FIELD HEARING IN NEW YORK: JOB CREATION IN HIGHER EDUCATION COMMUNITIES: HOW UNIVERSITY RESEARCH AND DEVELOPMENT SPURS SMALL-BUSINESS GROWTH

HEARING

BEFORE THE

SUBCOMMITTEE ON CONTRACTING AND TECHNOLOGY

OF THE

COMMITTEE ON SMALL BUSINESS
UNITED STATES
HOUSE OF REPRESENTATIVES

ONE HUNDRED THIRTEENTH CONGRESS

FIRST SESSION

HEARING HELD
AUGUST 5, 2013

Small Business Committee Document Number 113–034
Available via the GPO Website: www.fdsys.gov

U.S. GOVERNMENT PRINTING OFFICE

82–343 WASHINGTON : 2013

For sale by the Superintendent of Documents, U.S. Government Printing Office
Internet: bookstore.gpo.gov Phone: toll free (866) 512–1800; DC area (202) 512–1800
Fax: (202) 512–2104 Mail: Stop IDCC, Washington, DC 20402–0001

HOUSE COMMITTEE ON SMALL BUSINESS

SAM GRAVES, Missouri, *Chairman*
STEVE CHABOT, Ohio
STEVE KING, Iowa
MIKE COFFMAN, Colorado
BLAINE LUETKEMER, Missouri
MICK MULVANEY, South Carolina
SCOTT TIPTON, Colorado
JAIME HERRERA BEUTLER, Washington
RICHARD HANNA, New York
TIM HUELSKAMP, Kansas
DAVID SCHWEIKERT, Arizona
KERRY BENTIVOLIO, Michigan
CHRIS COLLINS, New York
TOM RICE, South Carolina
NYDIA VELÁZQUEZ, New York, *Ranking Member*
KURT SCHRADER, Oregon
YVETTE CLARKE, New York
JUDY CHU, California
JANICE HAHN, California
DONALD PAYNE, JR., New Jersey
GRACE MENG, New York
BRAD SCHNEIDER, Illinois
RON BARBER, Arizona
ANN McLANE KUSTER, New Hampshire
PATRICK MURPHY, Florida

LORI SALLEY, *Staff Director*
PAUL SASS, *Deputy Staff Director*
BARRY PINELES, *Chief Counsel*
MICHAEL DAY, *Minority Staff Director*

CONTENTS

OPENING STATEMENTS

WITNESSES

APPENDIX

JOB CREATION IN HIGHER EDUCATION COMMUNITIES: HOW UNIVERSITY RESEARCH AND DEVELOPMENT SPURS SMALL-BUSINESS GROWTH

MONDAY, AUGUST 5, 2013

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SMALL BUSINESS,
SUBCOMMITTEE ON CONTRACTING AND TECHNOLOGY,
Washington, DC.

The Subcommittee met, pursuant to call, at 10:00 a.m., in Room 2008, Engineering and Science Building, Innovative Technologies Complex, Binghamton University, 85 Murray Hill Road, Vestal, New York, Hon. Richard Hanna [chairman of the Subcommittee] presiding.

Present: Representative Hanna.

Chairman HANNA. Good morning, everyone. I want to thank you for being here. We will bring this hearing to order.

I want to thank each of you for being with us today as we examine the relationship between Binghamton University and the local economy here in the Southern Tier, with a particular focus on the small businesses that are created from research that is spun out of this university's labs.

Binghamton University is a public research university and is one of four universities centers in the State University of New York system. Since its establishment in 1946, the university has grown from a small liberal arts college, Harper College, to a large doctoral-granting institution presently consisting of 6 colleges and schools and home to nearly 15,000 undergraduate and graduate students.

In the most traditional of senses, Binghamton University is the economic hub of this region. It provides over 11,000 direct and indirect jobs and provides about $622 million a year in the region. And when you take into account the expenditures associated with the university, it amounts to approximately 12 percent of the gross domestic product for Broome and Tioga counties.

