State University System
Education and General
2017-2018 Legislative Budget Request
Form I

University(s):	**All SUS Institutions**
Issue Title:	**Advancing Discovery and Innovation in Florida (ADIF) – A Proposal to Accelerate Research Competitiveness in Florida**
Priority Number	
Recurring Funds Requested:	**$63,000,000**
Non-Recurring Funds Requested:	**$73,000,000**
Total Funds Requested:	**$136,000,000**
Please check the issue type below:	
Shared Services/System-Wide Issue for Fiscal Year 2017-2018	☒
New Issue for Fiscal Year 2017-2018	☒

The public research universities within Florida strive to make a difference, to positively impact our state, the nation, and the world by creating new knowledge, translating knowledge into relevant impact, creating the next generation of thinkers, doers, and discoverers, and in so doing, become recognized leaders among research institutions. A commitment to being externally recognized leaders in discovery through research and to translate that knowledge to relevant impact is critically important if our state is to be a leader in the emerging innovation economy. Growing and attracting innovation industries will lead to economic opportunity for our citizens and change the world for the better.

For the state of Florida to secure its place as a national leader in the 21st century, it must prove competitive in discovery and innovation. The stronger the universities and the state are in R&D performance and reputation, the more competitive we become in attracting and retaining the best and most promising faculty, students, staff, and companies. In this regard, Florida lags. In a recent NSF survey of R&D spending across the US, the state of Florida ranked 14th in total R&D expenditures, just ahead of Connecticut, Indiana, and Minnesota, but trailing North Carolina. Fact is, Florida, the 3rd largest state by population, has twice the population of North Carolina, more than triple that of Connecticut, Indiana, or Minnesota, yet we rank, 14th. In research intensity, determined by the percentage of state GDP that is spent on R&D, we rank 36th. We are below average. The state of Florida, its citizens, and future Floridians deserve better.

States with strong and competitive research enterprises ranked ahead of Florida have taken steps previously to support their research infrastructure with a wide range of statewide grant programs that continue today in a drive to make their institutions of higher education more competitive for federal grant opportunities.

In 2015, the Texas legislature restructured previously existing state programs for research enhancement and created a number of new grant programs designed to make its institutions more competitive nationally. These include the Texas Research University Fund, the Core Research Support Fund, the Texas Comprehensive Research Fund, and the Governor's University Research Initiative – a continuum of statewide research enhancement programs. Also, in 2007 Texas voters authorized $3 billion in bonds to fund cancer research -- $1.575 billion in competitive research has been funded to date.

In Pennsylvania, the legislature commissioned a working group analysis that led to the creation in 2001 of a two-tier grant program in clinical and biomedical sciences to provide research enhancement awards within the state for the purpose of making Pennsylvania institutions more competitive for federal grants.

Massachusetts established a 10-year, $1 billion research enhancement initiative in the life sciences beginning in 2008. The Massachusetts Life Sciences Center provides financial investments in public and private institutions in the state to advance research and development and commercialization.

In New York, the Empire State Development's Division of Science, Technology and Innovation (NYSTAR) provides program funding to accelerate innovative technology

and new businesses through five separate programs supporting university research. The state also created the New York State Stem Cell Science program in 2007, funding over $354 million in grants to New York institutions since then. The State University System of New York Research Foundation maintains five newly created Networks of Excellence to increase research collaboration and spur commercialization activities.

California voters in 2004 authorized a new program providing $3 billion for stem cell research by California universities and businesses, or those performing a certain portion of the research within the state. Grants support basic science, clinical trials, training grants, programs and building infrastructure, and research by new faculty members, and graduate and post-doctoral students.

The State of Florida needs to become a magnet for the best and brightest people on the planet who create the next generation of computing technology, discover cures to disease, and discover innovative technologies that yield a more secure society for our children. This is the path for future prosperity for our state, and the SUS institutions within Florida are fully committed to this objective.

To this end, the Vice Presidents for Research in all 12 SUS institution are proposing a bold new initiative entitled, "Advancing Discovery and Innovation in Florida (ADIF)". This initiative is comprised of specific programs designed to achieve three specific objectives in advancing our competiveness and effectiveness in research, namely 1) increasing research capacity, output, and impact, 2) increasing and enhancing undergraduate participation in research, and 3) connecting university research to Florida industry and economic development.

Objective 1: Increase research capacity, output, and impact

The single most significant asset that the state has that will determine Florida's future status in the industries of the future are its universities and their capacity to generate new ideas and innovations through research. We see that at every level of the university hierarchy. It is the availability of human and physical capital that precipitates new knowledge and technology. Recruiting and equipping talent is the most impactful element in competing in this landscape. To this end, the following programs are proposed.

