The Washington Economics Group, Inc.®

The Economic Impacts of USF's Innovation Enterprise on the Tampa MSA and the State of Florida

Submitted to:

UNIVERSITY OF SOUTH FLORIDA

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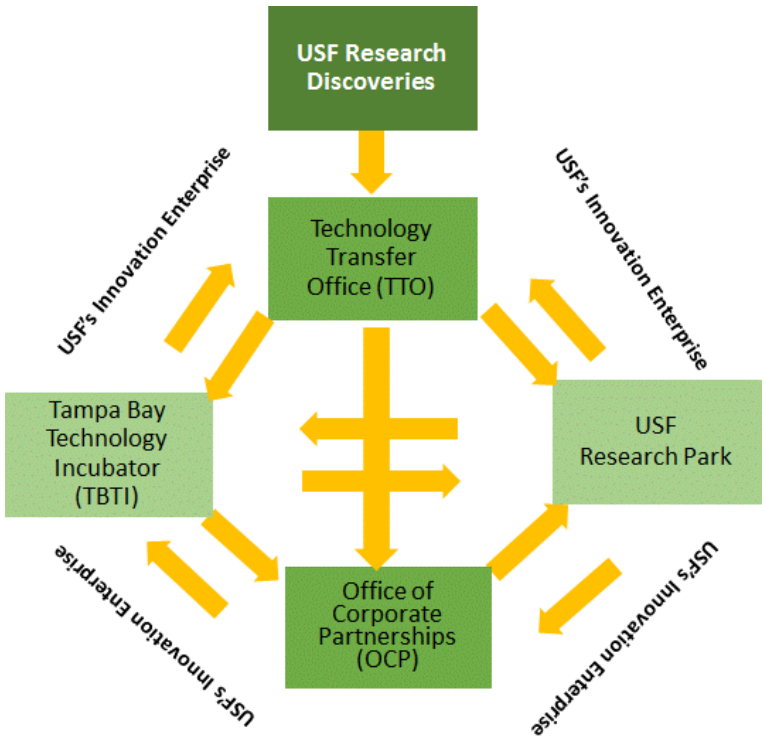
I. Executive Summary

The Washington Economics Group, Inc. (WEG) was retained by the University of South Florida (USF) to prepare a three year update of the Innovation Enterprise economic impacts, provide an analysis of the 2018 fiscal year and compare the economic impacts with the original Study analyzing the 2015 fiscal year data. WEG utilized the same methodology and the IMPLAN Input/Output (I/O) model to make statistical valid comparisons between the 2016 Study of 2015 fiscal year data and the update of 2018 fiscal year data presented in this Study. This report captures data not included in USF's annual economic impact analysis.

The University of South Florida (USF) is a leader in cutting-edge research and commercialization of new products, technology incubation and partnerships in the State of Florida and nationwide. This positive development generates significant economic development impacts for the Tampa Metropolitan Statistical Area (MSA)[1] and throughout Florida.

USF's Innovation Enterprise—broadly defined as the USF Technology Transfer Office (TTO), Tampa Bay Technology Incubator (TBTI), and the Office of Corporate Partnerships (OCP) plus the growing number of startups, early stage companies, researchers and community partners in the USF Research Park—acts as a catalyst to a broad range of new research innovations generated from USF and the community. The diagram below illustrates this ongoing process. This analysis of the Innovation Enterprise does not include research and research expenditure dollars.



[1]Comprising Hillsborough, Pinellas, DeSoto and Hernando Counties.

The TTO facilitates the commercialization of USF intellectual property, including patents and copyrights, directly stemming from USF research. TBTI supports both USF spinout companies and community startups through their early stage of commercialization with facilities, scientific equipment, and—most importantly—its programming. The USF Research Park provides proximity, specialized facilities, and a lively and engaged entrepreneurial community environment for companies and organizations interested in partnering with USF. The Office of Corporate Partnerships acts as the "front door" to identify and recruit potential external partners and internal researchers to work with them, as well as facilitating connections for external partners to recruit interns and employees. Whether the partnership is focused on sponsored research, locating in the USF Research Park, educational programs, student internships, or an array of other opportunities, OCP is an active partner—with both USF offices and external partners—in designing solutions.

Throughout USF's Innovation Enterprise, vibrancy, engagement and community-driven efforts define the synergistic relationship that exists among the TTO, TBTI, OCP and USF Research Park. That relationship has created an environment where entrepreneurship and economic development thrive, and its commercialization process has resulted in both *intangible* benefits (what economists' term "externality" benefits) and *quantifiable* economic impacts on high-wage employment, household income and economic output for the Tampa MSA and Florida.

USF's Innovation Enterprise is participating in and contributing to a larger innovation-based ecosystem. Community startups and corporate partnerships with USF and local companies within the ecosystem are empowered via the proximity, specialized facilities and density of companies within the USF Research Park. Community startups include companies such as Intezyne, Inc., which relocated from Massachusetts to the USF Research Park, bringing high-wage jobs and research collaboration opportunities. Publicly traded company Iovance Biotherapeutics has established its research and product development facilities in the USF Research Park—those facilities are about to expand for the third time in less than five years.

The OCP team proactively develops relationships with community and corporate partners; collaborates with them on needs assessment, asset identification, and partnership goals; and actively engages in problem solving to address challenges in building and sustaining the innovation and talent ecosystems in the Tampa MSA and beyond. With over 800 companies from A (Abbott Laboratories) to Z (ZioPharm Oncology) affiliated with USF Research & Innovation over the past five years, the problem solving and ecosystem building opportunities are innumerable. OCP continues to explore the possibilities by hosting events like the Innovation & Economic Prosperity Luncheon, attended by over 100 USF and Tampa MSA business and civic leaders, and focusing on what partners and USF can do to realize an impact on economic development.

The *intangible* "externality" benefits of USF's Innovation Enterprise activities are significant, and are presented in-depth in Section II of this Study. Among these benefits:

- Supporting and strengthening the economic development strategy of the Tampa MSA and Florida in creating an innovation economy for the 21st Century.
- Increasing employment opportunities and the retention of talent in high-wage skill occupations—e.g., over 80 percent of employment supported by USF's Innovation Enterprise is created in the Knowledge-Based Services sector.
- Providing a business environment that attracts new companies to the Tampa MSA—i.e., creating a cluster of innovative companies attracted by USF's Innovation Enterprise.

The *quantifiable* economic impacts of USF's Innovation Enterprise are also significant and have grown considerably over time. Table ES-1 below summarizes these impacts, derived from the professionally accepted and widely utilized IMPLAN Methodology. **These positive economic impacts have increased significantly since the last Study conducted by The Washington Economics Group, Inc. (WEG) in October 2016 of FY-2015 data. The updated results below show the growing importance of the USF Innovation Enterprise in creating a high-wage, knowledge-based economy in the Tampa MSA.**

Table ES-1. Summary of the Annually Recurring Economic Impacts of USF's Innovation Enterprise Commercialization Activities in the Tampa MSA

Impact on:	Direct	Indirect & Induced	Total Impact
Employment (Jobs)	1,992	2,068	**4,060**
Household Income ($ Million)	$114	$98	**$212**
Gross Domestic Product (Value Added $ Million)	$142	$172	**$314**
Federal, State & Local Tax Revenues ($ Million)*	- -	- -	**$71**
Total Economic Impact ($ Million)	$260	$288	**$548**

*Taxes indirectly generated through increased economic activity.
Notes: Total may not equal the sum of all due to rounding. See definition of terms in Economic Glossary (Appendix II).
Source: The Washington Economics Group, Inc. (WEG)

The economic impacts of the comprehensive activities contained in the USF Innovation Enterprise have been increasing over time. As previously stated, WEG prepared in 2016 an analysis of the impacts of USF's Innovation Enterprise. Data from the updated 2019 report have been compared to the results

presented in the mentioned year. Over the past three years, as USF has brought additional innovations to market with the support of Innovation Enterprise activities, the Tampa MSA innovation cluster has deepened as a result of additional companies being created or otherwise affiliating with the cluster.

Therefore, employment attributable to the USF Innovation Enterprise has noticeably grown. This has led to increases in other measures of economic activity in a virtuous cycle of positive economic impacts. These growth measures are set forth in Table ES-2 below.

Over the past three years Employment has increased by a significant 35 percent, while the other measures of economic activity, Household Income, Gross Domestic Product, Public-Sector Revenues and Economic Impact (Output), have also increased by strong percentages.

Table ES-2. Growth of the Economic Impacts of USF's Innovation Enterprise Activities in the Tampa MSA

Impact on:	Total Impact		Change	Percent Change
	FY-2015	FY-2018		
Employment (Jobs)	3,017	4,060	1,043	35%
Household Income ($ Million)	$149	$212	$63	42%
Gross Domestic Product (Value Added, $ Million)	$224	$314	$90	40%
Federal, State & Local Tax Revenues ($ Million)*	$52	$71	$19	37%
Total Economic Impact ($ Million)	$395	$548	$153	39%

*Taxes indirectly generated through increased economic activity.
Notes: Total may not equal the sum of all due to rounding. See definition of terms in Economic Glossary (Appendix II).
Source: The Washington Economics Group, Inc. (WEG)

Relative to the 2015 fiscal year, the new economic impacts results presented above demonstrate the growing importance of USF's expanding Innovation Enterprise activities. These growing impacts improve the standard of living of residents, while creating a top business environment to attract, retain and expand high-wage, high-skill employment.

Section II of this Study presents the increasing "externality benefits" of **USF's Innovation Enterprise** comprehensive activities. This primarily **qualitative section** emphasizes the new programs, initiatives and awards received since the 2016 Study, demonstrating the growing benefits of the Innovation Enterprise on the Tampa MSA ecosystem.

Section III of this Study **quantifies** the growing economic impacts of the Innovation Enterprise programs and activities. It also presents in greater detail the methodology used to determine the quantification of economic impacts for the Tampa MSA, analyzing the various impacts on Jobs (employment) supported, Household Income generated and overall economic activity. Section IV presents the quantifiable economic impacts at the State level. As expected, the great majority of the impacts are concentrated in the Tampa MSA, although there are spillover impacts throughout Florida.

In conclusion, the already significant *intangible* and *quantifiable* economic impacts of USF's Innovation Enterprise commercialization activities have increased steadily since the last report and are expected to continue growing in the future. This conclusion is based on the increasing number of new products at various phases of development and the companies affiliated and resident in TBTI and the USF Research Park. Among these new cutting-edge products are: therapeutics, diagnostic/devices, consumer products/services and industrial products/services.

USF's commercialization strategy, through the multifaceted efforts of USF's Innovation Enterprise, has led to significant gains in economic development and is essential to the State's competitive positioning in the global marketplace in driving research dollars into sustained economic growth, creating high-wage, high-skilled jobs and supporting the diversification and continued expansion of the Tampa MSA and Florida economies.

II. USF's Innovation Enterprise: A Key Driver of Economic Development in the Tampa MSA

This section presents the broadly defined USF's Innovation Enterprise (which includes the Technology Transfer Office (TTO), the Tampa Bay Technology Incubator (TBTI), Office of Corporate Partnerships (OCP) and the USF Research Park) for its catalytic role played in advancing the economic development strategies of the State of Florida and the Tampa MSA. The TTO, TBTI, OCP and USF Research Park make important contributions toward creating a vibrant and engaged entrepreneurial environment that develops and attracts start-ups, community partners, faculty researchers and early stage companies by facilitating the commercialization of new ideas, discoveries and innovation that emanates from the external community and USF Research, including community startups. Among the results of commercializing new product inventions and the connectivity and support given by USF's Innovation Enterprise are high-wage and high-skill job creation in targeted industries, retention of talent and the consequential attraction of new businesses to Florida and to the Tampa MSA. This section will also include a big picture "blue sky type" economic analysis of the existing pipeline from the commercialization of USF Research by the TTO. The objective is to demonstrate analytically and qualitatively the growing economic development importance of USF's Innovation Enterprise, its commercialization process and its multifaceted activities to the Tampa MSA and to the State.

"USF has grown into a top economic driver for Tampa Bay and the State of Florida," University of South Florida President Judy Genshaft stated. One of the main reasons for this statement is based on the efforts of USF's Innovation Enterprise. Specifically, the TTO, TBTI, OCP and USF Research Park are fundamental components of Florida's drive to diversify the economy and rebrand the State as a hub for innovation. In the last 15 years, there has been a strong effort by policy makers and State leaders to expand Florida's economy by repositioning and rebranding Florida to focus on high-wage, high-skilled jobs. USF's Innovation Enterprise is a prime example of this effort.

The economic development benefits of USF's Innovation Enterprise and its commercialization activities go beyond the quantifiable impacts estimated in Sections III and IV of this Study; they also include externality benefits (intangible benefits) and linkages to Florida's standard of living by supporting Florida's economic development strategy, attracting innovators and developing high-wage (knowledge-based) industries.

Technology transfers from USF Research, support of new startups and development of industry partnerships in the Research Park are critical to the economic vitality of Florida and the Tampa MSA Region. USF's Innovation Enterprise's commercialization activities add significantly to the high-wage job creation in targeted State industries such as life sciences, which generate tax revenues that support other important programs and initiatives, and improve the quality of life of residents through innovative breakthroughs in healthcare, clean energy, advanced manufacturing and other emerging sectors. These

economic development-related activities create a technology and innovation cluster in a metropolitan area such as Tampa, attracting investors and other cutting-edge businesses.

The U.S. Federal government has been funding non-defense research for approximately 50 years, starting with space programs in the 1960s, then energy programs in the 1970s and health-oriented programs in the 1980s.[2] With the U.S. Congress' passage of the Bayh-Dole Act and implementation of the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs in the early 1980s, the Federal government began to promote and conduct research turning the results of these programs into viable commercial products such as new drugs, software and "green" technology solutions. The Bayh-Dole Act allows non-government entities such as universities to benefit from inventions created using Federal funding that end up in the marketplace. The SBIR and STTR programs offer grants to small businesses conducting research and development that may result in products with commercial potential. Furthermore, *"The results were profound. In the decade preceding Bayh-Dole, the top 100 U.S. research universities produced less than 2,200 patents. During the entire period, many of the nation's very best universities had patent stats in the single digits, including zero. In the decade after Bayh-Dole the total number shot to over 5,000 and in the '90s, the figure more than tripled to over 17,000 patents.[3]"*

The Obama Administration further raised the bar for commercialization in its November 2011 memorandum, *"Accelerating Technology Transfer and Commercialization of Federal Research in Support of High-Growth Businesses."*[4] Today, Federal funding of research and development totals about $140 billion annually,[5] of which USF, its spinout companies and community startup companies are important recipients. Even more remarkable than the boom in patents from research universities nationally over the last 30 years is the growth in research at Florida universities over the last decade. **For the entire decade of the 1970s, six Florida universities generated only 16 U.S. patents. In contrast, during the past 10 years, just three – the University of Florida, University of South Florida and University of Central Florida – garnered 2,543 patents,[6] placing each in the top 20 schools nationally.**[7]

Specifically, USF was ranked by The Chronicle of Higher Education as the 5th fastest growing research university in the U.S. from 2000 to 2010. USF is also a "patent machine," and turns out more utility patents than any other research university in the State of Florida. This technology

[2] http://www.aaas.org/spp/rd/histda09.pdf
[3] http://www.tbo.com/list/news-opinion-commentary/florida-where-climate-is-right-for-american-inventors-20150824/
[4] https://www.whitehouse.gov/the-press-office/2011/10/28/presidential-memorandum-accelerating-technology-transfer-and-commerciali
[5] https://www.fas.org/sgp/crs/misc/R42410.pdf
[6] https://www.smithhopen.com/news_detail.aspx?id=685
[7] https://wusfnews.wusf.usf.edu/post/usf-ranks-5th-new-patents-among-us-public-universities

transfer sharply improves the regional and State economies over time. A few highlights of USF's efforts:

- USF ranks 1st in Florida, 7th in the nation among public universities and 16th world-wide for granted U.S. patents among all universities according to the Intellectual Property Owners Association/National Academy of Inventors (2018), and has ranked in the Top 10 among public universities for U.S. patents granted for the past nine years (2010-2018) in this key measure of innovation. Once commercialized, many of these patents will generate significant economic impacts to Tampa MSA.
- USF was ranked #19 among the "Best Universities for Technology Transfer, 2017" by the prestigious Milken Institute.
- USF was designated in 2015 an Innovative and Economic Prosperity University by the Association of Public and Land Grant Universities.
- USF ranked in the top 15 nationally of individually reporting public institutions for executed license and option agreements with 90 executed agreements in 2019. This places USF in the top 14 percent of all individually reporting institutions, both public and private (Association of University Technology Managers (AUTM) 2017).

Beyond patents, licenses and the growing pipeline of projects in various stages of development at USF, Florida has also gained traction in supporting **entrepreneurship**. In recent years, Florida ranked 1st in the nation for innovation by Fast Company Magazine,[8] as well as first overall in "business birthrate" among all States.[9] Yet, despite these designations, in the first two quarters of 2015 Florida entrepreneurs received only 1 percent of venture capital funding nationally according to PricewaterhouseCoopers MoneyTree™ reports.[10] Accessibility to funding is a crucial element to the successful creation, retention and sustainability of Florida's commercialized research ventures, and remains one of the toughest challenges for Florida entrepreneurs. However, USF's continued growth in research and technology transfer, and through the synergistic relationship between the TTO, TBTI (sponsored by the Florida High Tech Corridor Council "The Corridor" and Hillsborough County), OCP, and USF Research Park, more deal flow, investment and investors will look to companies associated with USF's Innovation Enterprise. This is a significant boost for the regional and State economy, improving the standard of living of Tampa MSA and Florida residents.