While all of this is critically important to our area, what we want to focus on today is how Binghamton University translates the high-tech research it conducts in its laboratories into brand new small businesses. That process, wherein universities and research institutions transfer scientific findings from one organization to another for the purpose of further development and commercialization, is known as "technology transfer."

The Federal Government spent about $131 billion for basic research in 2012. More than half of all basic research conducted in our Nation's colleges and universities is funded by the Federal Government. Therefore, this Committee has a keen interest in seeing what we can do to improve technology-transfer processes.

Federal programs like the Small Business Technology Transfer Program, STTR, offer specific avenues to help universities, such as Binghamton University, move new discoveries from the lab to the marketplace. The STTR program was created to provide Federal research and development funding for proposals that are developed and executed jointly between small business and research in not-for-profit organizations. This program helps create new high-tech businesses with new jobs for new graduates.

I am also very interested to hear how Binghamton University is partnering with current businesses to fill their workforce needs. One of the problems we often hear about from small businesses that testify before our Committee is that innovative firms can have difficulty finding qualified individuals to fill vacancies.

Programs like the New York State Strategic Partnership for Industrial Research, or SPIR, can help match qualified students with small firms looking to expand. This industry-supported initiative is a win-win. Qualified students get practical, real-world experience and potential employment following graduation, and the small businesses get an educated and capable extra set of hands to help grow their businesses.

It is the partnerships like these that often prove to be the most successful. I am looking forward to hearing from our witnesses on these important issues.

What I would normally do at this time is introduce Grace Meng, the ranking member from the Democratic side and a good friend. But since she is not here, I will just go ahead and introduce our first witness.

Dr. Bahgat Sammakia, is vice president for research at Binghamton University. He was a distinguished professor of mechanical engineering, joining Binghamton's staff in 1998.

He is the founding director of Small Scale Systems Integration and Packaging Center, a New York State Center of Excellence. He is also director of Energy Efficient Electronic Systems Center, a National Science Foundation industry and university cooperative research program that has focused on reducing the energy consumed by data centers around the world.

Dr. Sammakia earned his bachelor's degree from the University of Alexandria in Egypt and his master's and doctoral degree from the University of Buffalo. He is a fellow in the American Society of Mechanical Engineers, holds 14 U.S. patents and has published more than 180 peer-reviewed technical papers.

Thank you for being with us here today, Doctor.

I am going to introduce each person separately before they speak, so go ahead, sir. Thank you.

STATEMENTS OF BAHGAT SAMMAKIA, PH.D., VICE PRESIDENT FOR RESEARCH, BINGHAMTON UNIVERSITY, BINGHAMTON, NEW YORK; CHUCK SCHWERIN, CHIEF EXECUTIVE OFFICER, SONOSTICS, INC., BINGHAMTON, NEW YORK; AND RICK PRAY, PRESIDENT, RPA ELECTRONIC SOLUTIONS, INC., BINGHAMTON, NEW YORK

STATEMENT OF BAHGAT SAMMAKIA, PH.D.

Mr. SAMMAKIA. Thank you, Congressman.

So good morning, everyone, and welcome to Binghamton University's Innovative Technologies Complex.

This location is the perfect setting for the topic addressed by today's hearing. These buildings are home to multi-user labs, where industry partners work alongside our scientists. The university, along with the State and Federal Government, have invested about $250 million in this complex.

If you look outside, behind me as a matter of fact, you will see our Center of Excellence building, which is under construction and will be completed and occupied next year. We also have plans to build a fourth building in this complex, which will be near Murray Hill Road, and that will be a building focused on smart energy research.

My submitted testimony goes into more detail about the university's initiatives to educate students, develop path-breaking research, and transfer that research to the community through commercial marketing to help businesses.

We have a long history and a strong reputation for collaborating with the private sector. We currently partner with more than 20 global companies. We have also assisted hundreds of small businesses to grow and prosper. In fact, about 10 percent of our total funding comes from industry, and that is about 40 percent higher than the national average. But we can do better, and, with your continued support, we will do better.