1. Strategic Area Cluster Hires for Advancing Discovery and Innovation

Any effort to increase research capacity begins with increasing the talent pool within the state. While the SUS institutions have many talented researchers within it faculty ranks, we simply do not have sufficient numbers to compete. It is important that this state investment in new faculty research lines be strategically aligned with existing institutional, regional, and state strengths and needs, while aiming at opportunities at and beyond the horizon. This proposed program would solicit multiple proposals from each of the 12 SUS institutions in the state for research-centric cluster hires. Within the context of this initiative, "cluster" is defined as 3-5 faculty lines in a single research area. The specific persons to be recruited may or may not have preexisting collaborations but will have research activities that sit within a common research area. The objective is to create pinnacles of excellence within our institutions by creating critical mass of

expertise. Each of the proposed research cluster areas should have the following characteristics:

- Topic should be of local, national, and international importance, tackling issues and opportunities in areas such as health care, information technology, coastal and marine science, advanced manufacturing, and others that will shape our world and society going into the 21st century.
- The research topic should represent a pre-existing strength at the institution, or an area of significant importance to the institution for future growth
- Each proposal for a Discovery and Innovation Cluster should include a description of the topical area and its overall importance, justification for this area at the proposing institution including pre-existing strength in this area, a description of the number and rank (Assistant, Associate, Full) for faculty to be recruited, and the proposed budget.
- The budget should consist of two components: recurring funds for salary for the faculty hires, and one-time funds to offset startup costs. The requested one-time startup funding should not exceed the amount of annual salary costs. The institution will be responsible for any salary or startup costs that exceed these amounts.

In general, these faculty members will be tenure/tenure-track faculty, and as such will contribute to the teaching mission of our institutions at both the undergraduate and graduate levels. As such, the additional faculty will yield a decrease in the student/faculty ratio, thus enhancing the learning experience as well.

The performance metrics for return on investment for this particular program will include (in order of importance) research funding, publications, faculty awards, and patents for the specific cadre of hires within this program.

Requested funding: $40 million recurring for research faculty salary
$40 million non-recurring for associated startup

2. Strategic Investment into Research Infrastructure for Advancing Discovery and Innovation

Competitiveness in research requires infrastructure – laboratories, equipment, and infrastructure. For many areas of research in biotechnology, advanced manufacturing, and computing, new instruments and capabilities are enabling researchers to pursue challenges and opportunities that were not possible just in the recent past. University researchers, students and staff need access to these technologies in order to be competitive and at the cutting edge. Within this initiative, investments in research infrastructure are proposed, focusing on those investments that yield maximum impacts for research competitiveness.

1. Equipment and Instrumentation for Institutional Shared Facilities – Within our campuses, there are a variety of laboratory modalities ranging from the lab for a single investigator to facilities that are shared by multiple researcher groups. While there are significant equipment needs throughout the SUS system in all settings, the most efficient and effective institutional investments are in those facilities that are shared and accessible to researchers, staff and students across campus. Within this context, this initiative would include a program specifically aimed at improving the research instrumentation and facilities available to our researchers. Within this particular program, proposals would be solicited from the institutions for the purchase

of instrumentation and equipment for either existing or newly proposed Shared Instrumentation Facilities with an SUS institution. The proposal instrumentation request must have the following characteristics:

- The research areas supported by the Shared Facility should represent pre-existing strengths at the institution, or areas of significant importance to the institution for future growth
- The proposal must describe a mechanism by which researchers at other SUS institutions might gain access to the equipment
- The proposal must include a plan for sustaining operation and maintenance of the instrumentation and facility

The performance metrics for return on investment for this particular program will include research funding associated with the instrumentation and facility; new grants awarded due to instrumentation availability; faculty, student, and staff usage; publications attributable to the availability of these instruments.

Requested funding: $15 million non-recurring

2. <u>SUS Shared infrastructure - Sunshine State Education and Research Computing Alliance (SSERCA)</u> – The exponential growth of data and computation, and its increasing level of influence and importance, are providing for remarkable, new opportunities and challenges in nearly every sector of society, science, technology, and commerce. Nearly every aspect of modern society depends upon computational technology and data. Future research will heavily depend on access to computational infrastructure. Those who recognize and learn to leverage this capability will have a significant advantage not only in the high tech business of computation and communication, but in health care, engineering design, retail, scientific discovery, and a multitude of other fields where the effective leveraging to this data explosion will prove to be vital in global competition. The Sunshine State Education and Research Computing Alliance (SSERCA) is a proposed collaborative effort by six Florida public and one private universities to build a big-data research infrastructure for the state university system. This first-of-its-kind venture will provide the massive research computing power necessary to handle the challenges of sharing large data sets over large distances among multiple researchers. Creating a statewide network of computing infrastructure and expertise in our state university system will give the State of Florida significant advantage in innovative approaches to addressing these "big data" challenges.