State universities play a critical role in supporting new business development in Florida through cutting-edge research and development of new technologies. With a steady decline in corporate research, universities provide an environment for this innovation to take place. In fact, according to a study performed by the Association of American Universities (AAU), 56 percent of the nation's basic

[8] http://www.fastcompany.com/3007772/united-states-innovation-ranking-states-and-district-innovation
[9] http://www.inc.com/bill-murphy-jr/ranking-the-10-top-states-for-entrepreneurship-and-innovation.html
[10] https://www.pwcmoneytree.com/

research, the key ingredient for technology commercialization, happens in universities.[11] Through commercialized research, innovation-based startups are making significant advancements in key industries including life sciences, information technology, healthcare, communications and clean energy, and are finding solutions to 21st Century challenges.

Beyond the increased quality of life, these advancements and new companies are essential to the economic development of the State including high-wage job creation, increased economic activity and generating significant tax revenues to Federal, State and local governments as quantified in Sections III and IV of this Study. Furthermore, the Association of University Technology Managers found that 70 to 80 percent of startups remain headquartered near the university where they were started, thus retaining the majority of the economic benefits locally.[12]

At USF, leading edge research and entrepreneurship are ingrained in its culture. USF's TBTI is currently home to over 70 resident and affiliate companies, with 52 percent of these companies directly coming from the USF's TTO as spinouts. The mentorship and resources from the TTO and the TBTI are key to the success of many of these startups. Furthermore, high-tech facilities for science innovation are located throughout USF Research Park allowing cutting edge companies to grow. A few highlights for USF's entrepreneurial culture are:

- USF has facilitated the formation of 51 startup companies in the last 5 years, ranking in the top 16 percent nationally among individually reporting institutions for facilitating university startup companies (compared to AUTM 2016).
- TBTI companies reported 354 paid and unpaid employees and 44 USF student interns. Of those employed by TBTI companies, 94 new employees were added during the 2018 reporting period.
- In looking at the percentage of licenses that are startups over the last few years, USF is higher than its peer group and the AUTM average, reflecting the emphasis of USF and the State of Florida on enabling the economy.
- USF is the founder and home of the National Academy of Inventors (NAI), a non-profit member-supported organization with over 4,000 individual inventor members and Fellows and more than 250 universities and governmental and non-profit research institutes. The NAI is sponsored by The Corridor. The USF Chapter of the NAI has over 450 USF faculty, staff, students and alumni members, who collectively hold more than 2,400 U.S. patents.

In addition to serving community and university spin-outs, seeing the growth and success of the TBTI and the potential to help turn students' business ideas into reality, the Student Innovation Incubator (SII)

[11] https://www.aau.edu/WorkArea/DownloadAsset.aspx?id=11588
[12] http://etectbio.com/?p=1655

was conceived. In partnership with the USF Center for Entrepreneurship, SII opened in November 2013 with 14 initial student businesses founded by undergraduate and graduate students from disciplines across campus. Since then, SII has steadily grown with a record 77 students with established businesses or business ideas applying for the sixth cohort in October 2018. Twenty-five companies were accepted and joined the incubator for AY18 –19.

The goal of SII is to create, guide, and embrace student entrepreneurs in order to build successful business that are launched and sustained in Tampa Bay. Student ventures with scalable, commercial potential are given access to high-tech, collaborative office space, paired with industry mentors, subject matter experts, and community corporate partners to develop scalable business plans, and market-testable products and services.

Below are a few examples of companies that have benefited from the SII program:

- **2014-2015 Cohort: PikMyKid**

PikMyKid is a mobile app and platform that supports parents and children by making school transportation more efficient, timely, and safe. Currently, PikMyKid is live in 32 states and 7 different countries with over 200,000 school users. The company recently won the 2018 Miami-Dade County City of Tomorrow Challenge and received $50K in funding to implement their proposal in a real-world setting.

> *"SII was a tremendous resource for us when we had nothing but an idea in our head and a PPT presentation. All the resources available at the SII gave us the impetus, confidence and an experienced pool of advisors to convert our idea into a viable product ready for the market."*
>
> *- Pat Saravana Bhava, CEO of PikMyKid*

- **2016-2017: Yummi Foods**

Yummi Foods offers nutritious but tasty paleo and keto baked goods. Yummi Foods has grown considerably in a short period of time and are now in several Tampa locations. The Attic Cafe in downtown Tampa sells their snacks, and they are on shelves in places like Inside the Box Heights Public Market, Abby's Health and Nutrition, Intelligent Gourmet, and La Placita Restaurant & Bakery.

> *"They give you resources, they give you more training, they're not going to take your hand and just walk you (through), no. You have to put the work in. The harder that you work, the harder they work to help you. Everything is through USF, I don't know if I'm going to be able to repay them what I owe them. I really feel that it made a huge difference joining USF to make my business happen."*
>
> *- Adriana Florez, Founder of Yummi Foods.*

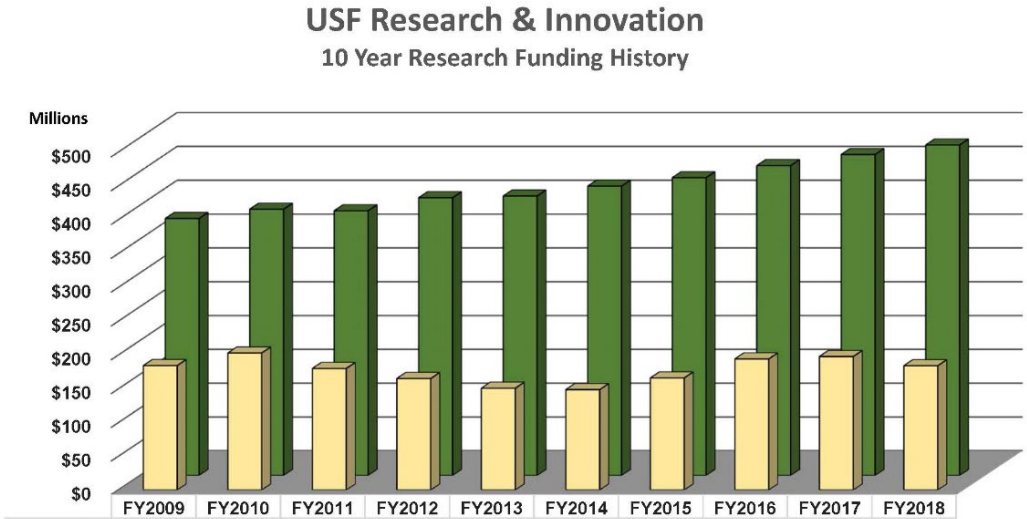
- **2018-2019: Stuby**

Stuby is a platform that helps students find a study partner and events that are a good match for their needs and can increase the academic interactions between students across America. The company, which launched their product in March of 2018, has been the recipient of the 2018 Daveler Fellow Entrepreneurship Award, was a 2018 Governors Cup Participant, and has been featured in various media outlets. Stuby recently merged with another SII company, Ideas worth Coding, to further advance their technology. SII allowed Rondon and Townsend to bring on interns, grow a team and figure out the missing links such as the marketing.

"I was able to go to CEO workshops and meet with local entrepreneurs in Tampa that run companies. We were even able to bring on some computer science majors from grad school for data analysis."

- William Rondon, Co-Founder of Stuby

Although research and research expenditures are not included in this economic impact study, USF is also a leader nationally in public university research. The National Science Foundation ranked USF 25th in total research expenditures among public universities and 42nd among all universities (public and private) in 2018. This is a major accomplishment for a young university such as USF to be ranked as one of the Top 25 research institutions in the country. USF continues to climb. The University of South Florida System set a new record of $489.5 million in research funding in FY 2018. In 2018, Federal research comprised 38 percent of total research awards, as you can see in Figure 1 below.



	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018
Federal	$185	$203	$180	$166	$151	$149	$166	$194	$198	$184
Total	$380	$394	$392	$411	$414	$428	$441	$459	$475	$489
Federal %	48%	52%	46%	40%	37%	35%	38%	42%	42%	38%

Figure 1.
Note: Total research and funding amounts include project and non-project data.
Source: University of South Florida (USF).

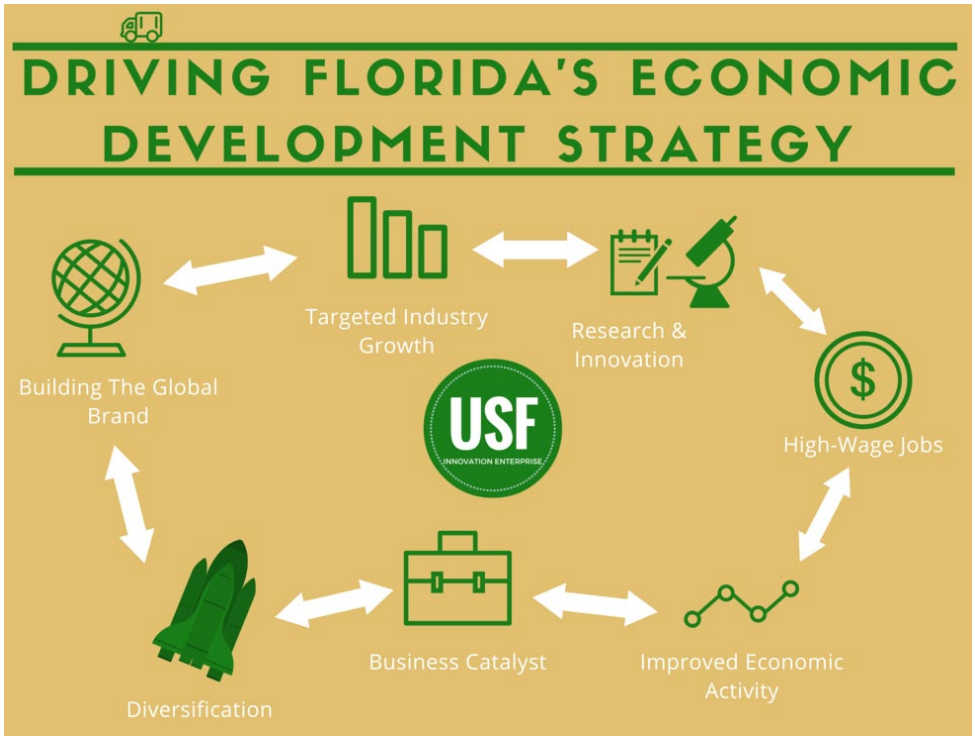
USF has become increasingly entrepreneurial as Federal research funding has declined due to a reduction in Federal funds. However, USF continues to attract research dollars from outside the State, boosting the local and State economic impact. The economic impact of USF's research and research expenditures is captured in the larger USF annual economic impact last measured at $4.4 billion.[13] The USF annual economic impact analysis does not include the data covered in this report of the impacts of USF's Innovation Enterprise.

Where did all of this focus on driving Florida's economic development strategy stem from? It was a strategic effort by USF leadership as described in its strategic plan. Two out of the five strategic initiatives of the USF Strategic Plan for 2013-2018 directly focused on research, innovation, technology transfer, partnerships, economic development and entrepreneurship. This culture of innovation is key. Two examples: with the sponsorship of The Corridor and additional private partners, USF founded the Florida Inventors Hall of Fame (FloridaInvents.org) in 2013. It is one of only a handful of state inventors' halls of fame in the nation. Forty-three outstanding Florida inventors have been inducted since its inception, including eight from USF.

In 2014, USF revised its policies to include patents and commercialization activities for tenure & promotion, making it an early proponent of such a change. In 2015, the Association of Public & Land Grant Universities (APLU) Task Force on Managing University Intellectual Property, led by USF President Judy Genshaft, recommended that technology transfer activities be explicitly among the criteria for tenure and promotion. In the years since, many universities have adopted these recommendations. This concerted effort and focus on the above led directly to driving Florida's economic development strategy.

The summarized matrix on the next page highlights the comprehensive benefits provided by USF's Innovation Enterprise services as well as the important role USF plays in the economic development of the State, creating knowledge-based and innovation-oriented industry clusters in high-wage, high-skill areas.

[13]See, USF Facts and Statistics webpage: https://www.usf.edu/about-usf/facts-statistics.aspx.



The Role of USF's Innovation Enterprise is Critical to USF's Commercialization Efforts

The role of USF's Innovation Enterprise in fostering the growth of new businesses, many based on USF's path-breaking research, is critical. USF's TTO works with researchers, students and partners to allow for a sustained focus on transferring cutting-edge research and innovation to the commercial marketplace. USF Research Park's environment of experts, of mentors, of risk takers, and of community partners has had significant success in the local economy by creating the high-impact jobs necessary to diversify and grow Florida's economy. For example, the TBTI has a $91,000 full time average salary of current clients, above the current Federal average of $52,000 by 57 percent, and significantly above the State average of $46,000.[14] These companies have also attracted a total of $158 million in external funding to date (at end of 9/2018 reporting period). This money directly impacts the local economy, as well as the State's, by fostering "positive societal change and sustainable development." Recognizing that proper planning and execution in the early stages of company development improve the chances for future funding and growth, USF's Innovation Enterprise delivers value-added support services that help minimize risks, and position companies for success.

USF's Innovation Enterprise's process brings researchers together with experienced entrepreneurs, community partners and investors to build businesses. USF's Innovation Enterprise also provides a myriad of resources for these companies to assist with growth, such as the USF Foundation Bull Ring

[14]Bureau of Labor Statistics (BLS)

Accelerator Grants (Foundation BRAG), USF Seed Capital Accelerator, Corridor Matching Grants Program, Grow FL, as well as many other partners and organizations and network groups.

As presented in Figure 2 below, of spin-outs from USF research, USF's Innovation Enterprise's leading and comprehensive efforts are working.

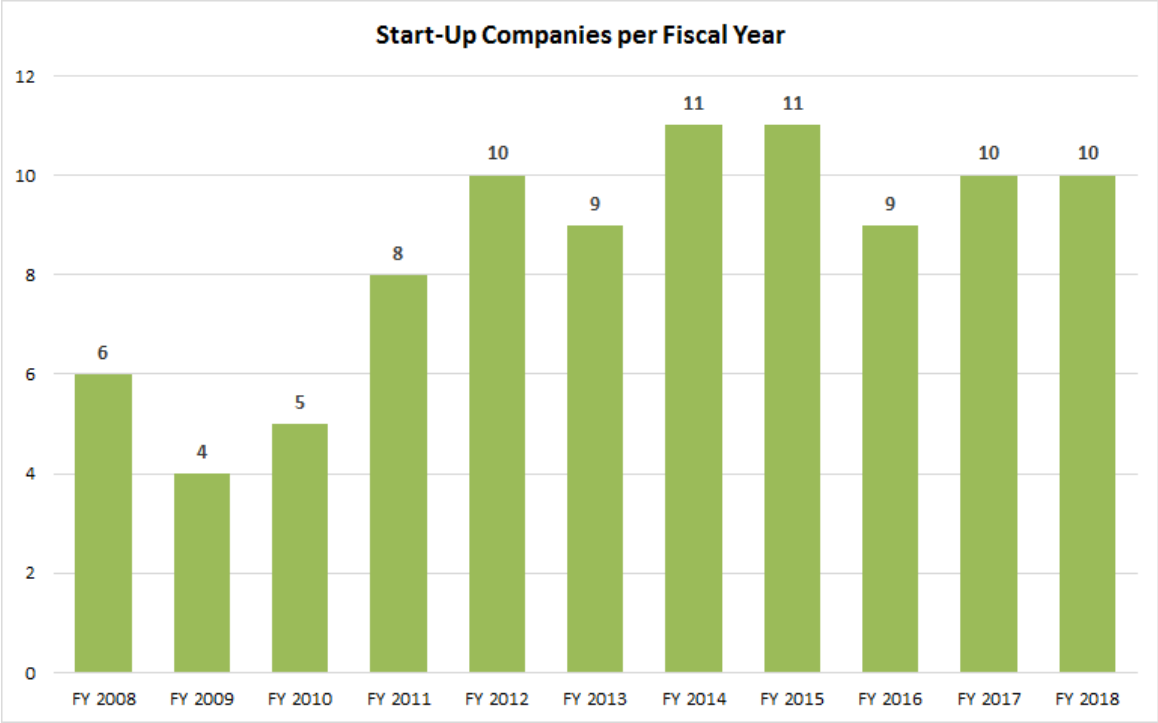


Figure 2.
Source: University of South Florida (USF).

Overall, USF's Innovation Enterprise, thanks to the work of the TTO, TBTI, and USF Research Park, is a driving catalyst of economic development for the State, regional, and local economies. As seen from the numbers throughout this Study, but for USF's Innovation Enterprise, there would be a significant loss of economic potential to the Region.