We do have challenges, and I wanted to take this morning to highlight some of those challenges.

We face significant obstacles in our research efforts on campus. Funding is crucial to everything that we do. And while we have experienced steady growth of research, Federal grants, and investments over the past decade, we are now seeing that trend of growth to begin to slow off and level off, and in some areas it is actually retrenching.

Our Nation is rapidly losing ground in key areas that support innovation. Further cuts, like the ones we are experiencing with sequestration, will only worsen the problem. The consequences can and probably will be devastating. They could include a less prepared, less skilled workforce, limited U.S.-based scientific and technological breakthroughs, fewer U.S. patents, and a decline in U.S. startups, products, and jobs.

I have had the opportunity to travel to other countries to learn about how their universities work with industry and the government to facilitate collaboration. Everywhere, I found that they are all encouraged to work side-by-side. The students and the faculty work hand-in-hand with industrial engineers and scientists. That structure really pays dividends. During the past 2 decades, the rate

of U.S. research and development investments has been outstripped by those in places such as China, South Korea, Hong Kong, and Taiwan.

The answer to this innovation deficit is a sustained, strategic Federal investment. And failing to act will pass to future generations the burden of lost leadership in innovation, economic decline, and limited job opportunities.

Our president, Harvey Stenger, recently joined SUNY Chancellor Nancy Zimpher and other SUNY presidents in a letter that calls for the closing of the innovation deficit. They have taken this public step because they believe this is a crucial time not only in our Nation's economic history but also in its innovation path to the future. SUNY leaders believe that targeted investments in research and higher education must be made, as they are a key driver of long-term economic growth and fiscal stability.

I believe the exciting new National Network for Manufacturing Innovation, or NNMI, program is an example of a step in the right direction as we strive to build manufacturing research that leads directly and quickly to job creation. Binghamton University is participating in two such proposals for this Federal program which brings universities and companies together in a meaningful way. It is all about collaboration that occurs in such a focused, concentrated manner that technology innovation and job creation are bound to result.

Just as we must reinvest in research and development, we also need to strengthen our commitment to education in the STEM disciplines: science, technology, engineering, and mathematics. It is truly the only way to prepare the next generation of Americans and American companies for what we know will be a global race for prosperity and security.

Binghamton University is eager to partner with our State and Federal leaders, and we will continue to collaborate with industry, both large and small. My written testimony has much more detail about the many ways we work to enhance our research efforts, develop technologies, and transfer innovation into the community to help spark economic growth and create jobs.

I do want to discuss one way we, as a university, hope to bridge the gap between mind and the marketplace. Our plan involves the development of a high-technology incubator. President Stenger's proposed incubator has received priority support from Governor Cuomo and the New York State Regional Economic Development Council.

With your support, Congressman Hanna, as well as the support of Senators Schumer and Gillibrand, we have also received crucial funding from the Federal Government's Economic Development Administration. Thank you.

Binghamton University and the regional economic development community plan to build the incubator in downtown Binghamton to provide a unique entrepreneurial ecosystem for emerging companies. This facility will foster innovation, commercialization, and job creation through collaboration efforts of academic, industry, and government partners.

There is no facility in Broome County that is suited to such high-tech companies. Creating this infrastructure will enable emerging

companies to grow and relocate in the community. These activities are at the core of what we do. With your support, we expect to continue to aid regional businesses as well as the overall economy and to expand our efforts into the future.

Thank you again for allowing me to address you today, and thank you for choosing our campus to host this event. Binghamton University is proud of its academic reputation, its research accomplishments, and its facilities, and we are always eager to partner with our representatives in government and in commerce.

If you have any additional questions, I would be happy to elaborate on the remarks I have just presented as well as my written testimony.

Chairman HANNA. Thank you, Doctor.

I would like to welcome Donna Lupardo for coming here today, someone I know who shares your interest in education and in this facility. So thank you for being here.

