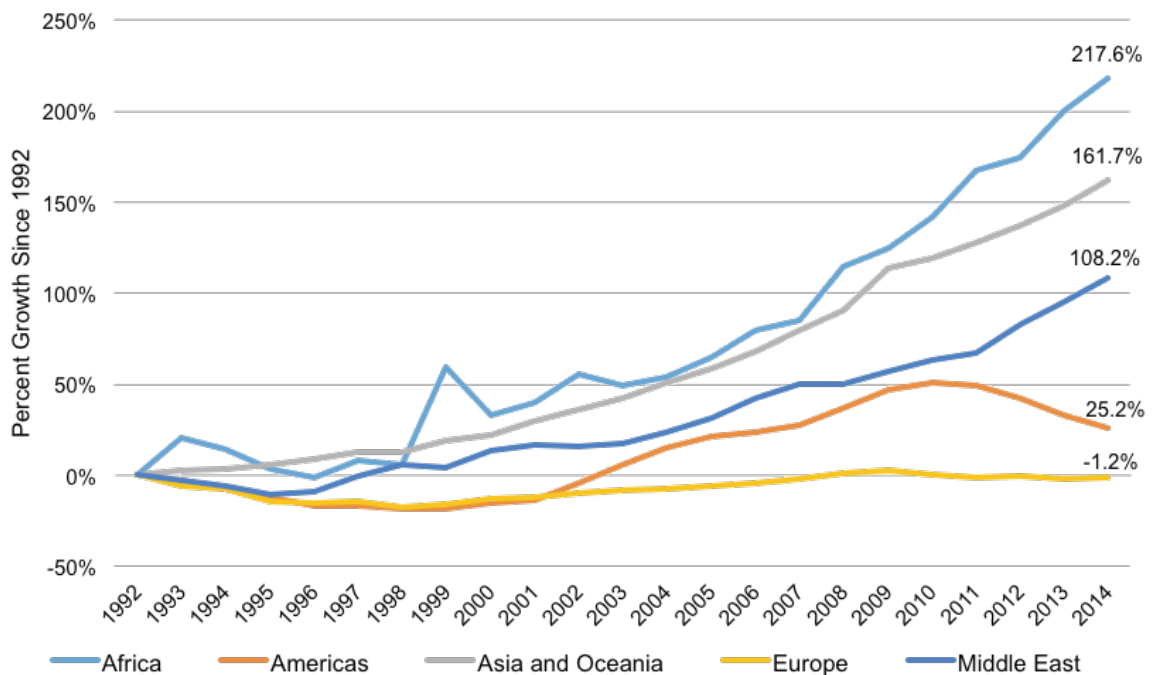


Industry growth is being fueled by international military and consumer spending.