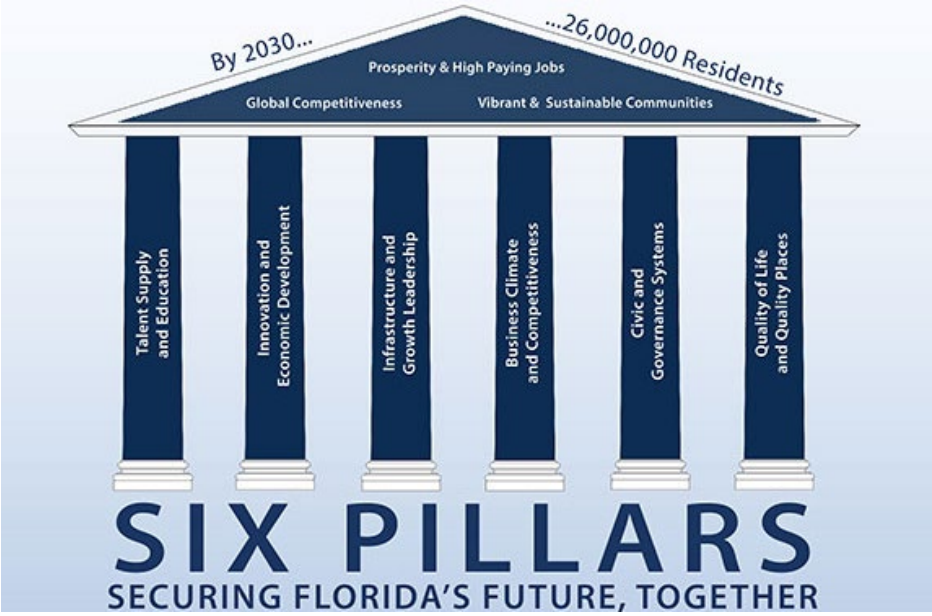
> **USF's Innovation Enterprise is essential to the State's economic development and its competitive positioning in the global marketplace, as it drives research dollars into sustained economic growth, creating high-wage, high-skilled jobs for the Tampa MSA and Florida economies.**

The jobs and companies created through the support of USF's Innovation Enterprise are in industries critical to the economic development strategy of the State, namely the generation of high-wage and high-skill jobs in 21st Century industries where knowledge and innovation are the principal inputs to the production process. These targeted industries include Aviation & Aerospace, CleanTech, AgTech,

Financial and Professional Services, Homeland Security and Defense, Information Technology, Life Sciences and Advanced Manufacturing.[15]

The companies using commercialized research and the support of USF's Innovation Enterprise are solving some of today's toughest challenges and helping to define Florida's innovative and globally competitive environment, thus advancing the economy of the 21st Century. There is strong and growing support across Florida for investments in innovations and new business. USF's Innovation Enterprise efforts support all six of the Pillars of Florida's Future Economy as presented in the graph below. These are:

1. Talent Supply and Education
2. Innovation and Economic Development
3. Infrastructure and Growth Leadership
4. Business Climate and Competitiveness
5. Civic and Governance Systems
6. Quality of Life and Quality Places



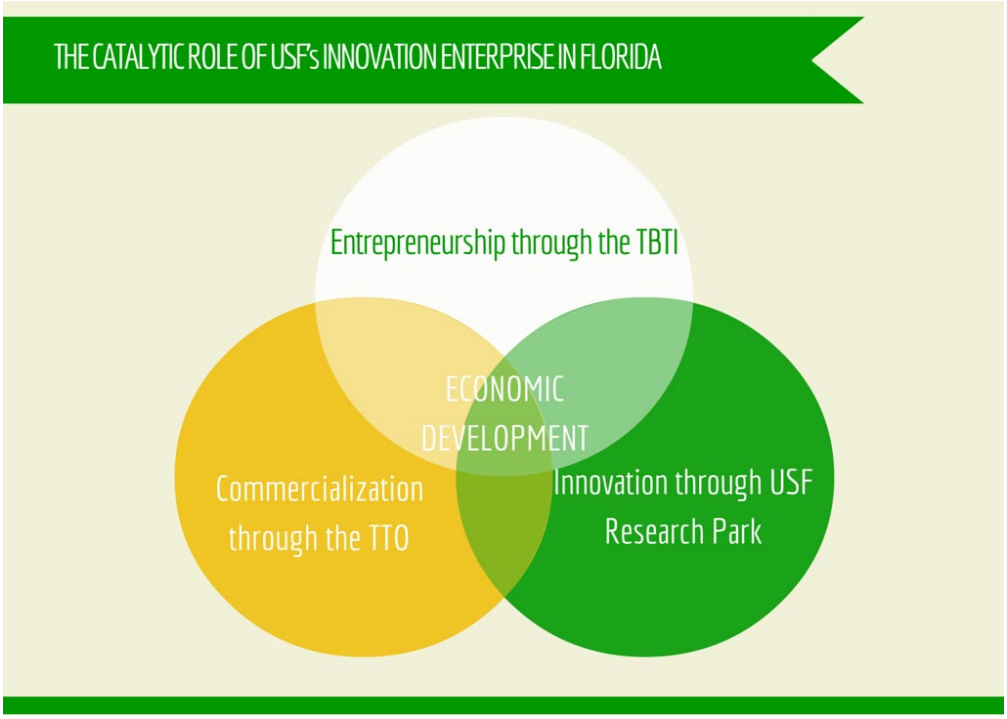
Source: Florida Chamber of Commerce (http://www.flchamber.com/six-pillars/overview/).

Through the support of new company creation, technology transfer, business partnerships, and by strengthening the collaboration among State, regional and local entities, USF's Innovation Enterprise serves as a major, seminal step in growing innovation and advancing the State's Plan for Economic Development.[16] Further, USF's Innovation Enterprise plays an important catalytic role in advancing Tampa Bay's Plan for Economic Development. Many of the goals and objectives for Tampa's Economic Development Strategy fall directly in the scope of what USF's Innovation Enterprise is

[15] http://www.enterpriseflorida.com/small-business/state-small-business-credit-initiative-ssbci/
[16] http://sitefinity.floridajobs.org/Business/FL5yrPlan/FL_5yrEcoPlan.pdf

accomplishing by diversifying the economy, creating new jobs and making the Tampa Region competitive[17]. The future of Florida and Tampa MSA economies in the 21st Century depends on USF's Innovation Enterprise's ability to compete globally through technology, innovation, and knowledge.

As illustrated in the Venn diagram below, USF's Innovation Enterprise's focused efforts on Entrepreneurship, Commercialization, and Innovation are key drivers of economic development in Florida. USF's Innovation Enterprise plays a major role in developing Florida's science, biotechnology and other technology clusters, and its ongoing activities assist the State in competing in targeted industries and, consequentially, retaining and attracting the human capital required for economic development. **Attracting and retaining talent is integral to starting and growing new companies in Florida, acting as magnets for the expansion and relocation of existing companies to the State, thus driving economic prosperity for generations to come.**



USF's Innovation Enterprise forms a cohesive web of opportunity for talented individuals to come together and create significant value in a market economy. These entrepreneurs, researchers, investors, community partners, and executives are all connected through USF's Innovation Enterprise's efforts. The following list is representative of USF's Innovation Enterprise companies spunout of USF Research, as well as the products they are launching to address some of today's toughest healthcare, business and societal challenges:

[17] http://floridarpcscorecard.com/wp-content/uploads/TampaBayCEDS_2012.pdf

- ***BioReNew, Inc.:***

  Solar-powered NEWgenerator technology used to convert wastewater into clean water, energy and nutrients in areas that do not have proper sanitation systems.

- ***Path Optical Systems, Inc.:***

  Process for creating smaller optical interconnects which can be directly printed on device boards to enable the next generation of computing devices.

- ***Alzamend Neuro:***

  A biotechnology company advancing treatment for early to moderage stage Alzheimer's patients with the use of immunotherapeutic treatment of vaccines.

- ***COI Energy Services:***

  Provides a cloud-based energy optimization platform for customers and smart cities.

- ***IstoVisio:***

  A healthcare technology company focused on a virtual reality platform for scientific data visualization and annotation system (Pending Lease 5119).

- ***NeuX Technologies*:**

  A therapeutic company focused on a non-invasive and non-addictive chronic pain management.

- ***Soilcea:***

  Creates non-GMO citrus trees using CRISPR/Cas9 to remove vulnerability to citrus canker and citrus greening.

- ***TransGenex NanoBiotech, Inc.:***

  TransGenex discovers and develops nanoparticle formations to diagnose as well as treat acute and chronic pulmonary inflammatory diseases and cancer based on unique gene expression and delivery technology.[18]

- ***AbleNook:***

  Creates products to help families in disaster areas.

- ***Agilis:***

  A biotherapeutic company advancing innovative DNA therapeutics for rare genetic disease that affect the nervous system.

[18] http://www.research.usf.edu/rf/incubator-companies.asp

The growing portfolio of companies generates significant economic impacts, as detailed in the next section. Many of these companies will successfully transition to be publicly owned entities with growing market-determined valuation and increased economic impacts on Tampa MSA and Florida.

In conclusion, the implementation of USF's commercialization strategy through the multifaceted efforts of USF's Innovation Enterprise has led to significant gains in economic development and the diversification of Tampa MSA and Florida's economies. USF has created a high-tech cluster near a major metropolitan area by commercializing research and supporting a network of investors, entrepreneurs, researchers, community partners, and executives to impact the local and State economies.

Further, this strategic focus by USF has positioned Florida for future growth in supporting new technologies. The efforts from all those involved in USF's Innovation Enterprise are also attracting investors and attention from outside of Florida, further boosting the long-run economic potential of the Tampa MSA and the State. These linkages are important for the Tampa MSA and Florida's economies. For decades to come, Florida and Tampa MSA will be benefitting from USF's Innovation Enterprise and its focus and specialty in commercialization, technology transfer, startup company creation, early stage company support, and business "collisions" created at USF Research Park.

The following sections of the Study demonstrate the important and **quantifiable** economic impacts on the Tampa MSA and the State that the commercialization of new discoveries, support of startups, and development of industry partnerships have generated from the activities of a public research institution, USF's Innovation Enterprise, on the economy. Section III quantifies the growing economic impacts of USF's Innovation Enterprise, its commercialization and its companies' activities over the past three years (FY 2016 to FY 2018) in expanding high-wage, high-skill employment in the Tampa MSA.

THE ECONOMIC IMPACTS OF USF'S INNOVATION ENTERPRISE AND COMMERCIALIZATION ACTIVITIES ON THE TAMPA MSA

III. The Annually Recurring Economic Impacts of USF's Innovation Enterprise (the Technology Transfer Office, the Tampa Bay Technology Incubator and USF Research Park) on the Economy of the Tampa MSA are Significant and Growing Strongly in Importance

The University of South Florida's Innovation Enterprise comprises three areas as follows:

1. **The Technology Transfer Office (TTO)** facilitates the commercialization of USF intellectual property, including patents and copyrights, directly stemming from USF research, the university's sponsored research portfolio as well as university portions of the commercialization of successful research projects and innovations.

2. **The Tampa Bay Technology Incubator (TBTI)** supports both USF spinout companies and community startups through their early stage of commercialization utilizing state-of-the-art facilities, scientific equipment, and, most importantly, programming. TBTI provides access to critical, costly research equipment along with a range of support functions that are necessary during the early stage of the research commercialization process.

3. **The USF Research Park** provides an important, centrally located, community environment for companies and organizations interested in partnering with USF. This community environment at USF Research Park is critical to support the necessary business "collisions" between researchers, early stage companies, startups, community partners and entrepreneurs.

These activities generate significant and growing quantifiable economic impacts each year (see Appendix III for Detailed Economic Impact Tables). These ongoing economic impacts support the economic development strategy of the Tampa MSA and the State of Florida. These impacts, estimated by utilizing a professionally accepted and widely used methodology (IMPLAN), support high-wage employment, the generation of Household Income, Gross Domestic Product (GDP), Economic Output and Public Revenues throughout the Tampa MSA and the State.

The IMPLAN Group, LLC (IMPLAN) provides the software and basic data needed to formulate the economic multiplier model developed for this Study. IMPLAN has been providing economic multiplier models for regional economic impact analysis since 1985.[19] Models developed using IMPLAN software have been widely used by private sector, academic economists and by Federal, State and local government agencies to quantifying economic impacts of ongoing enterprise activities, projects and policy alternatives among other uses.

[19]Information on the IMPLAN Group, LLC models and the company history can be found at www.implan.com

Methodology

Economic models that explicitly account for inter-industry linkages (supply relationships), the generation of labor and capital income and the spending of Household Income have been used since the 1960s to estimate the contribution that a particular business or industry makes to the general economy. These "input-output" models recognize that, as an industry experiences an increase in the demand for its products or services, it in turn needs more goods and services from its suppliers and must increase its purchases from other industries in the economy. The effect on regional production resulting from successive rounds of inter-industry linkages is referred to as the *indirect effect.* The resulting increases in regional production also lead to expansions in employment and labor income, and the increases in labor income lead to increases in consumer spending, further expanding sales and production throughout the regional economy. The latter economic impacts are referred to as the *induced effects*. The successive waves of production, spending and more production result in *economic multiplier effects*, where the final or total increase in regional production, income and employment, respectively, is larger than the initial (or "direct") increase in production, income and employment. The total quantitative economic contribution of these activities, therefore, is comprised of a *direct effect*, an *indirect effect* and an *induced effect*.

The operational expenditures, technology transfer expenditures and other commercialization-related expenditures of USF's Innovation Enterprise generate economic impacts that extend beyond those *directly* related to USF's commercialization activities and those of the individual companies. These "spillover" or multiplier impacts are the result of each business activity's supply relationships with other firms operating within the area, the proportion of business value added[20] that accrues to households in the form of labor and capital income, and the propensity of households to spend income on goods produced within the area. The *direct impact* of these activities comprises all of the operating expenditures made by the university in support of research and technology transfer activities, and activities of the incubators as well as each of the companies located in the Research Park at USF. Information on these expenditures was provided by the University of South Florida through its Innovation Enterprise main office.

Utilizing the *direct* economic impacts discussed above, *indirect* and *induced* economic impacts of these recurring activities were calculated using an extended *input-output* model of the economy of the four counties that make up the Tampa MSA (Hillsborough, Hernando, Pasco and Pinellas Counties). These comprehensive *direct, indirect* and *induced* economic impacts were totaled and are summarized in Table 1 on the next page.

[20]Value added" refers to the difference between business revenues and the cost of non-labor and non-capital inputs used to produce goods and/or services.

Table 1. Summary of the Annually Recurring Economic Impacts of USF's Innovation Enterprise Commercialization Activities in the Tampa MSA

Impact on:	Direct	Indirect & Induced	Total Impact
Employment (Jobs)	1,992	2,068	**4,060**
Household Income ($ Million)	$114	$98	**$212**
Gross Domestic Product (Value Added $ Million)	$141	$172	**$313**
Federal, State & Local Tax Revenues ($ Million)*	- -	- -	**$71**
Total Economic Impact ($ Million)	$260	$288	**$548**

*Taxes indirectly generated through increased economic activity.
Notes: Total may not equal the sum of all due to rounding. See definition of terms in Economic Glossary (Appendix II).
Source: The Washington Economics Group, Inc.(WEG)

A Over 4,000 Tampa MSA Jobs Are Supported by Commercialization Activities at USF's Innovation Enterprise through the Different and Synergistic Roles of the TTO, TBTI and Companies and Activities at USF's Research Park

Over 4,000 jobs for residents of the Tampa MSA are estimated to result from the *direct*, *indirect* and *induced* activities attributable to research commercialization activities due to Innovation Enterprise activities. These *directly* create 1,992 jobs in the Knowledge-Based Industries in addition to other sectors of the area economy. However, the *indirect* and *induced* job creation processes that result from these research and product development activities reach deeply into all sectors of the local economy. This dramatically and quickly demonstrates the close supply inter-relationships that the Knowledge-Based Industries sector has with all of the other sectors of the economy. An additional 2,068 jobs are supported via *indirect* and *induced* economic effects (mostly suppliers of goods and services to the research and product development processes) as per Table 1 above. **These and other positive economic impacts have grown significantly since the 2016 Study conducted by WEG as discussed later in this Section**.

> **Innovation and commercialization of knowledge-intensive products and services are sectors with a large proportion of high-wage, high-skilled jobs that are targeted by local leaders and indeed by the State in their economic development strategy.**

The majority of jobs supported by USF Innovation Enterprise are in the high-wage Knowledge-Based Industries sector providing an important 82 percent of the total followed by the Visitor Industry with 8 percent. Table 2 and Figure 3 on the next page breakdown the jobs supported by top industry categories.

Table 2. High-Wage Jobs Supported by the USF's Innovation Enterprise Commercialization Activities in the Tampa MSA

Industry	Jobs Supported	% of Total
Knowledge-Based Industries*	3,344	82%
Visitor Industry	318	8%
Retail Trade	189	5%
Wholesale Trade & Transportation Services	104	2%
Government & Other	61	2%
Construction and Manufacturing	44	1%
Total:	**4,060**	**100%**

Note: Total may not equal the sum of all due to rounding. See detailed tables in Appendix III.
Source: The Washington Economics Group, Inc. (WEG)

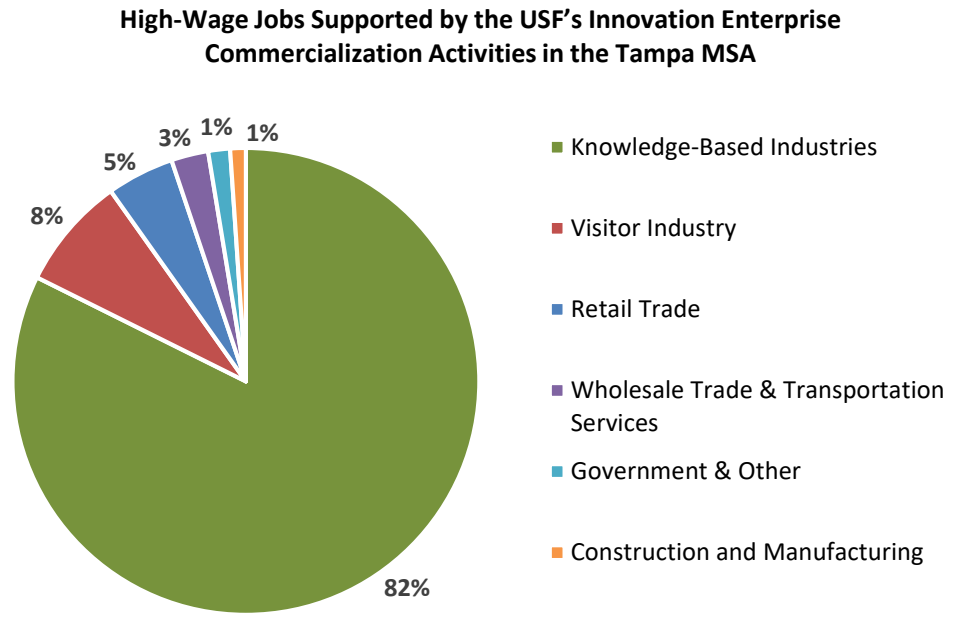


Figure 3.
Source: The Washington Economics Group, Inc. (WEG)

*Major industries under this category are: Life Sciences, IT, Finance Services, Professional and Administrative Services where knowledge is the larger input to production.