I neglected to introduce Adam Hepburn. We have other staff around the room who probably—Renee and Justin. Virtually everybody from Washington is up for this. We have a skeleton crew down there, but we try to focus on the district. And we try to make sure that people from Washington are familiar with not just the issues but the faces and circumstances of this district, the 22nd.

So thank you.

Our second witness is Chuck Schwerin, CEO of Sonostics, which spun out of bioengineering research at Binghamton University in 2008.

He previously directed the implementation of worldwide software copy protection and license management at Pitney Bowes MapInfo. He also coordinated the development, implementation, and maintenance of MapInfo's three core technologies, including MapInfo Professional, the flagship product.

Prior to his employment at MapInfo, he founded Environmental Data Systems in Saratoga Springs, New York, a software firm where he designed, marketed, and maintained unique software products for waste management and healthcare consumers.

Mr. Schwerin received his bachelor's degree in geography from Clark University and his master's in environmental policy and planning from Tufts University. He holds three patents on geographic information technology.

Thank you, sir, for being here. You may begin.

STATEMENT OF CHUCK SCHWERIN

Mr. SCHWERIN. Thank you very much.

Good morning, Mr. Chairman and members of the Committee. My name is Chuck Schwerin. I am CEO of Sonostics, a 5-year-old startup with an exclusive license from the Research Foundation of SUNY to commercialize research emanating from Binghamton University's Clinical Science and Engineering Research Center.

Congressman Hanna's message on the House Committee on Small Business Web site sums it up well. To unlock economic growth in this country and certainly in the Southern Tier of New York State, it is imperative that we, quote, "foster an environment where small businesses can thrive," unquote.

Here in the Southern Tier, far from the startup sweet spots of Silicon Valley, North Carolina's Research Triangle, or Boston's Route 128, the ecosystem for nurturing small-business innovation is still immature, despite the proximity of such a prominent institution as Binghamton University. The tri-cities cannot expect thousands of new manufacturing jobs to walk through our doors anytime soon.

While New York State is blessed with numerous institutions of higher learning that foster cutting-edge research, it takes a team of complementary talents to build a successful business, and they are not necessarily all found within the university walls. We must create an ecosystem here that attracts entrepreneurs and funding sources and marries their skills with compelling technology from the university to spawn innovative companies that offer well-paying jobs.

In my view, a culture of rational risk-taking is lacking among the traditional funders of early-stage business. That would be high-net-worth individuals, functioning angel networks, and most lending institutions. Further, there are too few early-stage funding sources at the State level, though the recent $45 million Innovate New York Fund is a welcome addition.

There is a plethora of research developed within the university, but only a modest percentage can be deemed translational. That means the purpose of that research is to create practical applications with commercial value.

Sonostics licensed several innovative technologies from the Research Foundation at SUNY that address chronic musculoskeletal conditions, which affect millions of people and confound traditional standards of care. The products and services we developed are meant to cause a reexamination of how these conditions are treated and at a fraction of existing costs.

When faced with a challenge of how best to translate research to commercial viability, technology-transfer offices can either identify mature public or private entities to whom they can license the raw technology or help the researcher/inventor build a team that can commercialize that technology via a startup venture. Sonostics is an example of the latter choice and, in my view, can be a better generator of jobs.

We negotiated a fair agreement for developing an innovative technique for detecting muscle weakness and worked closely with the university tech-transfer office and the patent attorneys they selected to protect the intellectual property. Then we recruited software engineers to write the software, medical assistants to deliver the service, and continue to support graduate student research on the core technology.

Sonostics could not have survived without significant assistance from both the public and private sector, and this aid included:

One, State support for the Centers of Advanced Technology. In our case, we collaborated with the CAT at Stony Brook, which specialized in sensor technology and built our first prototypes.

Two, State support for SPIR grants, the Strategic Partnership for Industrial Resurgence, which subsidized graduate student research using our technology in new, clinically advantageous ways.

Three, an NIH-IRS collaborative initiative called QTDP, or the Qualifying Therapeutic Discovery Project, funded via the Affordable Care Act, to encourage research and development in companies with fewer than 250 employees.