FINDING

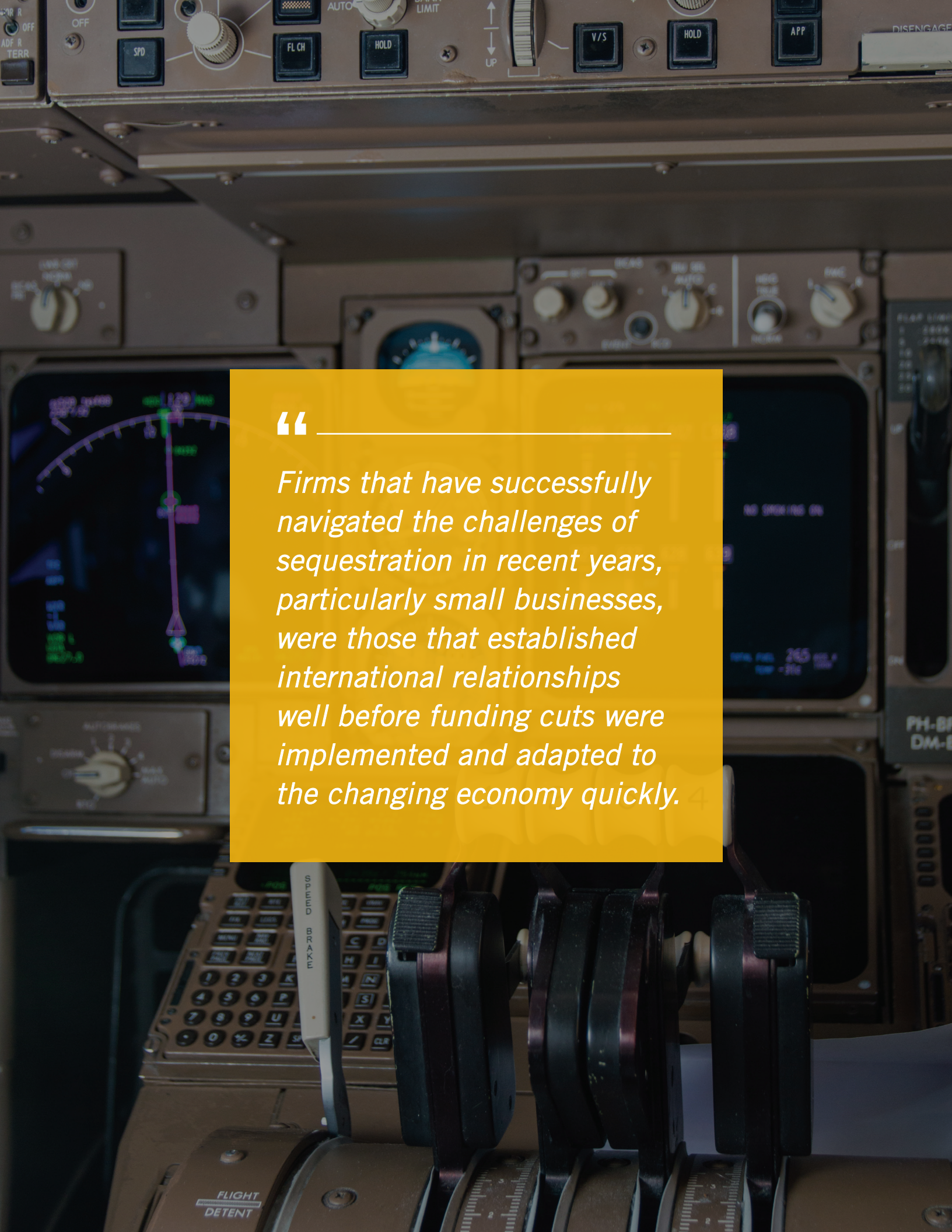
The aerospace and defense industry is becoming more global. As U.S. spending for the military has decreased over the last few years, foreign regions have steadily been growing their defense funding. Africa, Asia and Oceania, and the Middle East have all seen increased spending since 2010, while defense funding in the United States has decreased and Europe has remained somewhat stable.

MILITARY EXPENDITURE GROWTH BY GLOBAL REGION, 1992-2014



Source: SIPRI Military Expenditure Database, 2015.

This increase in foreign military spending has opened up new markets for American companies that need to find new sources of sales in the face of sequestration. Firms that have successfully navigated the challenges of sequestration in recent years, particularly small businesses, were those that established international relationships well before funding cuts were implemented and adapted to the changing economy quickly.