   The performance metrics for return on investment for the SSERCA big-data infrastructure will include research funding associated with the computational network; new grants awarded due to instrumentation availability; faculty, student, and staff usage; publications attributable to the availability of SSERCA.

   Requested Funding: $6 million in non-recurring funds to be used to acquire data storage systems at each of the six public institutions that are part of SSERCA;

$1 million in recurring funds to ensure that SSERCA is sustained after it is built—with annual maintenance contracts and one expert at each institution.

3. Laboratory Renovations – In addition to human capital and instrumentation, competitive research requires up-to-date laboratories. Across each of our SUS institutions, there are numerous laboratories in need of renovation to enable the recruitment and retention of top talent. Within this initiative, funding for research laboratories is requested. Each institution would be asked to propose laboratory renovation projects with the following required criteria:

- The laboratory for renovation must be designated for research activities
- The research supported by this laboratory should represent a pre-existing strength at the institution, or an area of significant importance to the institution for future growth
- The total budget for the renovation must be disclosed, and must include the source of funds for costs that exceed that allocate from this budget request

The performance metrics for return on investment for the laboratory renovations will include research funding associated with the laboratory; new grants awarded due to instrumentation availability; faculty, student, and staff usage of the laboratory.

Requested Funding: $12 million in non-recurring

Objective 2: Increase and Enhance Undergraduate Participation in Research

Within the ecosystem of university research, the primary focus in on knowledge discovery translation to impact employing the efforts of faculty, staff, post-docs, and graduate students. That said, within the research mission is a remarkable opportunity to enhance the educational experience of all students, in particular the undergraduates. Multiple studies have shown that meaningful participation by undergraduates in research enhances retention and enriches their educational experience. Most undergraduate activity is in the form of coursework in a classroom setting. While highly valued, this does not fully prepare the student for the workplace where many issues and challenges are open ended, require teamwork, and often do not have a predetermined outcome. Providing undergraduates with meaningful research experience, be it at their home institution, another university, at a national laboratory or in industry, provides them with an experiential learning and growth experience that is of significant value. To that end, this initiative includes the following programs:

1. Undergraduate Research Scholar Grant Program

Many of our undergraduates are engaged in research at their home institution. While this provides the core of their undergraduate experience, there is significant value in providing opportunities to experience a research setting and culture outside their norm, be it at another SUS institution, within industry, or at a national laboratory. In most cases, the host institution, if willing to host the student, will provide for all research infrastructure needs. This proposed program would provide selected students the opportunity to engage in research away from the home institution, providing funds for travel, tuition, and a modest stipend for living expenses. The program administration

could reside within the SUS or within a host SUS institution. The program administrator would be required to:

- Advertise the program to prospective host participants
- Develop framework for expectations under the program
- Negotiate MOUs with various host entities
- Develop mechanism for matching students with research hosting opportunities
- Administer funds to selected student participants

Selected Undergraduate Research Scholars would use the awarded resources to engage in research at the hosting institution.

The performance metrics for return on investment for this program will be retention rate on the participating students, as well as publications and presentations resulting in student research.

Requested Funding: $0.5 million recurring for program administration
$2 million recurring for student travel, tuition, and stipend

2. Institutional Undergraduate Research Programs

As stated earlier, a student's primary opportunity for a meaningful research experience is with a mentor within her or his home institution. In this case, support is needed primarily for the research group at that institution. Within this context, the budget request includes funds specifically to support research at the undergraduate level. This program would provide resources for undergraduates to participate in immersive research experiences outside of the classroom. The funds could be used for faculty support for engaging undergraduates in their research as well as graduate assistantships to facilitate near-peer research mentoring. Proposals would be solicited for faculty initiated research of benefit to the state and beyond. It is anticipated that multiple undergraduates would be engaged for any given project. It is also anticipated that most of these programs would reside within SUS institutions with primarily undergraduate teaching missions.

The performance metric will be percentage of graduating seniors who participated in research outside of the classroom during their undergraduate careers.

Requested Funding: $5 million recurring

Objective 3: Connect University Research to Florida Industry and Economic Development

It is the objective of university research, particular that at the public universities, to translate knowledge to relevant impact on society. Front and center in this endeavor is in connecting and support private sector industry and economic development across the state. In many ways, the state of Florida is already a leader in this space through creation of intellectual property, startup, and innovative regional programs. That said, the institutions within the SUS need to do more to make an impact on the future growth of our economy. Specifically, this budget request includes two statewide programs.