During the past three fiscal years, continued expansion and growth in activity attributable to USF's Innovation Enterprise have resulted in a significant increase in jobs supported. For the 2015 fiscal year, employment attributable to the USF Innovation Enterprise from *direct, indirect* and *induced* activities was 3,017. For the 2018 fiscal year, *direct*, *indirect* and *induced* activities were responsible for 4,060 employment, an increase of 1,043, or a significant 35 percent increase as shown in Figure 3.1 below.

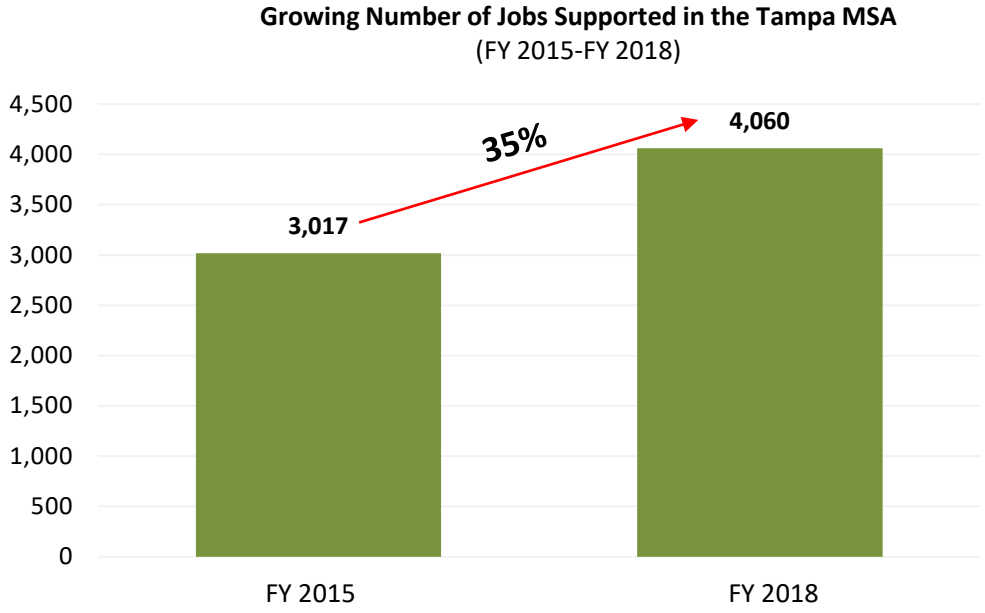


Figure 3.1.
Source: The Washington Economics Group, Inc. (WEG)

B. Generation of Household Income: USF's Innovation Enterprise Commercialization and Technology Transfer Activities Have Become Major Drivers in Increasing the Standard of Living of Tampa MSA Residents

The jobs created by Technology Transfer and Commercialization activities at USF's Innovation Enterprise generate significant Household Income for residents in the Tampa MSA. These activities create over $212 million in Household Income as quantified in Table 3 on the next page. In essence, USF's Innovation Enterprise Technology Transfer and Commercialization activities are important generators of Household Income each year, making an important contribution to the economic well-being of Tampa MSA residents.

As shown in Table 3 and Figure 4 on the next page, an estimated $183 million, or 86 percent, results from activities in the Knowledge-Based Industries sector. These are high-wage high-skill occupations targeted as a top priority by the economic development strategy of the Area. This is followed by the Visitor Industry that contributes almost $8 million, or 4 percent, while the Wholesale Trade &

Transportation Services, Retail Trade, Government & Other and Construction and Manufacturing sectors comprise almost $20 million, or 10 percent of the total Household Income impact generated.

Table 3. Household Income Generated by the USF's Innovation Enterprise Commercialization Activities in the Tampa MSA ($ in Thousands)

Industry	Total Impact	% of Total
Knowledge-Based Industries*	$183,490	86%
Visitor Industry	7,991	4%
Wholesale Trade & Transportation Services	6,684	3%
Retail Trade	6,369	3%
Government & Other	5,680	3%
Construction and Manufacturing	2,247	1%
Total:	**$212,461**	**100%**

Note: Total may not equal the sum of all due to rounding. See detailed tables in Appendix III.
Source: The Washington Economics Group, Inc. (WEG)

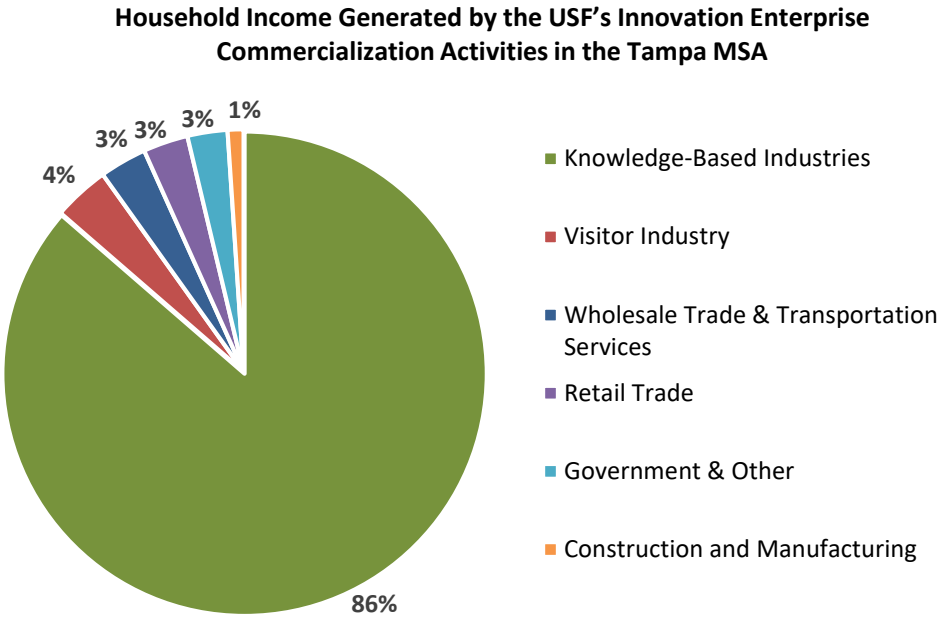


Figure 4.
Source: The Washington Economics Group, Inc. (WEG)

*Major industries under this category are: Life Sciences, IT, Finance Services, Professional and Administrative Services where knowledge is the larger input to production.

Since the prior Study, the successful activities of USF's Innovation Enterprise have resulted in a noticeable increase in Household Income. In the 2016 report, Household Income from *direct*, *indirect*, and *induced* activities was $149 million. In the current report, *direct*, *indirect* and *induced* activities were responsible for Household Income of $212 million, an increase of $63 million, or 42 percent as shown in Figure 4.1 below.

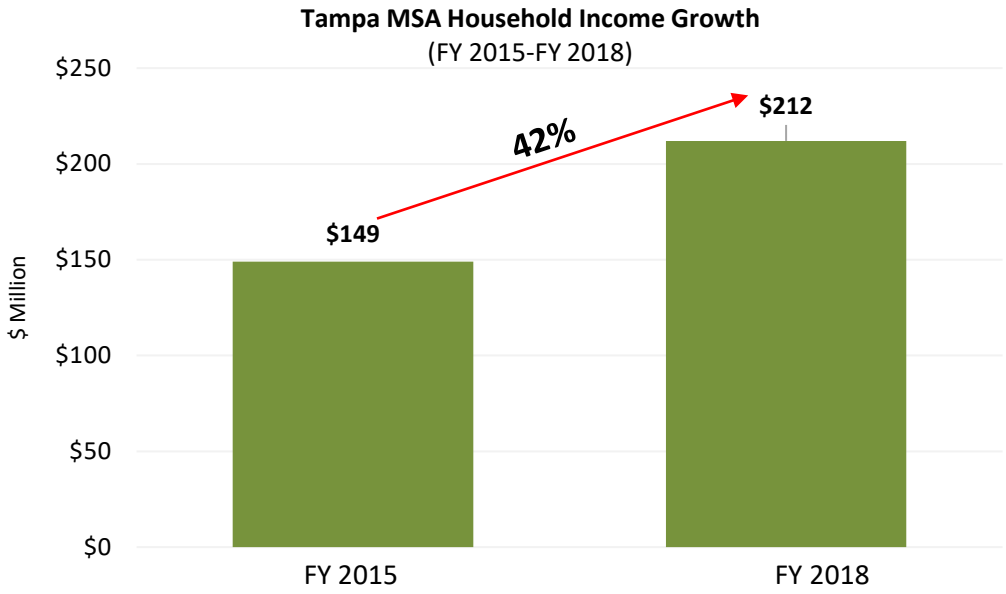


Figure 4.1.
Source: The Washington Economics Group, Inc. (WEG)

C. *USF's Innovation Enterprise Technology Transfer and Commercialization Activities Also Create Significant Value-Added Impacts for the Tampa MSA Economy*

Value added[21] is the portion of business revenues that is available to pay compensation to workers, capital income and indirect business taxes. Value added is also the principal source of income to households and a key measure of USF's Innovation Enterprise Technology Transfer and Commercialization activities' ongoing contributions to the Tampa MSA economy. An area's economic output is measured by its aggregate value added. At the national level, value added is Gross Domestic Product (GDP).

Each year, the activities of USF's Innovation Enterprise Technology Transfer and Commercialization add a net contribution to the Tampa MSA economy of $314 million, supporting the economic development drive of the Region.

[21] Value added" refers to the difference between business revenues and the cost of non-labor and non-capital inputs used to produce goods and/or services.

As shown in Table 4 and Figure 5 below, the greatest Value-Added impacts for the Tampa MSA are generated in the Knowledge-Based Industries sector, generating more than $264 million, or 84 percent of the total impact, while the Visitor Industry generates over $14 million, or 5 percent of the total. This is followed by other sectors such as Wholesale Trade & Transportation Services, Retail Trade, Government & Other and Construction and Manufacturing.

Table 4. GDP (Value-Added) Impacts Generated by the USF's Innovation Enterprise Commercialization Activities in the Tampa MSA ($ in Thousands)

Industry	Total Impact	% of Total
Knowledge-Based Industries*	$264,529	84%
Visitor Industry	14,329	5%
Wholesale Trade & Transportation Services	10,950	4%
Retail Trade	10,531	3%
Government & Other	9,424	3%
Construction and Manufacturing	3,916	1%
Total:	**$313,679**	**100%**

Note: Total may not equal the sum of all due to rounding. See detailed tables in Appendix III.
Source: The Washington Economics Group, Inc. (WEG)

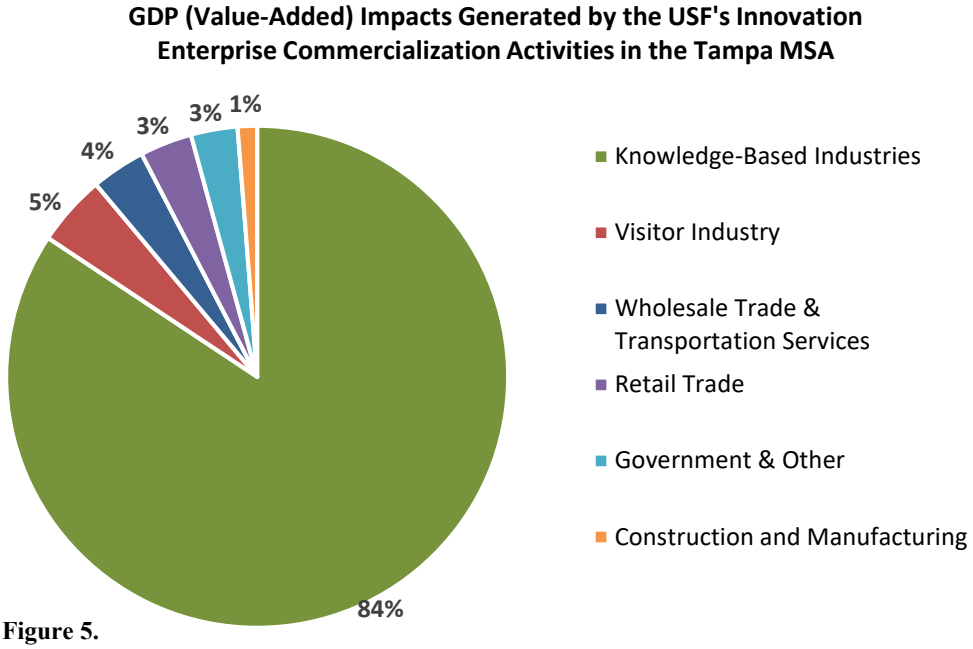


Figure 5.
Source: The Washington Economics Group, Inc. (WEG)

*Major industries under this category are: Life Sciences, IT, Finance Services, Professional and Administrative Services where knowledge is the larger input to production.

Since the first report, continued expansion and growth in activity attributable to USF's Innovation Enterprise have resulted in increased Gross Domestic Product (GDP) in the Tampa MSA. In the report of FY 2015 data, GDP (Value Added) attributable to the USF Innovation Enterprise from *direct*, *indirect*, and *induced* activities was $224 million. For FY 2018, *direct*, *indirect* and *induced* activities were responsible for a GDP of $314 million, an increase of $90 million, or a 40 percent as shown in Figure 5.1 below. This is another measure of the growing success of USF's Innovation Enterprise multifaceted activities in creating a value-added economy.

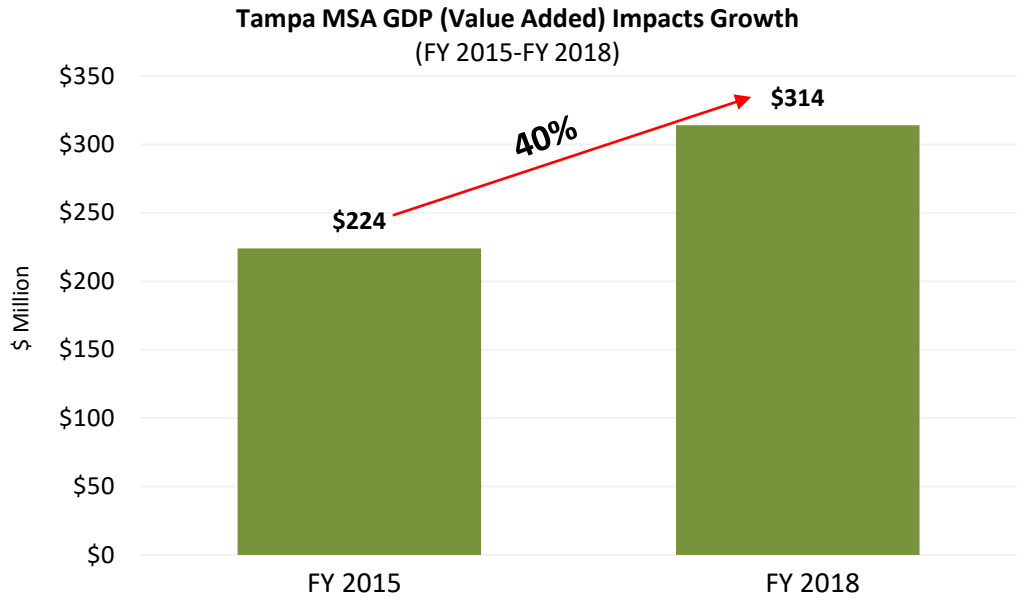


Figure 5.1.
Source: The Washington Economics Group, Inc. (WEG)

D. The Total Economic Impact of USF's Technology Transfer and Commercialization Activities at USF's Innovation Enterprise is a Significant $548 Million

A comprehensive measure of economic impact is Gross Economic Output, representing the sum of gross revenues (receipts) of private firms plus the value of government services (valued at cost). Table 5 and Figure 6 on the next page highlight the Total Economic Impact associated with USF's Innovation Enterprise's ongoing Technology Transfer and Commercialization activities, representing a significant $548 million in Total Economic Impact annually for the Tampa MSA. Given the high value-added nature of Commercialization and Technology Transfer, the largest portion of the Total Economic Impact occurs in the Knowledge-Based Industries sector representing 84 percent of the total. However, many other industries also benefit. Outside of the Knowledge-Based Industries sectors, the economic impact is widely distributed. All sectors of the Tampa MSAeconomy are positively impacted, but the greater percentage is created in the high-wage Knowledge-Based Industries sector.

In conclusion, Technology Transfer and Commercialization activities at USF's Innovation Enterprise have positive and important economic impacts for the Tampa MSA economy.