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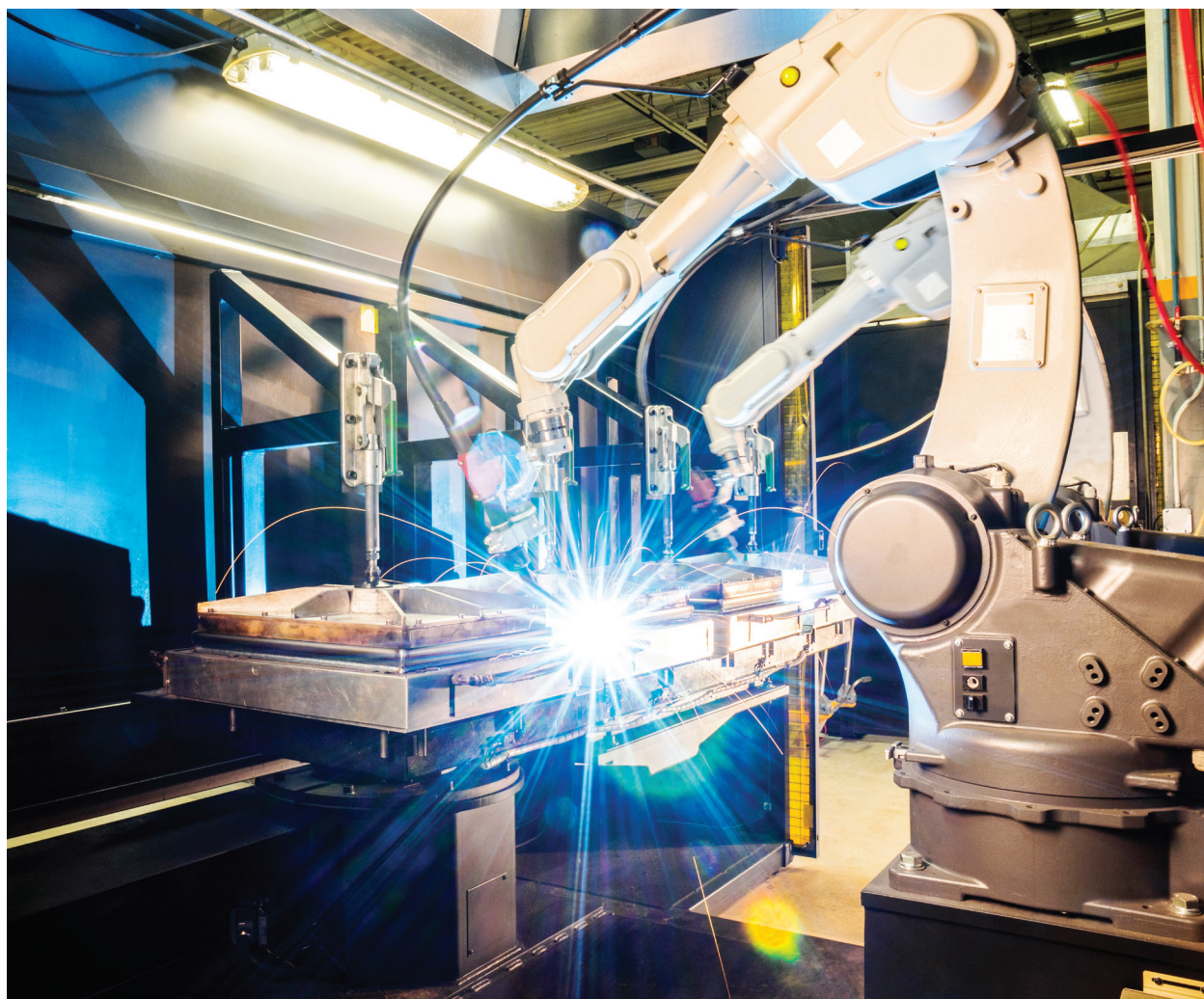
Firms that have successfully navigated the challenges of sequestration in recent years, particularly small businesses, were those that established international relationships well before funding cuts were implemented and adapted to the changing economy quickly.

Aircraft products and parts are the region's top export, totaling \$2.87 billion and made up 15.6 percent of all exports in 2014. The related industries of semiconductors, precision instruments and communications equipment represent other strong export sectors. Overall, regional exports increased by 19 percent between 2010 and 2014, while aircraft products and parts exports grew by 33 percent.ⁱⁱⁱ

TOP THREE GREATER PHOENIX EXPORT SECTORS

SECTOR	2010 REAL EXPORTS	2014 REAL EXPORTS
Aircraft Products & Parts	\$2,158 M	\$2,872 M
Semiconductors	\$1,711 M	\$1,490 M
Precision Instruments	\$1,116 M	\$942 M
Total Exports	\$15,419 M	\$18,407 M

Source: Brookings Institution, 2015 Export Monitor.



The ability to sell to foreign countries has been a boon to some firms. However, complicated government regulations for defense-funded projects have created problems for small companies that need to find new markets for their products.

Growing international sales are also increasing company pressure to establish international operations. Globalization has already strained U.S. manufacturing in the industry, as low cost labor overseas has attracted jobs away from U.S. workers. As the market for aerospace and defense sales continues to transition abroad, companies may see increased supply chain savings from creating new operations near foreign customers.

Companies that excel at supply chain management have continued to grow their U.S. operations, while others have invested heavily in maintaining research and technology development in the United States, even as production has moved overseas.