Four, a New York State Tax and Finance-administered program called QETC, qualified emerging technology company incentives, that also rewarded investment in pure research that is translated into commercial products.

Five, loans from the Broome County Industrial Development Agency.

Six, incubator space at the Broome County Innovation Center.

And, lastly, Binghamton University, not only through its SPIR program, but with its business-friendly technology-transfer office and its promotion of Sonostics as a poster child of how corporate-higher education partnerships can succeed.

It is encouraging to see government assistance for a new, state-of-the-art incubator that is planned for downtown Binghamton under the aegis of the university. Such facilities, combined with the just-passed Start-Up New York tax benefit bill, should enable communities like Binghamton to more favorably compete against other States in the drive to attract and keep entrepreneurial talent and grow new enterprises.

This is not a case of "build it and they will come," however. Hard work remains to demonstrate to entrepreneurs that Binghamton can, as Mr. Hanna said, foster an environment where small businesses can thrive.

Having lived through the birth and adolescence of a local startup during quite challenging economic times, I would like to offer several suggestions on fostering that environment.

One, tax abatement policy is great for companies that already have reached the stage of maturity where profits are realized and taxes are due. Typically, this is not the case during a company's early years. The benefit of QTDP or QETC for Sonostics was our ability to accept tax reduction as grants, not as carry-forward credits against some uncertain future profit. Continuance rather than sunsetting of State and Federal incentives that lowers tax burdens for profitable firms or provides grants to not-yet-profitable ones is a prudent course.

Two, continued State support for centers of advanced technology and centers of excellence that enables young venturers a means to validate technology and produce prototypes in a most cost-effective way.

Three, public-sector support for seed-stage businesses should increase. The $45 million Innovate New York Fund is commendable but not sufficient. Those funds will likely go to companies already generating significant revenue.

A hundred thousand dollars invested in a startup can often have a greater marginal impact and create more jobs than would a $500,000 investment in a company already generating several million a year in revenue. Many will fail, but the successful ones can more than repay investments in the losers. Their needs to be a cultural shift in the level of acceptable risk-taking.

Lastly, firms like Sonostics do not possess all the resources necessary to identify newly instituted or time-limited opportunities

sponsored by the public sector. A one-stop shop that dispenses information about financial incentives or regulatory updates would be a welcome innovation for entrepreneurs, technology-transfer staff, as well as county development agency personnel.

That role today falls to the tuned-in legal and accounting professionals who specialize in startup clients and tend to be located in the geographies where new venture creation is more prevalent. If we in upstate New York are to compete, this knowledge base ought to be more easily and equitably disseminated. Perhaps congressional constituent services could help level the playing field via information seminars, workshops, or other distribution methods.

I very much appreciate your decision to hold this hearing in Binghamton, and I thank you for the opportunity to provide you with my input.

Chairman HANNA. Thank you, sir.

Our next witness is Rick Pray, president of RPA Electronic Solutions, Incorporated.

Mr. Pray holds a bachelor's degree in electrical engineering from Penn State and a master's degree in electrical engineering from Syracuse University.

From 1981 to 1995, he worked as a visual systems engineer for Link Flight Simulation, contributing to the development of image generator and display systems for the training and simulation marketplace. He also briefly worked for CID Technologies, developing high-performance scientific imaging camera systems.

In 1995, he cofounded RPA. With RPA, Mr. Pray has continued to develop solutions for training and the simulation industry, many of which have related to small-business innovation research efforts with all branches of the U.S. military and primarily involved in visual systems research and development.

Thank you for being here, sir. You may begin.

STATEMENT OF RICK PRAY

Mr. PRAY. Thank you. I want to thank you, as well, for the opportunity to speak today.

I do come to you as a small business that was not created out of research here at Binghamton University. We spun out of Link Flight Simulation. But we have found many programs here with the university that have worked well for us.

We have taken advantage of SPIR, the Strategic Partnership for Industrial Resurgence. We have had about 10 graduate students come through our facility, working on various internal research and development projects that we had going. And we have hired three of them directly as full-time employees, and they still work for my company.