Table 5. Total Economic Impact Arising from the USF's Innovation Enterprise Commercialization Activities in the Tampa MSA ($ in Thousands)

Industry	Total Impact	% of Total
Knowledge-Based Industries*	$459,850	84%
Visitor Industry	24,829	5%
Wholesale Trade & Transportation Services	18,778	3%
Government & Other	18,612	3%
Retail Trade	16,133	3%
Construction and Manufacturing	9,899	2%
Total:	**$548,101**	**100%**

Note: Total may not equal the sum of all due to rounding. See detailed tables in Appendix III.
Source: The Washington Economics Group, Inc. (WEG)

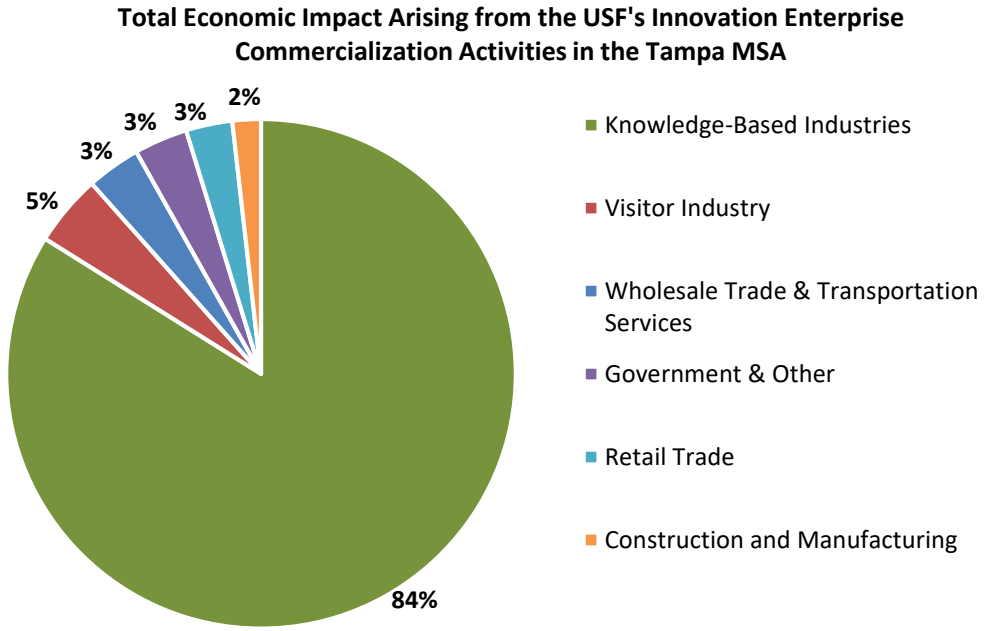


Figure 6.
Source: The Washington Economics Group, Inc. (WEG)

*Major industries under this category are: Life Sciences, IT, Finance Services, Professional and Administrative Services where knowledge is the larger input to production.

Since WEG's last Study, continued expansion and growth in activity attributable to USF's Innovation Enterprise have resulted in a significant increase in Total Economic Impact. In the report of FY 2015 data, the Total Economic Impact attributable to the USF Innovation Enterprise from *direct*, *indirect* and *induced* activities was $395 million. In the report of FY 2018 data, *direct*, *indirect* and *induced* activities generated a Total Economic Impact of $548 million, an increase of $153 million, or a 39 percent increase as shown in Figure 6.1 below.

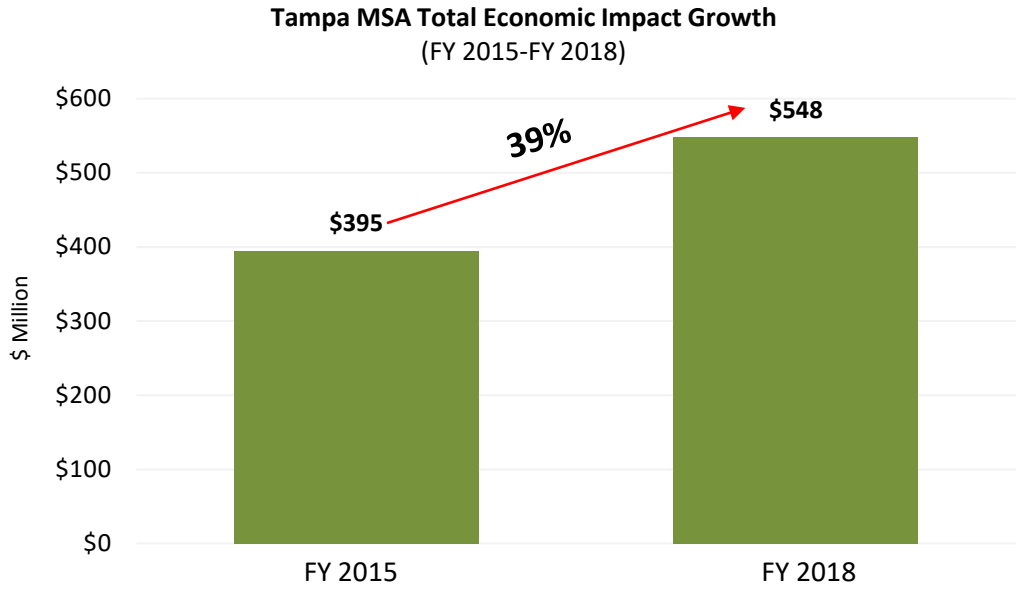


Figure 6.1.
Source: The Washington Economics Group, Inc. (WEG)

E. Recurring Fiscal Contributions Generated by the Technology Transfer and Commercialization Activities at USF's Innovation Enterprise

The increased economic activity resulting from the Technology Transfer and Commercialization activities at USF's Innovation Enterprise results in significant tax and other public revenues for Federal, State and local governments each year. Table 6 on the next page shows that over $71 million of total fiscal revenues result annually from these activities. Of this total, almost $52 million, or 73 percent, flows to the Federal government, with the remaining $19 million, or 27 percent, of tax revenues allocated to State and local governments throughout Florida.

Table 6. Annual Fiscal Contributions Attributable to the USF'S Innovation Enterprise Commercialization Activities in the Tampa MSA ($ in Thousands)

Taxes and Fees Paid By:	Federal	State and Local	Total
Labor	$24,392	$0	$24,392
Capital	$520	$0	$520
Indirect Business Taxes	$2,227	$16,922	$19,149
Households	$19,249	$1,616	$20,865
Corporations	$5,418	$723	$6,141
Total:	**$51,806**	**$19,261**	**$71,067**

Note: Total may not equal the sum of all due to rounding.
Source: The Washington Economics Group, Inc. (WEG)

During the past three years continued expansion and growth in activity attributable to USF's Innovation Enterprise have resulted in growth of Public-Sector Revenues. In the report of FY 2015 data, Public-Sector Revenues attributable to the USF Innovation Enterprise from *direct, indirect* and *induced* activities was $52 million. In the current update report of FY 2018 data, *direct, indirect* and *induced* activities generated Public-Sector Revenues of $71 million, an increase of $19 million, or a 37 percent increase as shown in Figure 7 below.

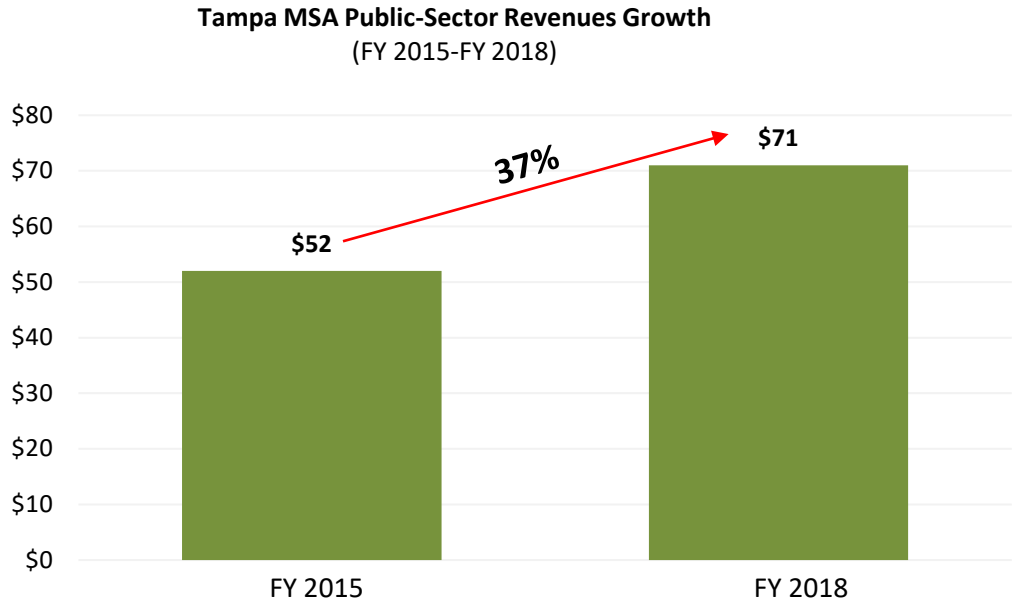


Figure 7.
Source: The Washington Economics Group, Inc. (WEG)

THE ECONOMIC IMPACTS OF USF'S INNOVATION ENTERPRISE AND COMMERCIALIZATION ACTIVITIES ON THE STATE OF FLORIDA

IV. The Annually Recurring Economic Impacts of Commercialization Activities at USF's Innovation Enterprise on the Florida Economy are Important

The ongoing Technology Transfer and Commercialization activities that take place within USF's Innovation Enterprise create important and growing quantifiable economic impacts each year on the Florida economy (see Appendix III for Detailed Economic Impact Tables). These economic impacts, estimated by utilizing a professionally accepted and widely used methodology, generate high-wage employment, create Household Income, Economic Impact (Output) and Public Revenues **throughout the State of Florida**. **While most of the economic impacts occur in the Tampa MSA, the Region of USF's principal operations, there are positive "spillover" impacts for the State as a whole**.

The *direct impact* of these activities comprises all of the operating expenditures[22] made by the University's Technology Transfer and Commercialization activities in addition to the activities of each of the companies located in TBTI and USF Research Park. Utilizing the *direct* economic impacts discussed above, *indirect* and *induced* economic impacts of these recurring operations were calculated using an extended *input-output* model of the economy of the State of Florida. Table 7 below details the *direct*, *indirect* and *induced* economic impacts on the State.

Table 7. Summary of the Economic Impacts of the USF's Innovation Enterprise Commercialization Activities in Florida

Impact on:	Direct	Indirect & Induced	Total Impact
Employment (Jobs)	1,992	2,282	**4,274**
Household Income ($ Million)	$121	$102	**$223**
Gross Domestic Product (Value Added $ Million)	$149	$183	**$332**
Federal, State & Local Tax Revenues ($ Million)*	- -	- -	**$76**
Total Economic Impact ($ Million)	$267	$315	**$582**

*Taxes indirectly generated through increased economic activity.
Notes: Total may not equal the sum of all due to rounding. See definition of terms in Economic Glossary (Appendix II).
Source: The Washington Economics Group, Inc. (WEG)

A. Over 4,200 Florida High-Wage Jobs Are Supported by the Technology Transfer and Commercialization Activities at USF's Innovation Enterprise

Over 4,200 jobs for Florida residents are estimated to result *directly*, *indirectly* and *induced* from Technology Transfer and Commercialization activities taking place at USF's Innovation Enterprise. These activities *directly* create 1,992 jobs (Table 7) in the Knowledge-Based Industries, where

[22] Information on these expenditures was provided by USF.

knowledge is the larger input to production and other sectors of the Florida economy. However, the *indirect* and *induced* job creation processes that result from these research and product development activities also reach deeply into all sectors of the State's economy. This dramatically and quickly demonstrates the close supply inter-relationships that the Knowledge-Based Industries sector has with all of the other sectors of the Florida economy.

An additional 1,019 jobs are supported via *indirect* economic effects (mostly suppliers of goods and services to the research and product development processes). Lastly, 1,263 jobs are generated from *induced* spending effects (Table 7). Technology Transfer, Commercialization, product development and the associated supporting industries are business sectors with a high proportion of high-wage, high-skilled jobs that are targeted by State leaders in their economic development strategy.

Table 8 below and Figure 8 on the next page show the breakdown of the jobs created in more detail by sectors with the Knowledge-Based Industries sector providing an important 82 percent of the total. It should be noted that the *induced* and *indirect* effects of jobs created are also included in the Visitor Industry, Retail Trade, and in the Wholesale Trade & Transportation Services sectors, accounting for 14 percent of all job creation.

Table 8. High-Wage Jobs Supported by the USF's Innovation Enterprise Commercialization Activities in Florida

Industry	Jobs Supported	% of Total
Knowledge-Based Industries*	3,496	82%
Visitor Industry	324	7%
Retail Trade	200	4%
Wholesale Trade & Transportation Services	121	3%
Government & Other	72	2%
Construction and Manufacturing	61	2%
Total:	**4,274**	**100%**

Note: Total may not equal the sum of all due to rounding. See detailed tables in Appendix III.
Source: The Washington Economics Group, Inc. (WEG)

*Major industries under this category are: Life Sciences, IT, Finance Services, Professional and Administrative Services where knowledge is the larger input to production.

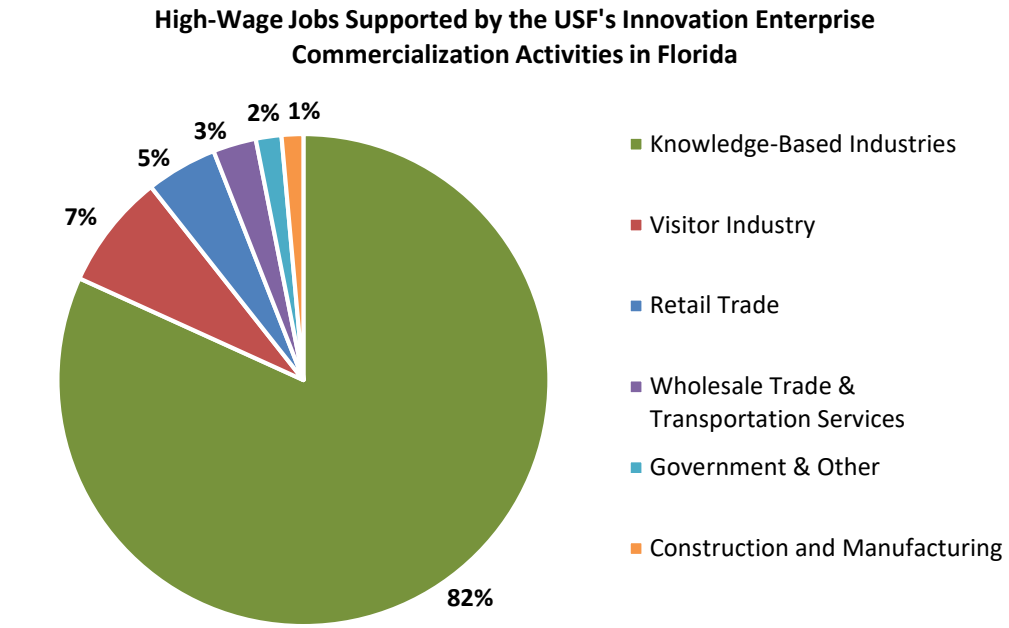


Figure 8.
Source: The Washington Economics Group, Inc. (WEG)

During the past three years, continued expansion and growth in activity attributable to USF's Innovation Enterprise have resulted in increased employment. In the report of FY 2015 data, Florida employment attributable to the USF Innovation Enterprise from *direct*, *indirect* and *induced* activities was 3,104. In the report of FY 2018 data, *direct*, *indirect* and *induced* activities were responsible for the employment throughout Florida of 4,274 persons, an increase of 1,120, or a 36 percent increase as shown in Figure 8.1 below.

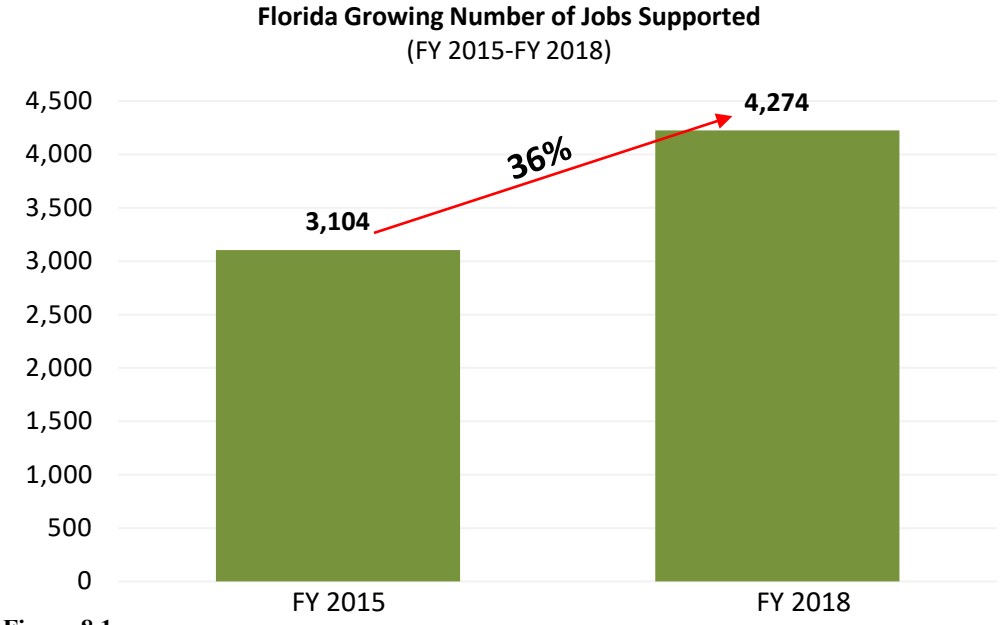


Figure 8.1.
Source: The Washington Economics Group, Inc. (WEG)

B. USF's Innovation Enterprise's Technology Transfer and Commercialization Activities Contribute to Florida's Economic Diversification Toward High-Wage, High-Skill Industries

The State's Economic Development Strategy targets the creation of an innovation economy, leading to high-wage occupations and commercializagtion of new discoveries. USF Innovation Enterprise is a key contributor to this strategy.