RECOMMENDATION

While globalization has increased competition for local companies, it has also opened up new markets for firms to grow their business. However, to compete globally, companies need additional resources and programs that support small firms' growth efforts.

The complex regulations surrounding exporting, especially when Department of Defense funding has been provided, can be difficult for small firms to navigate. Increasing access to export assistance, training and loan programs through the Small Business Administration, the International Trade Administration and the Metro Phoenix Export Alliance (MPEXA) will help companies explore foreign markets and learn more about the intricacy of exports.

Also, expanding the availability of foreign trade zones, customs checkpoints, and other tools that foster exports and international partnerships can provide the right incentive for companies to expand their operations.

In order to support aerospace and defense companies in the region and attract more firms to grow the industry presence, industry leaders in Greater Phoenix need to better leverage and promote a globally recognized regional brand. Efforts to grow foreign direct investment will indirectly support other new technologies and industry growth in aerospace and defense.

For companies that conduct business overseas, access to direct international flights is essential to maintaining contacts and growing sales. Providing greater connectivity from Greater Phoenix to Europe, Asia and the Middle East will help local companies connect to foreign markets more efficiently. As aerospace becomes a more global industry, this will also help attract more aerospace and defense firms to the region.



Emerging technologies are transforming the industry through product development and process improvement.

FINDING

New technology development is now the cornerstone of U.S. competition in global manufacturing, and aerospace and defense companies in Arizona must commercialize new products in order to stay at the forefront of the industry.

Arizona companies are already leading innovation efforts. Two of the top five global innovators and four of the top five North American space technology innovators have an Arizona presence.

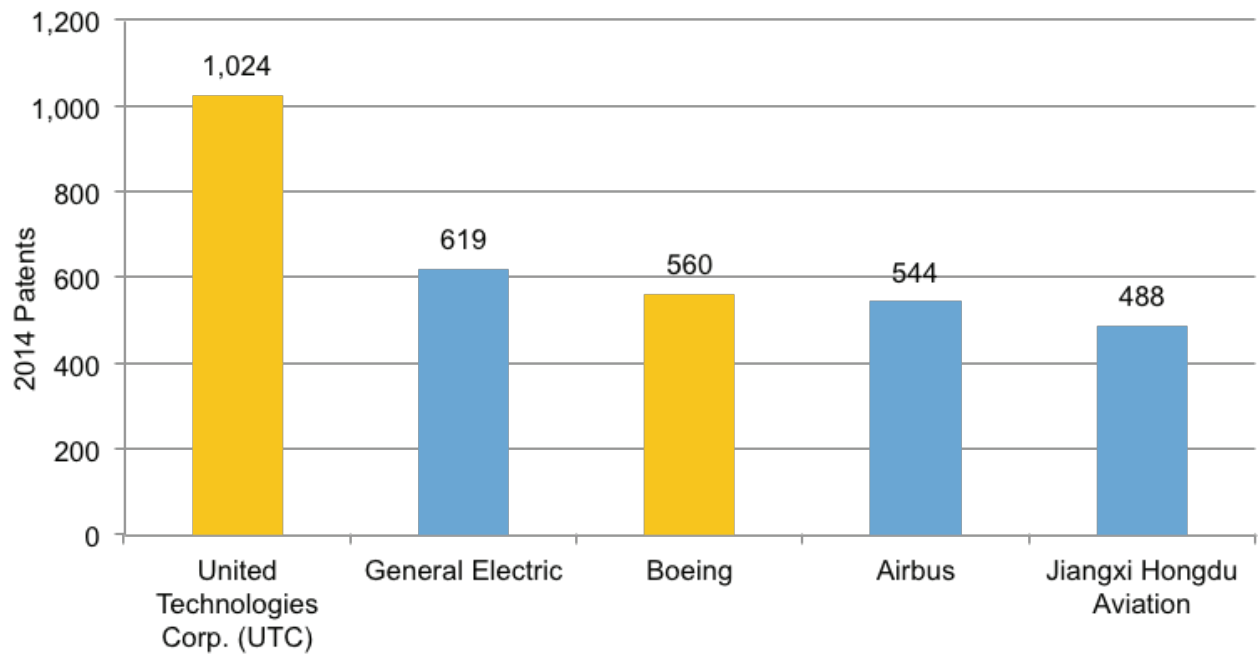
The region is strongly positioned to capitalize on two growing trends in aerospace: satellite communications and space exploration. As the world becomes increasingly interconnected, industry leaders are creating new satellite systems to provide Internet access to all areas of the globe. The technology needed to launch these satellite systems will be a significant driver of space industry growth.