1. Statewide Matching Grant Program for Industry-Sponsored Research at SUS Institutions

A significant opportunity for companies within the state, particularly those in high tech, to secure a strategic advantage in their respective market is to leverage the research expertise within the SUS institutions. Within this initiative, a statewide matching grant program would be created to incentivize industry-sponsored research projects at the SUS institutions. In particular, this program would provide matching funds to R&D projects sponsored by Florida-based companies for research at SUS institutions to develop commercially applicable emerging technologies. This new program builds on the foundation established by the remarkable success of the Florida High Tech Corridor Council (FHTCC), a nationally recognized program that has benefited central Florida businesses. In particular, this program would be extended to companies located anywhere within the state of Florida whereby they can accelerate innovation by leveraging the R&D expertise within the SUS. Opportunities for collaboration would include researchers from all academic disciplines across the universities – including health sciences, agribusiness, engineering, and the physical sciences. This program is particularly attractive for supporting small to midsize high tech companies in advancing their competitiveness in the innovation economy. Matching funds would be made available, subject to the specifics of the research proposal and a commitment from the company for both cash and in-kind contributions at least equal to the matching funds being sought. The overall objective of the program is to facilitate the growth of innovative industry throughout the state by connecting the innovative small, midsize, and large companies within the state with research expertise at the participating university. It is anticipated that promoting such collaborations to grow innovative technologies will retain talented students within the state and improve the tech economy in Florida. We also anticipate that many of these projects will be linked to federally funded SBIR/STTR programs, thus leveraging this investment to bring in more federal research dollars to the state, increase incubation of new start-up efforts, and broaden the opportunities for translational research thereby resulting in economic development.

The performance metrics for return on investment for this program will be matching funds from industry and private sector performance of industry partners.

Requested Funding: $12 million in recurring funds for the matching grant program

2. Increase Research Commercialization Activities through I-Corps™

One of the strategic priorities in the 2025 Florida State University System (SUS) Strategic Plan is to "Increase the number of patents, licenses and start-up companies created as a result of university research." This effort is targeted on capitalizing on the SUS' innovative strengths in order to increase its commercialization pipeline.

Over the past 4 years, the National Science Foundation (NSF) has been experimenting with a novel and effective training method, called Innovation Corps (I-Corps™), to accelerate the transition of basic research advances into startups and products, based upon time-tested methodology employed at Stanford University and UC Berkeley. The I-Corps program sits between basic research and startups and/or licensing. With over 800 teams trained nationally by this program, it has been to shown accelerate the technology transfer process. Other federal agencies, such as NIH and DoD, have already rolled out similar programs. More programs are on the way. States such as Ohio and Iowa have rolled out

their own I-Corps™ programs. The State of Florida is at a cusp of opportunity in this regard.

Florida is a leader in the national I-Corps™ program, ranking third in the nation after California and Texas in the number of active NSF I-Corps™ Teams. The region has two I-Corps Sites and seven academic institutions that have produced I-Corps Teams, including USF, UCF, FIU, FIT, FSU, FAMU, and UF. As is evident from the active grants in the state, there is enough capacity for more teams. The entrepreneurial climate in the state is right for these teams to move forward; the state is already able to sustain a significant number of SBIR grantees. An integrated effort in Florida will help catalyze the academic transformation that has already begun and provide an international gateway to the Caribbean and Latin America to bring academic innovations and business relationships to the U.S. Possible post I-Corps partners include angel and venture networks, Florida Institute for Commercialization of Public Research, Florida Venture Forum, and GrowFL; to name a few.

Florida Regional Innovation Network (FRIN) supports a strong partnership effort among the twelve public and private universities. Taking into consideration the $2.27 billion in research at Florida's universities, trained I-Corps instructors at UCF's and USF's I-Corps Sites, and mentor networks at research parks across the state, can be integrated and expanded to provide transformational I-Corps training open to all the Florida universities. The immediate output will be a new cadre of faculty and students who understand how to find a business behind an idea, which in the long term will result in licensing, and startups with external sources of funding such as SBIR/STTR and angel investments.

The performance metrics for return on investment for this program will be the number of newly trained I-Corps graduates, as well as the number of companies resulting from I-Corps trainees.

Requested Funding:
$1 million recurring in funding to regional I-Corp teams from SUS institutions
$1 million recurring for post I-Corps support towards SBIR capacity building
$0.5 million recurring for regional program delivery (instructors, teaching support) and administration

TOTAL REQUESTED FUNDING
$63 million recurring
$73 million non-recurring