The jobs created by the Technology Transfer and Commercialization activities at USF's Innovation Enterprise generate significant Household Income impacts throughout Florida, which generate over $223 million for Florida's Households each year as quantified in Table 9 below.

Table 9. Household Income Generated by the USF's Innovation Enterprise Commercialization Activities in Florida ($ in Thousands)

Industry	Total Impact	% of Total
Knowledge-Based Industries*	$190,736	85%
Visitor Industry	9,224	4%
Wholesale Trade & Transportation Services	7,710	3%
Retail Trade	6,412	3%
Government & Other	6,213	3%
Construction and Manufacturing	3,033	2%
Total:	**$223,328**	**100%**

Note: Total may not equal the sum of all due to rounding. See detailed tables in Appendix III.
Source: The Washington Economics Group, Inc. (WEG)

As shown in Table 9 above and Figure 9 on the following page, almost $191 million, or 85 percent of household income results from activities in the Knowledge-Based Industries sector targeted for growth by the State. The Visitor Industry contributes over $9 million, or 4 percent, followed by Wholesale Trade & Transportation Services, Retail Trade, and the Government and Other sectors which combined generate close to $30 million or 13 percent. The remaining sector, Construction and Manufacturing, contributes over $3 million or 2 percent of the Household Income created.

*Major industries under this category are: Life Sciences, IT, Finance Services, Professional and Administrative Services where knowledge is the larger input to production.

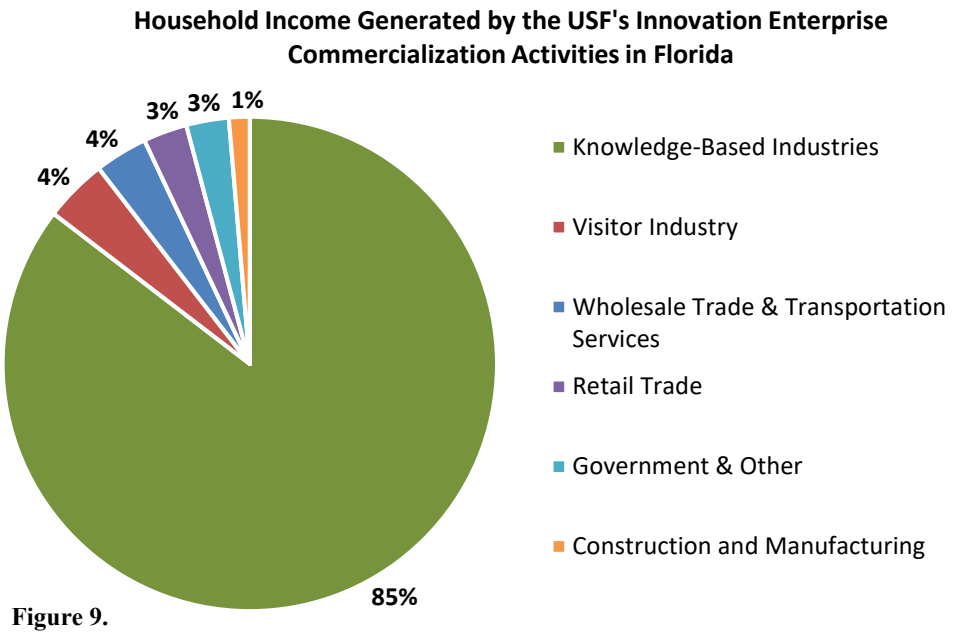


Figure 9.
Source: The Washington Economics Group, Inc. (WEG)

Continued expansion and growth in activity attributable to USF's Innovation Enterprise have resulted in increased Household Income throughout Florida during the past three years. In the report of FY 2015 data, Florida household income attributable to USF's Innovation Enterprise from *direct, indirect* and *induced* activities was $149 million. In the report of FY 2018 data, *direct, indirect* and *induced* activities were responsible for Florida Household Income of $223 million, an increase of $74 million, or a 50 percent increase as shown in Figure 9.1 below.

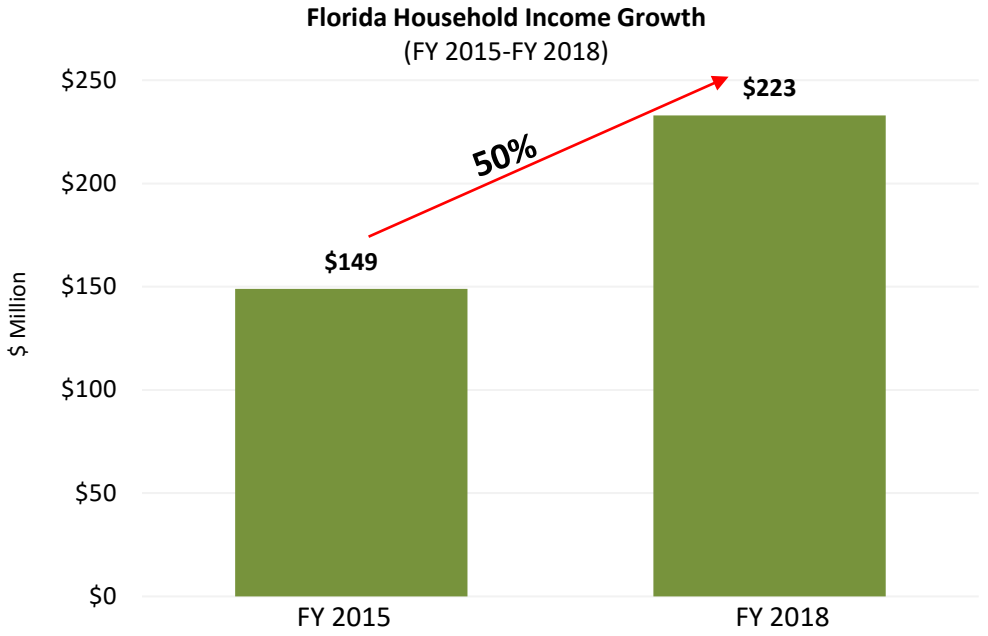


Figure 9.1.
Source: The Washington Economics Group, Inc. (WEG)

C. *USF's Innovation Enterprise's Technology Transfer and Commercialization Activities Create Significant Value-Added Impacts Annually for Florida's Economy*

Value added is the portion of business revenues that is available to pay compensation to workers, capital income and indirect business taxes.[23] Value added is also the principal source of income to households and a key measure of USF's Innovation Enterprise's Technology Transfer and Commercialization ongoing contributions to the State and its Economic Development Strategy. Table 10 below highlights the value-added impacts generated by these activities, adding each year a net contribution to the State's economy of almost $332 million. **By this measure, USF's Innovation Enterprise's commercialization activities support the drive to create a high value-added, high-wage economy in Florida**.

Table 10. GDP (Value-Added) Impacts Generated by the USF's Innovation Enterprise Commercialization Activities in Florida ($ in Thousands)

Industry	Total Impact	% of Total
Knowledge-Based Industries*	$275,128	83%
Visitor Industry	16,357	5%
Wholesale Trade & Transportation Services	12,684	4%
Government & Other	11,856	3%
Retail Trade	10,565	3%
Construction and Manufacturing	5,244	2%
Total:	**$331,834**	**100%**

Note: Total may not equal the sum of all due to rounding. See detailed tables in Appendix III.
Source: The Washington Economics Group, Inc. (WEG)

The greatest value-added impacts for Florida are generated in the Knowledge-Based Industries sector, generating over $275 million or 83 percent of the total impact, while the Visitor Industry creates over $16 million, or 5 percent of the total. This is followed by other sectors such as Wholesale Trade & Transportation Services, Government & Other, Retail Trade, Construction and Manufacturing as illustrated in Figure 10 on the next page.

[23] Aggregate value added also includes compensation to government workers.

[*] Major industries under this category are: Life Sciences, IT, Finance Services, Professional and Administrative Services where knowledge is the larger input to production.

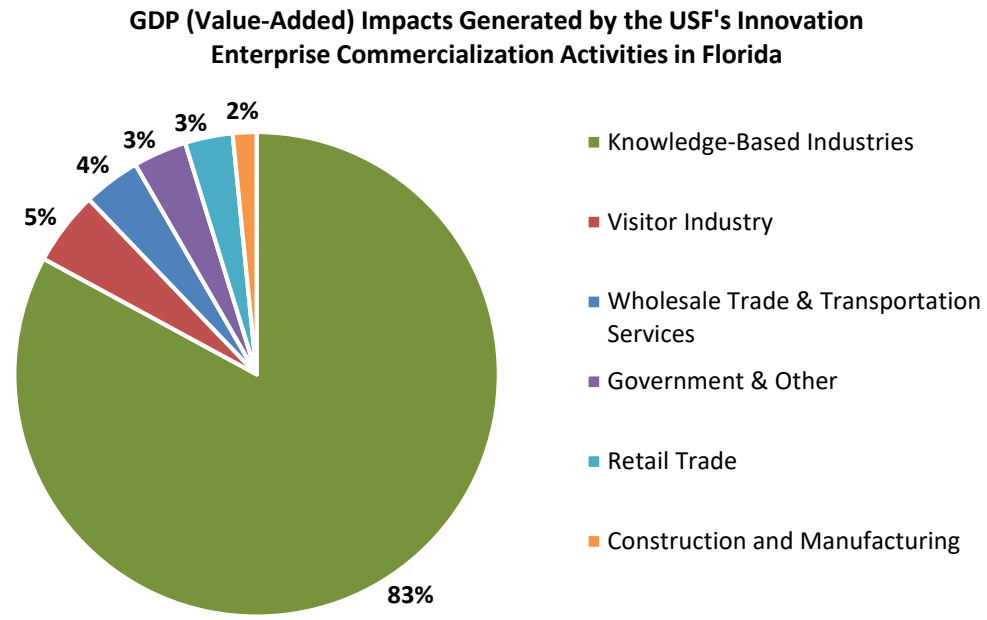


Figure 10.
Source: The Washington Economics Group, Inc. (WEG)

Continued expansion and growth in activity attributable to USF's Innovation Enterprise have contributed to increased GDP throughout the State of Florida during the past three years. In FY2015, Florida GDP (Value Added) attributable to USF's Innovation Enterprise from *direct, indirect* and *induced* activities was $224 million. In FY2018, *direct, indirect* and *induced* activities were responsible for Florida Gross Domestic Product of $332 million, an increase of $108 million, or a 48 percent growth as shown in Figure 10.1 below.

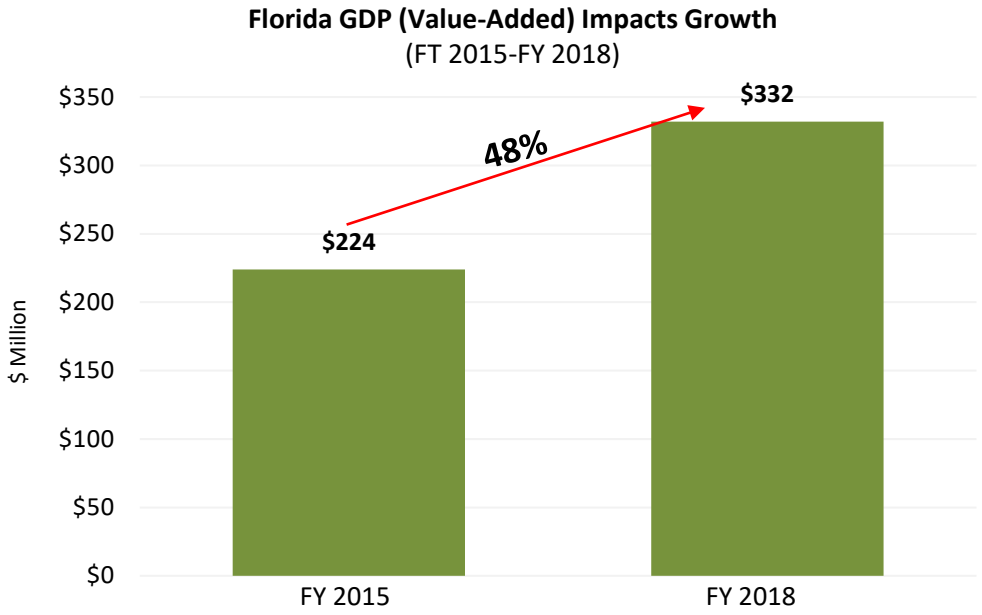


Figure 10.1.
Source: The Washington Economics Group, Inc. (WEG)

D. The Recurring Total Economic Impact of USF's Innovation Enterprise's Commercialization Activities in Florida is over $582 Million

A comprehensive measure of economic impact is Gross Economic Output, representing the sum of gross revenues (receipts) of private firms plus the value of government services (valued at cost). Table 11 below highlights the Total Economic Impact associated with USF's Innovation Enterprises's ongoing Technology Transfer and Commercialization activities, representing a significant $582 million in gross economic impact annually for Florida.

As expected and as it was the case in the Tampa MSA region, the largest portion of the Total Economic Impact occurs in the Knowledge-Based Industries sector representing 82 percent of the total. However, many other industries also benefit, as shown in Table 11 below and Figure 11 on the next page. Outside of the Knowledge-Based Industries sectors, the economic impact is widely distributed.

Table 11. Total Economic Impact Arising from the USF's Innovation Enterprise Commercialization Activities in Florida ($ in Thousands)

Industry	Total Impact	% of Total
Knowledge-Based Industries*	$478,661	82%
Visitor Industry	27,090	5%
Government & Other	23,704	4%
Wholesale Trade & Transportation Services	21,828	3%
Retail Trade	16,535	3%
Construction and Manufacturing	14,676	3%
Total:	**$582,494**	**100%**

Note: Total may not equal the sum of all due to rounding. See detailed tables in Appendix III.
Source: The Washington Economics Group, Inc. (WEG)

All sectors are positively impacted, and the impacts range between 3 and 5 percent of the impact. **In essence, Technology Transfer and Commercialization activities at USF's Innovation Enterprise have positive and important economic impacts for the Florida economy.**

*Major industries under this category are: Life Sciences, IT, Finance Services, Professional and Administrative Services where knowledge is the larger input to production.

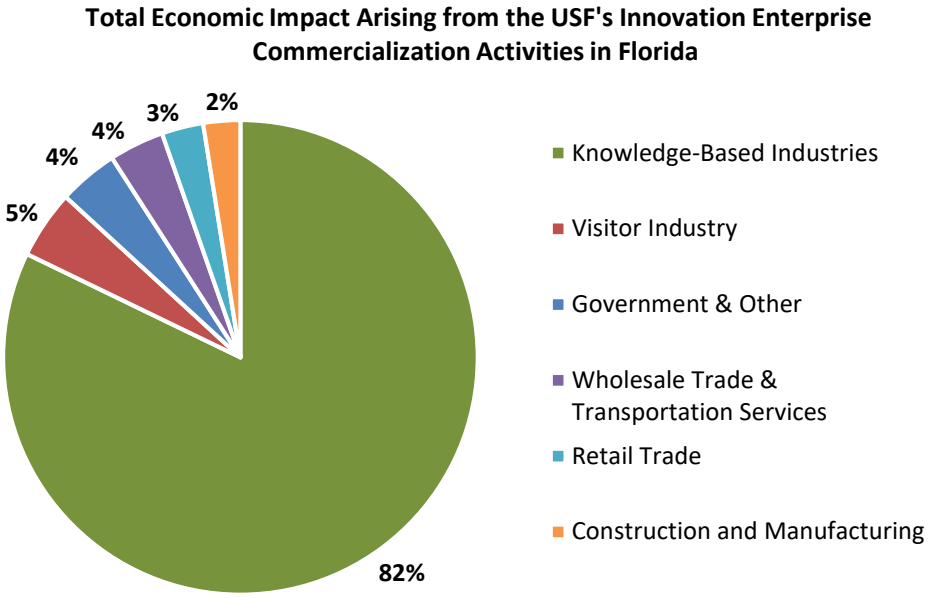


Figure 11.
Source: The Washington Economics Group, Inc. (WEG)

The expansion and growth growth in activities attributable to USF's Innovation Enterprise have continued during the past three years resulting in the growth of Economic Impact (Output). In the prior Study of 2015 data, Florida's Economic Impact attributable to USF's Innovation Enterprise from *direct, indirect* and *induced* activities was $400 million. In the report of FY 2018 data, these activities generated Total Economic Impact throughout Florida of $582 million, an increase of $182 million, or a 46 percent growth as shown in Figure 11.1 below.