Additionally, the commercial space sector itself is booming. Companies aspiring to send customers to space in the next decade will drive innovation over that time as companies compete to be the first to corner this lucrative market. Space is a mostly unexplored territory, and there may be room for government funding to increase in this area as military spending decreases.

In Greater Phoenix, major companies such as ViaSat and Orbital ATK have expanded their operations in the region, and specialize in developing new cutting-edge products in the satellite industry. Orbital ATK has partnered with Iridium Communications, which has a Greater Phoenix operations center, on a next generation satellite network, Iridium NEXT. These new satellites are planned to launch via SpaceX this year.^{iv} ViaSat is quickly becoming one of the most reliable names in in-flight Wi-Fi and will soon be the wireless service provider for American Airlines and Air Force One.^v

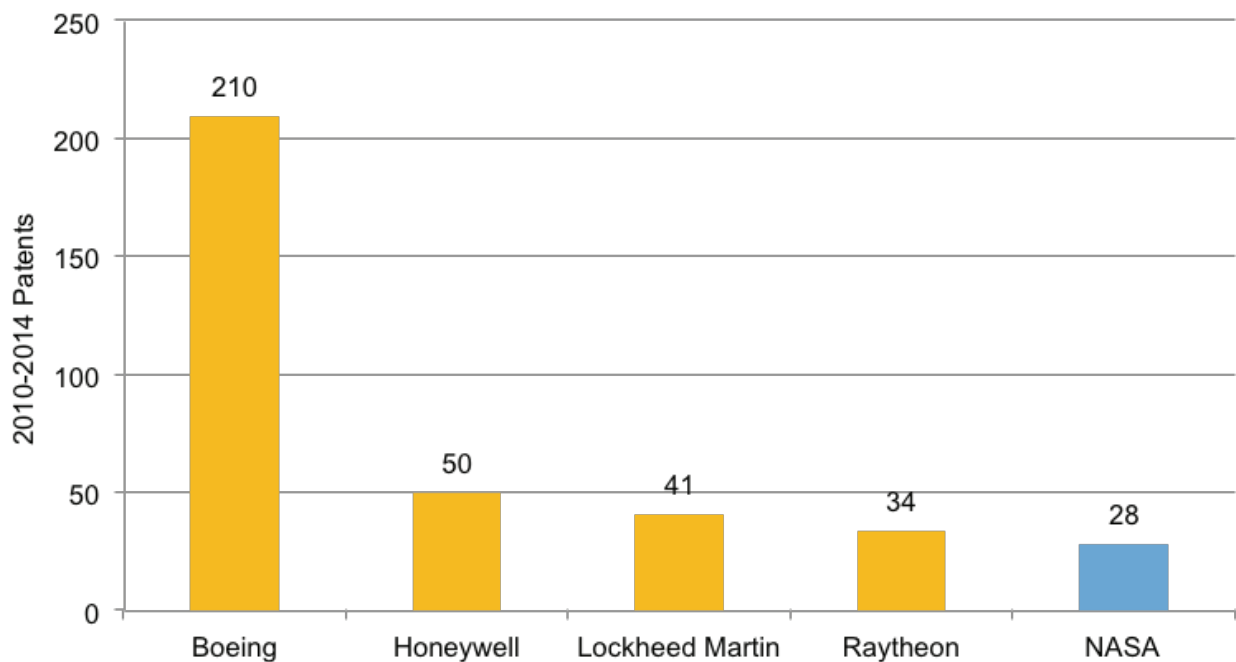
Companies and education institutions from around the state are partnering on industry-leading space exploration projects. The University of Arizona's Lunar and Planetary Laboratory in Tucson and Arizona State University's School of Earth and

TOP 5 AEROSPACE GLOBAL INNOVATORS



Note: Gold columns indicate a company with a large Greater Phoenix/Arizona presence.
Source: Thomson Reuters Derwent World Patents Index.