We have also taken advantage of the Integrated Electronics Engineering Center here at Binghamton University. The IEEC provides the ability to access very expensive high-tech equipment that is used in electronics manufacturing that a small business like us would not be able to afford.

We have to produce the same level of quality in electronics as much larger entities than ourselves. We build systems that are usually in the realtime signal processing and image processing marketplace. And when there are problems in production that we

have with local manufacturers in various things, because we are doing state-of-the-art design and construction of systems, we have to get access to inspection equipment, manufacturing equipment, and things of that nature that allow us to improve our processes, find out what the faults are. And the IEEC center has provided that. They provide it both with access to very expensive X-ray equipment and systems where we can go in and look for problems and find out what the source of them is.

It has also provided us graduate students who work in the lab that may have an area of expertise one of my employees does not in how to operate equipment or how to look for specific things. We have actually had them take some of our circuit cards that were having production problems and destroy them and take them apart and figure out where the problems were in the manufacturing process for us.

So SPIR and the IEEC center have been great resources for us. And, in fact, on the SPIR side of it, we just hired one of those SPIR employees 2 months ago now as a full-time employee for our company. So we actively use that program.

We also take advantage of the university for workforce training. We have funded multiple master's degrees and bachelor's degrees through our tuition-assistance policy with our employees. My business partner, himself, came here and got his master's degree, funded by our company.

So we take advantage of that to keep our workforce trained. We have the tuition assistance. We fund, you know, advanced degrees in the same field of study that our current employees have. And that has been a great asset to us, to have this local facility here and this local university where we can keep our workforce trained.

We have made some attempts on the STTR Program with Binghamton University. You mentioned the Small Business Technology Transfer Program in the past. In our area of the market that we serve in training and simulation, it is primarily in realtime visual systems and display systems products. And so we tried an attempt at one point to partner with a researcher here at the university and go after an STTR that was in that field of interest.

We were not successful there; we didn't win that one. And it was primarily because, in the feedback we got, that the research of the faculty member here was not involved in our marketplace. They were not involved in realtime visual systems and training research.

So we haven't attempted that again, but we do find that there are a lot of Link spinoff companies still here in the area, many of them small. I can think of at least seven off the top of my head. Two of them are actually large. And, you know, there are some things we would love to partner with the university on in new cutting-edge research in our areas of interest, as well.

We see that, you know, even though some of us have been around—our company formed in 1995—we have been around for 18 years now, we are still very small. We are a 10-, 11-person company. There are things we just cannot fund on our own internal research and development funding. We don't have the financial resources to do so. But if we could go after some of these STTRs or other things and have the university team with that, there are many, like I said, training and simulation companies in this region

that would directly benefit from that. We are already job producers. You know, we would like to expand and actually get actively involved in even more of that.

We have found that some other universities have been very successful at it, one in particular, the University of Central Florida. They have actually put in place curriculum that are credits and targeted class work in training and simulation, in simulation and those types of things within their engineering program. So they actually have a curriculum designed around the training and simulation marketplace.

We would love to have, you know, some classes here that our employees could take and that other students that come to this university—there are a lot of local students who come here, too, that would like to stay in the area—to come out with more specialized training in our field and our marketplace and the other six or seven companies that exist around here, as well.

But, all in all, you know, we have found this university to be a great resource for us. SPIR, IEEC, and the fact that we can bring our existing employees over here and, you know, have them take coursework and advance in their fields of interest is a great advantage to our business.

Thank you.

Chairman HANNA. Thank you.

One of the things that I can say without hesitation is that we all know that education is that thing which transforms not just individuals but countries and will allow our country to be competitive globally. As you said, Doctor, we are falling behind.

And I, for myself, am vice chair, along with Mr. Lipinski from Chicago, of the Science, Technology, Engineering, and Math Caucus, something we spend a great deal of time in our office thinking about and pursuing.