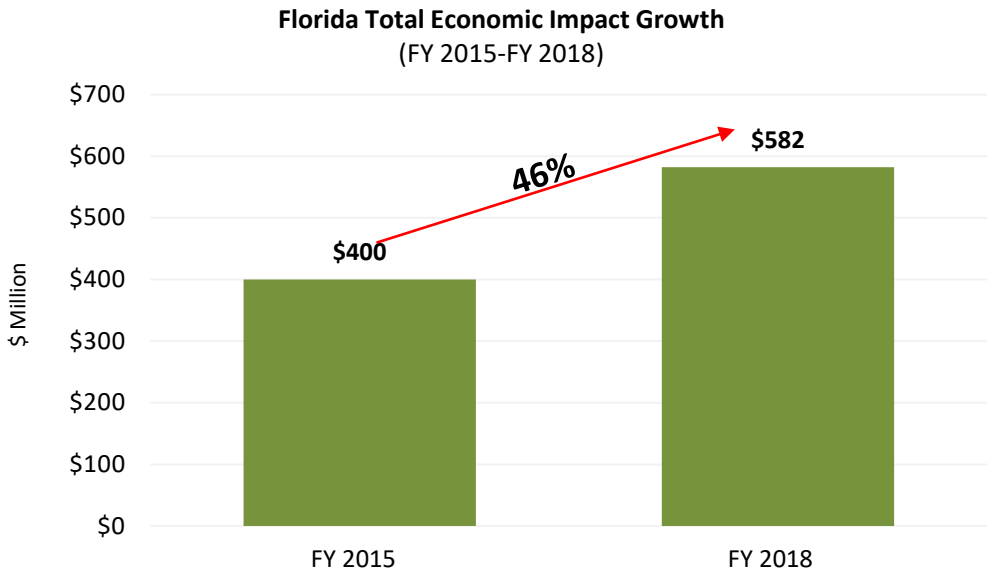


Figure 11.1
Source: The Washington Economics Group, Inc. (WEG)

E. Recurring Fiscal Contributions Generated by Technology Transfer and Commercialization Activities at USF's Innovation Enterprise

As Technology Transfer and Commercialization activities at USF's Innovation Enterprise continue to expand the process results in significant tax and other public revenues for Federal, State and local governments each year as shown in Table 12 below.

Almost $76 million of total fiscal revenues results annually from these activities. Of this total, over $54 million, or 72 percent, flows to the Federal government, with the remaining $21 million, or 28 percent, of tax revenues allocated to State and local governments throughout Florida.

Table 12. Annual Fiscal Contributions Attributable to the USF's Innovation Enterprise Commercialization Activities in Florida ($ in Thousands)

Taxes and Fees Paid By:	Federal	State and Local	Total
Labor	$25,583	$0	$25,583
Capital	$667	$0	$667
Indirect Business Taxes	$2,208	$18,843	$21,051
Households	$20,596	$1,830	$22,426
Corporations	$5,352	$724	$6,076
Total:	**$54,406**	**$21,397**	**$75,803**

Note: Total may not equal the sum of all due to rounding.
Source: The Washington Economics Group, Inc. (WEG)

During the past three years continued expansion and growth in activity attributable to USF's Innovation Enterprise have resulted in growth of Public-Sector Revenues throughout the State of Florida. In the report of FY 2015 data, Florida Public-Sector Revenues attributable to USF's Innovation Enterprise from *direct, indirect* and *induced* activities was $53 million. In the report of FY 2018 data, *direct, indirect* and *induced* activities generated Public-Sector Revenues throughout the State of $76 million, an increase of $23 million, or a 43 percent increase as shown in Figure 12 on the next page.

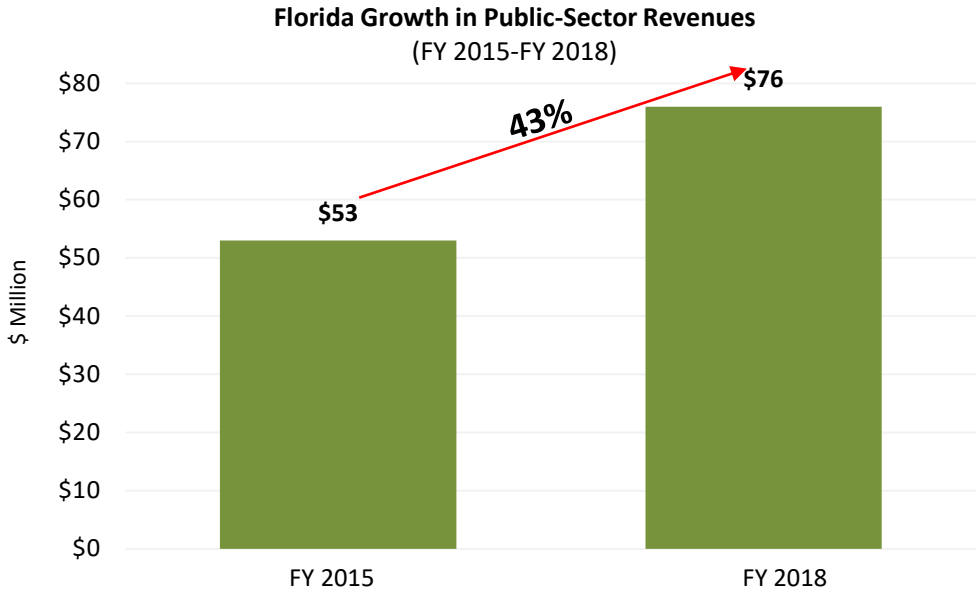


Figure 12.
Source: The Washington Economics Group, Inc. (WEG)

Appendix I: Methodology

IMPLAN Model

The multiplier impacts calculated by the IMPLAN model are based on input-output methodology, which explicitly considers the inter-industry linkages that exist within an economy. Each industry needs labor and inputs from other industries in order to produce economic output. Whenever an industry experiences an increase in the demand for its output, many other industries within that economy indirectly experience an increase in demand as well because of these inter-industry linkages. This increase in demand that results from the need for material inputs is called the *indirect effects*. In addition, an increase in production within a region also leads to an increase in household income through the hiring of workers, which in turn generates further demands for goods and services within the region. Firms also need to expand their base of physical capital to meet higher levels of demand, and this too stimulates regional economic growth. The latter effects are referred to as *induced effects*. The inter-industry linkages and the induced effects on consumer and capital spending lead to successive rounds of production, and this process results in an increase in output that exceeds the initial change in demand, or a *multiplier effect*. Similarly, the increase in household income will exceed the initial payroll increase encountered in the industry that experienced the original increase in demand. The total change in employment in the regional economy is a multiple of the direct change in employment.

$$
\begin{aligned}
x_1 &= a_{11}x_1 + a_{12}x_2 + a_{13}x_3 + \cdots + a_{1k}x_k + a_{1h}x_h + a_{1i}x_i + f_1 \\
x_2 &= a_{21}x_1 + a_{22}x_2 + a_{23}x_3 + \cdots + a_{2k}x_k + a_{2h}x_h + a_{2I}x_I + f_2 \\
x_3 &= a_{31}x_1 + a_{32}x_2 + a_{33}x_3 + \cdots + a_{3k}x_k + a_{3h}x_h + a_{3i}x_i + f_3 \\
&\vdots \\
x_k &= a_{k1}x_1 + a_{k2}x_2 + a_{k3}x_3 + \cdots + a_{kk}x_k + a_{kh}x_h + a_{ki}x_i + f_k \\
x_h &= a_{h1}x_1 + a_{h2}x_2 + a_{h3}x_h + \cdots + a_{hk}x_k + a_{hh}x_h + a_{hi}x_i + f_h x_i \\
&= a_{i1}x_1 + a_{i2}x_2 + a_{i3}x_h + \cdots + a_{ik}x_k + a_{ih}x_h + a_{ii}x_i + f_i
\end{aligned}
$$

The following represents the system of equations that comprise the regional economy in an extended input-output model like IMPLAN:

The variables x_1 to x_k represent total production of output in each industry. The coefficients a_{ij} represent the purchases from industry "i" that are needed to produce a dollar of output in industry "j". These are known as the *direct requirement* coefficients. The variable x_h refers to household income and the coefficients a_{ih} refer to the average amount of household income spent on purchases from industry "i", or the *average propensities to consume*. The coefficients a_{hi} are similar to the inter-industry purchases (a_{ij}'s), but they represent the household income that is generated from each dollar of output produced in industry "i". Similarly the variable x_I represents regional spending on capital goods, and the coefficients a_{Ij} represents the spending on capital goods for each dollar of output produced in industry "j". The coefficients a_{jI} represent the amount purchased from industry "j" for each dollar spent on capital goods within the region. The variables f_j represent the exogenous final demand faced by each industry, respectively.

This system of equation reduces, using matrix notation, to the following solution for industry output and household income:

$$X = (I - A)^{-1} F$$

X is the vector of industry outputs plus household income and F is a vector of exogenous final demands. The "output multipliers" (i.e., the change in industry output and household income that results from a change in final demand for the output of a particular industry) are given in the columns of the $(I-A)^{-1}$ matrix. The IMPLAN software calculates these multipliers for counties, states and other sub-state regions. These multipliers can be used to provide a sense of the economic importance of an industry or an economic activity in a given region. The multipliers impacts for gross state product, labor and capital income and the government revenue impacts are derived from the basic output multipliers given by $(I-A)^{-1}$.

The IMPLAN model uses historical relationships between public-sector revenues and regional economic output in order to estimate the public-sector revenue impact resulting from the establishment of a new, or expansion of an existing economic activity.

Appendix II: Economic Glossary

Definitions of Economic Terms Used in the Analysis	
Employment	Total of full-time or part-time jobs.
Household (Labor) Income	All forms of employment income, including Employee Compensation (wages and benefits) and Proprietor Income.
Gross Domestic Product (Value Added)	The increased value of a product as a result of the economic inputs (labor and capital) expended at a given stage. In the IMPLAN Model, GDP is the sum of: Employee Compensation, Proprietor Income, Other Property Type Income (Interest) and Indirect Business Taxes.
Economic Impact	Total value of all transactions attributed to an activity.
Direct Effects	The set of expenditures applied to the predictive model (i.e., I/O multipliers) for impact analysis. It is a series (or single) of production changes or expenditures made by producers/consumers as a result of an activity or policy. These initial changes are determined by an analyst to be a result of this activity or policy. Applying these initial changes to the multipliers in an IMPLAN model will then display how the region will respond, economically to these initial changes.
Indirect Effects	The impact of local industries buying goods and services from other local industries. The cycle of spending works its way backward through the supply chain until all money leaks from the local economy, either through imports or by payments to value added. The impacts are calculated by applying Direct Effects to the Type I Multipliers.
Induced Effects	The response by an economy to an initial change (direct effect) that occurs through re-spending of income received by a component of value added. IMPLAN's default multiplier recognizes that labor income (employee compensation and proprietor income components of value added) is not a leakage to the regional economy. This money is re-circulated through the household spending patterns causing further local economic activity.

Appendix III: Detailed Impact Tables

Detailed Impact Tables

Within the main portion of the Study the economic impacts are presented at a summary level. *Direct, Indirect* and *Induced* Impacts are aggregated into the Total Impact, and Industries are summarized by function. The following Tables present detailed impacts at the two-digit NAICS industry classification level. The following industry sector summarizations are used in this Study:

1. **Government & Other** is the sum of: Agriculture & Forestry, Mining, Utilities, Company Management and Government & Other.
2. **Knowledge-Based Industries** is the sum of: Information, Finance & Insurance, Real Estate, Professional Services, Administrative, Educational Services, Health & Social Services, Arts, Entertainment & Recreation and Other Services.
3. **Wholesale Trade & Transportation Services** is the sum of: Wholesale Trade and Transportation & Warehousing.
4. The **Accommodation and Food Services** sector was renamed **Visitor Industry.**

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Table B-2. Household Income Generated by USF's Innovation Enterprise's Commercialization Activities 56

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Table B-4. Total Annual Economic Impact Arising from USF's Innovation Enterprise's Commercialization Activities 58

Tampa MSA Detailed Economic Impact Tables

Table A-1. Total High-Wage Jobs Supported by USF's Innovation Enterprise's Commercialization Activities

Industry	Supported			
	Direct	Indirect	Induced	Total
Agriculture & Forestry	0	1	3	4
Mining	0	0	0	1
Utilities	0	4	2	5
Construction	0	16	14	30
Manufacturing	0	7	7	14
Wholesale Trade	0	12	32	44
Transportation & Warehousing	0	6	183	189
Retail Trade	0	29	32	60
Information	0	18	17	35
Finance & Insurance	0	39	90	129
Real Estate	0	157	67	224
Professional Services	698	298	60	1,056
Company Management	5	17	11	33
Administrative	0	196	79	274
Educational Services	1,131	12	39	1,183
Health & Social Services	0	0	217	217
Arts, Entertainment & Recreation	15	14	36	64
Accommodation & Food Services	125	50	143	318
Other Services	18	27	117	162
Government & Other	0	11	7	18
Total:	**1,992**	**913**	**1,155**	**4,060**

Note: Total may not equal the sum of all due to rounding.
Source: The Washington Economics Group, Inc. (WEG) from IMPLAN Input/Output Methodology.

Table A-2. Household Income Generated by USF's Innovation Enterprise's Commercialization Activities ($ in Thousands)

Industry	Impacts			
	Direct	Indirect	Induced	Total
Agriculture & Forestry	$0	$32	$56	$87
Mining	$0	$2	$2	$3
Utilities	$0	$490	$223	$714
Construction	$0	$781	$652	$1,433
Manufacturing	$0	$372	$443	$815
Wholesale Trade	$0	$881	$2,435	$3,316
Transportation & Warehousing	$0	$210	$6,159	$6,369
Retail Trade	$0	$1,679	$1,689	$3,368
Information	$0	$1,727	$1,574	$3,301
Finance & Insurance	$0	$2,704	$5,389	$8,093
Real Estate	$0	$2,529	$1,149	$3,678
Professional Services	$56,710	$21,779	$4,350	$82,839
Company Management	$465	$1,614	$1,021	$3,099
Administrative	$0	$7,528	$2,678	$10,206
Educational Services	$52,426	$309	$1,368	$54,102
Health & Social Services	$0	$1	$12,996	$12,997
Arts, Entertainment & Recreation	$297	$356	$931	$1,583
Accommodation & Food Services	$3,513	$1,189	$3,289	$7,991
Other Services	$1,285	$1,346	$4,060	$6,691
Government & Other	$0	$1,091	$686	$1,777
Total:	**$114,693**	**$46,619**	**$51,149**	**$212,461**

Note: Total may not equal the sum of all due to rounding.
Source: The Washington Economics Group, Inc. (WEG) from IMPLAN Input/Output Methodology.

Table A-3. GDP (Value-Added) Impacts Generated by USF's Innovation Enterprise's Commercialization Activities ($ in Thousands)

Industry	Impacts			
	Direct	Indirect	Induced	Total
Agriculture & Forestry	$0	$52	$102	$154
Mining	$0	$10	$9	$18
Utilities	$0	$1,495	$901	$2,396
Construction	$0	$1,217	$1,005	$2,221
Manufacturing	$0	$586	$1,109	$1,695
Wholesale Trade	$0	$1,761	$4,871	$6,632
Transportation & Warehousing	$0	$314	$10,218	$10,531
Retail Trade	$0	$2,145	$2,174	$4,318
Information	$0	$3,619	$4,356	$7,976
Finance & Insurance	$0	$3,854	$8,688	$12,542
Real Estate	$0	$20,788	$20,223	$41,010
Professional Services	$72,140	$24,947	$5,653	$102,740
Company Management	$587	$2,041	$1,292	$3,920
Administrative	$0	$10,015	$3,429	$13,445
Educational Services	$57,740	$316	$1,452	$59,508
Health & Social Services	$0	$1	$15,156	$15,157
Arts, Entertainment & Recreation	$275	$523	$1,586	$2,384
Accommodation & Food Services	$7,566	$1,634	$5,129	$14,329
Other Services	$3,322	$1,941	$4,505	$9,768
Government & Other	$0	$1,781	$1,156	$2,937
Total:	**$141,630**	**$79,037**	**$93,012**	**$313,679**

Note: Total may not equal the sum of all due to rounding.
Source: The Washington Economics Group, Inc. (WEG) from IMPLAN Input/Output Methodology.

Table A-4. Total Economic Impact Arising from USF's Innovation Enterprise's Commercialization Activities ($ in Thousands)

Industry	Impacts			
	Direct	Indirect	Induced	Total
Agriculture & Forestry	$0	$90	$179	$269
Mining	$0	$42	$29	$71
Utilities	$0	$2,894	$1,866	$4,760
Construction	$0	$2,464	$2,096	$4,560
Manufacturing	$0	$1,805	$3,534	$5,339
Wholesale Trade	$0	$2,699	$7,465	$10,164
Transportation & Warehousing	$0	$488	$15,645	$16,133
Retail Trade	$0	$4,120	$4,494	$8,614
Information	$0	$8,222	$9,525	$17,747
Finance & Insurance	$0	$8,042	$19,466	$27,508
Real Estate	$0	$30,402	$30,540	$60,942
Professional Services	$145,323	$39,336	$8,352	$193,011
Company Management	$1,059	$3,680	$2,329	$7,068
Administrative	$0	$14,538	$5,346	$19,884
Educational Services	$95,890	$489	$2,199	$98,578
Health & Social Services	$0	$1	$24,312	$24,313
Arts, Entertainment & Recreation	$532	$930	$2,870	$4,332
Accommodation & Food Services	$12,895	$2,899	$9,035	$24,829
Other Services	$3,977	$2,834	$6,724	$13,535
Government & Other	$0	$3,899	$2,545	$6,444
Total:	**$259,676**	**$129,874**	**$158,551**	**$548,101**

Note: Total may not equal the sum of all due to rounding.
Source: The Washington Economics Group, Inc. (WEG) from IMPLAN Input/Output Methodology.