TOP 5 NORTH AMERICAN SPACE TECHNOLOGY INNOVATORS



Note: Gold columns indicate a company with a large Greater Phoenix/Arizona presence.
Source: Thomson Reuters Derwent World Patents Index.

Space Exploration are both leaders in space research. Staff at Arizona State University developed a key instrument used on the Osiris-Rex mission led by the University of Arizona that will collect soil samples from the asteroid Bennu. Local company KinetX was also involved in modeling the orbital dynamics for this mission. Lockheed Martin designed and built the spacecraft at their Denver location, while Honeywell supplied critical instruments for routing and stability.^{vi}

The aerospace industry has also become increasingly reliant on new software technologies as the Internet of Things (IoT) and sensors have created opportunities for new markets. Software is vital to new aircraft systems; for example, the program used to operate Lockheed Martin's new F-35 joint strike fighter contains over eight million lines of software code.^{vii}

Additionally, sensors are now being used to collect important information for aircraft maintenance and repair activities, and the data being collected by sensors on airplanes in the sky can be used in a variety of applications – from weather predictions to in-flight entertainment options.

Automation is powering the next phase of U.S. manufacturing and has many implications for the aerospace industry as well. 3D printing and additive manufacturing are key components of the current innovation taking place. These technologies will also drive the need for a more technically trained workforce, capable of creating new and influential products and processes in the future.

RECOMMENDATION

Growing the existing research and development activity in the region can help establish Greater Phoenix as a hub for aerospace innovation and will contribute to the attraction of like businesses to the region.

There is already a significant amount of research and innovation taking place in aerospace and defense in Greater Phoenix. However, the region's technology innovations are not highly publicized in the media or at the forefront of national conversations around aerospace. One challenge is the private, confidential nature of the technology development of some defense companies in the region. These firms are not capable of publicizing some efforts.

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The aerospace industry has also become increasingly reliant on new software technologies as the Internet of Things (IoT) and sensors have created opportunities for new markets.



Facilitating more local research partnerships will not only spark increased innovation, but also create an additional resource for companies that want to move or grow in the region. Proximity and collaboration are the key components of innovation in this sector due to the interconnected system of work. Capitalizing on resources like Arizona State University and connecting it with the existing industry will help grow the region's research capabilities.

The growth of space and satellite companies in the region presents an opportunity for increased publicity and promotion. As these firms mature and produce more ground-breaking technologies, marketing companies' efforts will support a high-technology brand that facilitates increased interest in the innovation taking place in the Greater Phoenix region.

Competition for capital investment in new technology is increasing, and more states are offering significant incentives to major manufacturers. Recent expansions by Raytheon and Orbital ATK have required local and state support to secure growth in Arizona. For local legacy companies, especially those heavily focused on defense, improving access to and modernizing economic development financing tools and tax credit programs that can allow for reinvestment in the equipment and facilities needed to pivot towards new technologies, will help these firms grow their operations in the region for years to come.



Automation in manufacturing presents new workforce opportunities and challenges.

FINDING

The aerospace and defense industry is currently experiencing a key transition in its workforce composition. As a legacy industry, the sector has seen an increase in the average age of its workers. This trend is apparent in both manufacturing and engineering positions and has major implications for the future of the industry.

As the workforce ages, companies have had problems finding new talent to replace retiring workers. As more companies struggle to find workers, the automation of production processes becomes increasingly attractive for these manufacturers. While automation has been increasing for years, the technology required has recently become more cost efficient for even small firms to invest in.

Increased productivity from automation is also driving the decline in traditional employment in aerospace manufacturing over the last several years, and the industry is not expected to see significant natural growth in the next few years.



Photo Courtesy of Arizona Republic

However, an increase in the number of retirements will be a source of demand for workers over the next 10 years even if the total number of jobs in the industry continues to decrease. Chmura Economics, a labor market data provider, forecasts that while the search, detection and navigational instruments sector of the industry will shrink by over 300 jobs over the next 10 years, the sector will require over a thousand people to fill positions that will be vacated.^{viii}

Decreasing employment in manufacturing due to the growth in automation has made the industry less attractive for younger workers exploring future careers. However, an increased reliance on new technologies in the industry will likely cause the number of high-skilled, high-wage positions to grow. Future manufacturing workers will need to be able to work alongside, repair, and even program computer-controlled machines and robots, which will require more complex skills.