State of Florida Detailed Economic Impact Tables

Table B-1. Total High-Wage Jobs Supported by USF's Innovation Enterprise's Commercialization Activities

Industry	Supported			
	Direct	Indirect	Induced	Total
Agriculture & Forestry	0	3	7	10
Mining	0	2	2	4
Utilities	0	7	4	10
Construction	0	18	15	33
Manufacturing	0	13	14	28
Wholesale Trade	0	12	33	46
Transportation & Warehousing	0	7	193	200
Retail Trade	0	35	41	75
Information	0	20	20	40
Finance & Insurance	0	43	100	143
Real Estate	0	195	87	283
Professional Services	698	317	67	1,083
Company Management	5	16	11	32
Administrative	0	210	87	297
Educational Services	1,131	12	39	1,183
Health & Social Services	0	0	223	223
Arts, Entertainment & Recreation	15	16	40	71
Accommodation & Food Services	125	52	147	324
Other Services	18	30	124	172
Government & Other	0	9	6	15
Total:	**1,992**	**1,019**	**1,263**	**4,274**

Note: Total may not equal the sum of all due to rounding.
Source: The Washington Economics Group, Inc. (WEG) from IMPLAN Input/Output Methodology.

Table B-2. Household Income Created by USF's Innovation Enterprise's Commercialization Activities ($ in Thousands)

Industry	Impacts			
	Direct	Indirect	Induced	Total
Agriculture & Forestry	$0	$99	$252	$351
Mining	$0	$6	$5	$11
Utilities	$0	$819	$515	$1,335
Construction	$0	$834	$684	$1,518
Manufacturing	$0	$713	$802	$1,515
Wholesale Trade	$0	$954	$2,567	$3,521
Transportation & Warehousing	$0	$225	$6,187	$6,412
Retail Trade	$0	$2,012	$2,178	$4,189
Information	$0	$1,961	$1,801	$3,762
Finance & Insurance	$0	$2,867	$5,736	$8,603
Real Estate	$0	$3,185	$1,531	$4,716
Professional Services	$57,099	$20,689	$4,418	$82,206
Company Management	$501	$1,639	$1,108	$3,248
Administrative	$0	$7,790	$2,910	$10,700
Educational Services	$57,857	$316	$1,452	$59,624
Health & Social Services	$0	$1	$12,554	$12,555
Arts, Entertainment & Recreation	$189	$388	$1,096	$1,672
Accommodation & Food Services	$4,350	$1,334	$3,539	$9,223
Other Services	$1,028	$1,404	$4,468	$6,900
Government & Other	$0	$764	$505	$1,269
Total:	**$121,024**	**$47,998**	**$54,306**	**$223,328**

Note: Total may not equal the sum of all due to rounding.
Source: The Washington Economics Group, Inc. (WEG) from IMPLAN Input/Output Methodology.

Table B-3. GDP (Value-Added) Impacts Generated by USF's Innovation Enterprise's Commercialization Activities ($ in Thousands)

Industry	Impacts			
	Direct	Indirect	Induced	Total
Agriculture & Forestry	$0	$133	$326	$459
Mining	$0	$37	$28	$65
Utilities	$0	$2,879	$2,077	$4,956
Construction	$0	$1,291	$1,049	$2,340
Manufacturing	$0	$1,130	$1,774	$2,904
Wholesale Trade	$0	$1,903	$5,122	$7,025
Transportation & Warehousing	$0	$339	$10,225	$10,565
Retail Trade	$0	$2,722	$2,937	$5,659
Information	$0	$3,858	$4,463	$8,321
Finance & Insurance	$0	$4,049	$9,190	$13,239
Real Estate	$0	$22,679	$21,796	$44,475
Professional Services	$72,890	$24,030	$5,762	$102,682
Company Management	$634	$2,072	$1,401	$4,108
Administrative	$0	$10,300	$3,726	$14,025
Educational Services	$63,432	$323	$1,538	$65,293
Health & Social Services	$0	$1	$14,656	$14,656
Arts, Entertainment & Recreation	$187	$589	$1,950	$2,726
Accommodation & Food Services	$8,921	$1,879	$5,556	$16,357
Other Services	$2,690	$2,048	$4,972	$9,710
Government & Other	$0	$1,366	$903	$2,269
Total:	**$148,755**	**$83,628**	**$99,450**	**$331,834**

Note: Total may not equal the sum of all due to rounding.
Source: The Washington Economics Group, Inc. (WEG) from IMPLAN Input/Output Methodology.

Table A-4. Total Annual Economic Impact Arising from USF's Innovation Enterprise's Commercialization Activities ($ in Thousands)

Industry	Impacts			
	Direct	Indirect	Induced	Total
Agriculture & Forestry	$0	$264	$606	$870
Mining	$0	$241	$177	$418
Utilities	$0	$5,854	$4,362	$10,216
Construction	$0	$2,681	$2,240	$4,921
Manufacturing	$0	$3,755	$6,000	$9,755
Wholesale Trade	$0	$2,906	$7,821	$10,727
Transportation & Warehousing	$0	$537	$15,998	$16,535
Retail Trade	$0	$5,181	$5,920	$11,101
Information	$0	$8,911	$10,245	$19,156
Finance & Insurance	$0	$8,653	$20,973	$29,627
Real Estate	$0	$34,863	$33,498	$68,361
Professional Services	$146,070	$38,890	$8,712	$193,671
Company Management	$1,106	$3,614	$2,444	$7,163
Administrative	$0	$15,134	$5,806	$20,939
Educational Services	$101,582	$492	$2,289	$104,363
Health & Social Services	$0	$1	$23,758	$23,760
Arts, Entertainment & Recreation	$444	$1,049	$3,482	$4,975
Accommodation & Food Services	$14,250	$3,248	$9,592	$27,090
Other Services	$3,346	$3,050	$7,417	$13,812
Government & Other	$0	$3,008	$2,028	$5,036
Total:	**$266,798**	**$142,332**	**$173,364**	**$582,496**

Note: Total may not equal the sum of all due to rounding.
Source: The Washington Economics Group, Inc. (WEG) from IMPLAN Input/Output Methodology.

Appendix IV:

The Washington Economics Group, Inc.
Project Team and Qualifications

J. Antonio Villamil
Founder and Senior Advisor

Tony Villamil is a nationally recognized economist, with over thirty-five years of successful career as a business economist, university educator and high-level policymaker for both federal and state governments. Tony was selected in 2008 as the founding Dean of the School of Business of St. Thomas University, serving successfully until December 31, 2013 at which time he resigned to return as senior advisor to the growing economic consulting practice that he founded, The Washington Economics Group, Inc. (WEG), a Florida-based firm established in 1993 upon returning to the State from his public service in Washington, D.C.

Dr. Villamil is the immediate past Chairman of the Governor's Council of Economic Advisors of Florida, and during 1999-2000, he was selected by Governor Bush as his first Director for Tourism, Trade and Economic Development. Previously, he was appointed by President George H. W. Bush as U.S. Undersecretary of Commerce for Economic Affairs, receiving unanimous U.S. Senate confirmation. Presently he is active on Corporate Board of Directors, including Mercantil Holding Corporation and Amerant Bank, N.A., Pan American Life Insurance Group (PALIG), Spanish Broadcasting System (SBS) and AGMUS Ventures Inc. (AVI).

Among civic and professional leadership positions, he is currently Chairman of the Economic Roundtable and member of the Board of Directors of the Beacon Council-Miami-Dade County's official economic development organization. He is also on the Board of Directors of the Greater Miami Chamber of Commerce. He serves as Senior Fellow of the James Madison Institute (JMI) of Tallahassee, Florida.

He earned Bachelor and Master Degrees in Economics from Louisiana State University (LSU), where he also completed coursework for the Ph.D. Degree. In 1991, Florida International University (FIU) awarded him a Doctoral Degree in Economics (hc), for "distinguished contributions to the Nation in the field of economics." He frequently speaks to business, government and university audiences on the Florida economy, U.S. trade policy and economic development issues.

Tony is a resident of Coral Gables, Florida, where he lives with his family, traveling frequently throughout Florida, the U.S. and globally to conduct research and presentations for clients of The Washington Economics Group, Inc. (WEG)

Charles K. Yaros
Associate Consultant for Economics

Chuck Yaros is an Associate Consultant for Economics at The Washington Economics Group, Inc. (WEG). He serves as economic consultant in the areas of financial economics and economic impact studies. Prior to joining WEG he was a Vice President and Portfolio Strategist at Shay Financial Services in Miami where he specialized in developing, implementing and managing interest rate risk and capital optimization strategies for financial institutions.

Mr. Yaros has over 20 years of experience as a business and financial economist, having worked in a number of positions of progressive responsibility in the South Florida business community. Additionally, he has spoken and taught courses on financial risk management.

Chuck received his undergraduate degree in Economics with Honors from Trinity College and his Master's degree in Economics from Duke University, where he also completed course work for the Ph.D. degree. Chuck and his family are residents of Coral Gables, Florida.

Haydee M. Carrion
Senior and Project Research Assistant

Haydee M. Carrion has been Executive Assistant to Dr. Villamil since the firm's founding in 1993. She has senior level expertise in multi-media presentations and in the preparation and design of complex reports and documents for clients, utilizing the latest technologies

In 2012, WEG promoted her to Senior and Project Research Assistant to the firm, given outstanding performance in web-based research and in assistance to the firm's Principal in the preparation of audio-visual presentations for clients and in desktop publishing. Ms. Carrion is fluent in Spanish, with experience in the preparation of economics and business documents in the language.

Ms. Carrion has been with WEG for over 25 years. Ms. Carrion holds degrees in Business Administration and Office System Technologies from Miami-Dade College.

The Washington Economics Group, Inc. (WEG) has been successfully meeting client objectives since 1993 through economic consulting services for corporations, institutions and governments of the Americas. We have the expertise, high-level contacts, and business alliances to strengthen your competitive positioning in the growing marketplaces of Florida, Latin America and the Caribbean.

Our roster of satisfied clients, over the past 25 years, includes corporations, financial institutions, public entities, and non-profit associations expanding their operations in the Americas.

EXCLUSIVE CONSULTING APPROACH:

Each client is unique to us. We spend considerable time and effort in understanding the operations, goals, and objectives of clients as they seek our consulting and strategic advice. We are not a mass-production consulting entity nor do we accept every project that comes to us. We engage a limited number of clients each year that require customized consulting services in our premier areas of specialization. These premier and exclusive services are headed by Founder and Senior Advisor J. Antonio (Tony) Villamil. Tony is a former U.S. Under Secretary of Commerce with over thirty-five years of experience as a business executive and as a senior public official of the U.S. and most recently of Florida.

PREMIER CONSULTING SERVICES:

Economic Impact Studies highlight the importance of a client's activities in the generation of income, output and employment in the market area serviced by the entity. These studies are also utilized to analyze the impact of public policies on key factors that may affect a client's activities such as tax changes, zoning, environmental permits and others.

Strategic Business Development Services are customized to meet client objectives. Recent consulting assignments include customized marketing strategies, country risk assessments for investment decisions and corporate spokesperson activities and speeches on behalf of the client at public or private meetings.

Economic Development Strategies. The firm supports cities, counties and states in developing targeted economic development plans and strategies to attract, retain and expand high-wage industries. Each plan is based on the factor endowments of the area, and in close coordination with public officials in charge of economic development.

For a full description of WEG capabilities and services, visit our website at:
www.weg.com

The Washington Economics Group, Inc.
Representative Client List 1993-2019

Multinational Corporations	
ALSTOM	Lockheed Martin
Ameritech International	Lucent Technologies
Bureau Veritas (BIVAC)	MasterCard International
Carrier	MediaOne/AT&T
Carnival Corp.	Medtronic
Esso Inter-America	Merck Latin America
FedEx Latin America	Microsoft Latin America
Genting Group	Motorola
Hyatt	Phelps Dodge
IBM	SBC Communications
Joseph E. Seagram & Sons, Inc. (Vivendi)	Telefonica Data Systems
KPMG	Visa International
Construction and Real Estate Development Firms	
Areas USA, Inc.	Inland Port Systems, LLC
Barron Collier Companies	Landstar Development
Berkowitz Development Group	LXR Luxury Resorts
Boca Developers	Miami Asset Management Company, Inc.
CDS International	Miapolis, LLC
Century Homebuilders	Odebrecht Construction, Inc.
Codina Realty	Palazzo Las Olas Group, LLC
Chateau Group	Tate Capital
Empire World Towers, LLC	The Allen Morris Company
ESJ Capital Partners	The Related Group, Inc.
Ferro Investment Group, LLC	The Rouse Company
Flagler Development	The St. Joe Company
Florida East Coast Realty Inc.	Trammel Crow Company
Florida Realtors	WCI Development Companies
Engineering, Planning and Design Firms	
AECOM (DMJM Harris)	HNTB
Atkins (PBSJ)	Kimley-Horn and Associates
CDM Smith (Wilbur Smith Associates)	Parsons Brincherhoff
Golder Associates	Redevelopment Management Associates (RMA)
Colleges and Universities	
Alabama State University	Rocky Mountain College of Art and Design
Barry University	San Ignacio College
Eckerd College	Sistema Universitario Ana G. Méndez
Embry-Riddle Aeronautical University	St. Thomas University
Florida Agricultural & Mechanical University	University of Central Florida
Florida International University	Universidad Politécnica de Puerto Rico
Full Sail University	University of Florida
Keiser University	University of Miami
Los Angeles Film School	UM's Rosenstiel School of Marine and Atmospheric Science
Miami-Dade College	University of South Florida/*ENLACE*
Palm Beach Medical Education Corporation	University of South Florida
Law Firms	
Becker & Poliakoff	Gloria Roa Bodin, Esq.
Bilzin Sumberg	Greenberg Traurig, LLP
Carlton Fields	Holland & Knight, LLP
Colson Hicks Eidson	Steel Hector & Davis
DLA Piper	Tew Cardenas, LLP
Dunbar & Dunbar	
Financial Institutions	
ABN-AMRO Bank	First Union National Bank (Wells Fargo)
Advantage Capital	Hemisphere National Bank
Allen & Company	HSBC/Marine Midland
BNP Paribas	International Bank of Miami (First United Bank)
BAC Florida	Lazard Freres & Co.
Bank Atlantic Corp.	Mercantil Bank N.A.
BankUnited, FSB	Pan American Life Insurance Group (PALIG)
Barclays Bank	PointeBank, N.A.
ESJ Capital Partners	Seitlin Insurance
Espirito Santo Bank	Sun Trust Corporation
FBA	The Equitable/AXA Advisors
FIBA	TD Bank, N.A.
Fiduciary Trust International	Union Planters Bank of Florida (Regions)

Florida-Based Companies	
All Aboard Florida	Iberia Tiles
AmericanAirlines Arena	International Speedway Corporation (ISC)
Atlantic Sapphire	Jungle Island
BMI Companies	Lake Nona
Communikatz	Mercy Hospital
CoreMessages	Miami Dolphins
Daytona International Speedway	Nopetro LLC
Dosal Tobacco	Palm Beach Premier
Drivers Club Miami	Resorts World Miami (RWM)
Farm Stores	Ron Sachs Communications
Fishkind & Associates	Rolling Loud
Florida Hospital	Sprint of Florida
Florida Marlins	eMerge Americas
Florida Power & Light	The Biltmore Hotel
Flo-Sun Sugar Corp.	The Heat Group
Greater Miami Convention & Visitors Bureau	Ultimate Software
Greater Ft. Lauderdale Alliance	Ultra Music Festival
Homestead-Miami Speedway	VICTUS

Non-Florida-Based Institutions	
Darlington Raceway	Richmond International Raceway
Georgia Retail Federation	Talladega Superspeedway
Illinois Retail Merchant Association	The Seed Foundation
Indiana Retail Council	United States Tennis Association (USTA)
Kansas Speedway	Virginia International Raceway
Martinsville Speedway	Washington Retail Association
New Jersey Motorsports Park (NJMP)	Watkins Glen International
Progress Energy	

Public Institutions and Non-Profit Organizations	
Baptist Health South Florida	Greater Tallahassee Chamber of Commerce
BayCare Health System	Independent Colleges and Universities of Florida (ICUF)
Broward County Public Schools	Indian River County Chamber of Commerce
Career Source North Central Florida	Inter-American Development Bank
Chapman Partnership	Jackson Health Systems
Citizens of Clean Energy	Jacksonville Chamber of Commerce
City of Boca Raton	Jewish Community Services
City of Coral Gables	Louisiana Committee for Economic Development
City of Doral	Miami Marine Stadium
City of Plantation	Miami Museum of Science
City of West Palm Beach	Miami-Dade County Public Schools
Economic Development Commission of Collier County	Miami-Dade Expressway Authority
Economic Development Commission of Lee County	Miami Downtown Development Authority
Economic Development Commission of Mid-Florida	Palm Beach International Agricultural Summit
Enterprise Florida, Inc.	Port of Miami
Farm Share, Inc.	SEIU Florida
Florida Bankers Association	South Florida Progress Foundation
Florida Citrus Mutual	Space Florida
Florida Chamber of Commerce	State of Florida
Florida International Bankers Association	SW Florida Regional Chamber of Commerce
Florida Institute for Commercialization of Public Research	Sylvester Comprehensive Cancer Center
Florida League of Cities	Tampa-Hillsborough Expressway Authority
Florida Nursing Homes Alliance	The Beacon Council
Florida Outdoor Advertising Association	The Florida Bar
Florida Ports Council	The Florida Chamber Foundation
Florida Retail Association	The Florida Coalition for Capital
Florida Sports Foundation	United Nations Economic Development Program
Florida Venture Forum	United Teachers of Dade
Friends of Miami Marine Stadium	Visit Florida
Greater Tampa Chamber of Commerce	Zoological Society of Florida

Latin America-Based Institutions	
Allied-Domecq, Mexico	*Mercantil Servicios Financieros*, Venezuela
Association of Peruvian Banks	Peruvian Management Institute (IPAE)
Federation of Inter-American Financial Institutions (FIBAFIN)	The Brunetta Group of Argentina
Fonalledas Enterprises, Puerto Rico	