For engineering workforce, the economic downturn that reduced new hiring has also led to an aging workforce, and growing companies are now trying to infuse new engineers and programmers with the industry's institutional knowledge.

AEROSPACE AND DEFENSE SUBSECTOR FORECASTED GROWTH IN GREATER PHOENIX

INDUSTRY	10 - YEAR GROWTH FORECAST		
	TOTAL APPROXIMATE REPLACEMENT DEMAND	TOTAL GROWTH DEMAND	AVERAGE ANNUAL GROWTH PERCENT
Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing	1,052	-324	-0.6%
Aircraft Manufacturing	895	-117	-0.3%
Aircraft Engine and Engine Parts Manufacturing	1,041	-136	-0.3%
Other Aircraft Parts and Auxiliary Equipment Manufacturing	664	-87	-0.3%

Source: JobsEQ, 2016.2





Developing workforce programs that can transition existing workers and help them adapt to new technologies will help prepare the industry for future growth.

➔ RECOMMENDATION

Greater Phoenix has a network of educational resources that should work to ensure that aerospace and defense companies have the ability to meet their future workforce needs. Currently, companies in the region leverage Arizona State University and Maricopa Community Colleges to find talented workers, but more direct connections between educational institutions and employers could ensure that skills more appropriately align with needs. This becomes increasingly important as automation and technology advance in the industry. Developing workforce programs that can transition existing workers and help them adapt to new technologies will help prepare the industry for future growth.

2014-2015 ARIZONA AEROSPACE AND DEFENSE RELATED PROGRAM COMPLETIONS

NON-DEGREE CERTIFICATES	ASSOCIATE DEGREES	BACHELOR DEGREES	MASTER DEGREES	DOCTORAL DEGREES
1,148	761	2,958	1,109	143

Source: National Center for Education Statistics, Program Completions 2014-15 Academic Year

Growing engineering programs at Arizona State University, Grand Canyon University, and Embry-Riddle Aeronautical University will help to attract and produce top talent. In addition to supplying a high-quality workforce, having nationally-ranked engineering programs in the region and state will attract businesses, market the region externally and drive increased innovation.

Producing top talent is not enough if the region cannot continue to retain its engineering workforce. Marketing the job opportunities at innovative companies in the region and working to pair talented employees with existing firms will help keep highly-educated workers in Greater Phoenix.

Developing flexible career pathways for the industry will allow employees to develop skills that can be applied to higher-wage positions, helping them to advance their careers and adapt to changing technologies. This will support growth throughout the economy by encouraging clear career trajectories for employees, furthering education and increasing human capital.

Conclusion

The aerospace and defense industry is evolving, both globally and locally. For Greater Phoenix firms to continue to compete, they must adapt. Sequestration and military funding cuts have created new challenges, especially for the defense-focused companies in the region. Despite new budget bills that have lessened the impact of funding cuts, Arizona has seen a significant drop in Department of Defense spending, and a full implementation of planned cuts would further stress the industry.

However, there are new markets opening up for this industry to grow. Export opportunities continue to expand, and the development of new technologies is accelerating. The region is primed to become a major player in the space and satellite industries by leveraging talent institutions that can prepare a next generation workforce capable of taking this legacy industry into the future.



END NOTES

ⁱ 56th Fighter Wing and Luke Field/Air Force Base Heritage Pamphlet, 1940-2015.

ⁱⁱ Deloitte, "2016 Global aerospace and defense sector outlook: Poised for a rebound," January 2016.

ⁱⁱⁱ Brookings Institution, "Export Monitor 2015," May 13, 2015.

^v Iridium Communications, Iridium NEXT, <https://www.iridium.com/network/iridiumnext>. Accessed Nov. 2, 2016.

^{vi} ViaSat, News, <https://www.viasat.com/news/viasat-provide-global-flight-internet-and-connectivity-services-air-force-one-and-other-us>. Accessed Nov. 2, 2016.

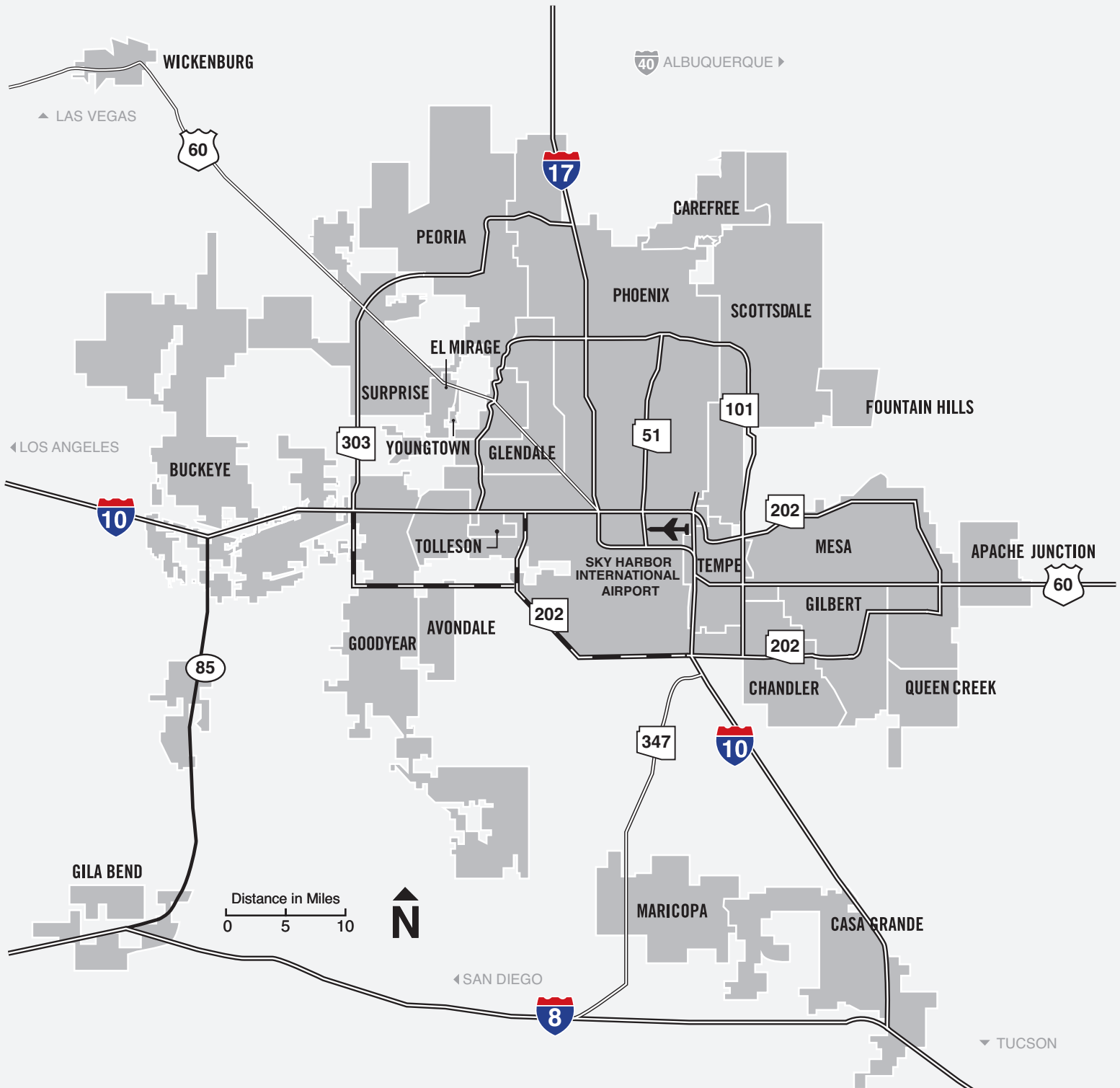
^{vii} Osirix-Rex, Team, <http://www.asteroidmission.org/team/team-list/>. Accessed Nov. 2, 2016.

^{viii} F35, Software Development, <https://www.f35.com/about/life-cycle/software>. Accessed Nov. 2, 2016.

^{viii} Chmura Economics, JobsEQ, 2016.2.

Acknowledgments

GPEC Member Communities





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