So I would like, though—and I want to say, too, up front, I agree with your comments about sequestration. But one of the underlying issues here that is implicit in particularly your statement, Dr. Sammakia, is that there is a purpose in government investing in basic research. There are people who would argue that—and I am not one of them—who would argue that basic research is something that businesses will do because they have a profit motive and et cetera. So you see cuts in this area. But yet we are falling behind in terms of what we spend as a function of our national budget on those items compared with other countries.

If this isn't too much to ask, because I would really like to have as concise a reason as possible on why it is important that government funds basic research.

Mr. SAMMAKIA. So the gap between research and development and products is shrinking. So basic research of a few decades ago is completely different from what we call basic research today.

Even what we call basic research today has become fairly applied. Almost all the research we conduct at the Center of Excellence in Binghamton has a product and a customer in mind. So it is very focused. It is focused on something people will buy and use and live a better life with. So it is really applied research. So that is one.

This country used to have major research labs which were in the private sector, and that has really gone down over time. Investment by the private sector in basic research is almost nonexistent now. The research is very applied in the priority sector.

One example—I can give you many examples, but I prefer to give you just one, which is Bell Labs, which used to conduct a lot of research that was really basic research but which has resulted in tremendous economic opportunities. A lot of products have come out of Bell Labs that have enabled a lot of real applications, even though it was basic research.

So basic research is very important. Why it is important for government to invest in it? Well, for one thing, you heard today from my colleagues, Chuck and Rick, that they came and used infrastructure on campus. They worked with us; they hired our students. Well, all of that is enabled by the Federal funding. So, in reality, we can't build our labs, we can't acquire equipment, and we can't hire the students to conduct research without Federal funding.

So that funding is now building the infrastructure. Some of our labs in this very building are used by multiple companies, by 20, 30, 40 companies. And we built these labs with the intent that they become available to industry. So we conduct our research, but industry comes and takes their measurements, or we help them with the taking of the measurements.

So this is infrastructure that enables not only research, but it also enables direct economic impact and direct product work. We love to do that. We love to work with industry very closely on solving real-life problems. It is also very important for our students to get that experience, because when they go to work after that, they are ready.

And I think I will stop here.

Chairman HANNA. Thank you. Thank you. That helps a lot.

So what you are saying is there is a gap; that the profit motive, of and by itself, doesn't provide or fill that gap; that the kind of venture capital that the government can supply does those things that other people may not imagine that need to be done. It is true science.

Mr. SAMMAKIA. That is exactly right.

Chairman HANNA. Would you like to weigh in on that?

Mr. SCHWERIN. I think the profit motive is often too short-range. We are so quarterly driven, especially, you know, the public companies, that there is a disincentive to invest in innovation that may not pay off at all or may not pay off for years to come, because you are being so scrutinized for how you perform on a quarter-by-quarter basis.

I mean, the number of, you know, landmark companies that have failed, especially in this region, because they didn't keep up, you know, are legion. And, unfortunately, we are so short-term-driven that, you know, public funding is really the only other alternative to allow the time that it takes to germinate, you know, pure research into something that is——

Chairman HANNA. To actually get into the unknown and create——

Mr. SCHWERIN. Right.

Chairman HANNA.—without knowing exactly where you are going. Interesting.

Mr. Pray, you have an interesting policy. You talked about it in your testimony. You actually help your employees come to Binghamton University, and your company pays for their tuition?

Mr. PRAY. Right. We have a tuition-assistance program. Up to $2,500 a year of tuition we will pay for our employees to get advanced degrees. And $2,500 will essentially fund two graduate-level courses here at Binghamton University. So, you know, we consider that they will be part-time students, but they will come here as a graduate student and they will do two classes a year and we will pay for that.

And if they choose to go to another school, which some have, as well, we have paid for it there. You know, it doesn't have to exclusively be here. It is where they want to get their degree. But it has to be an accredited university——

Chairman HANNA. Sure.

Mr. PRAY.—and it has to be in their field of work.

Chairman HANNA. Interesting.

I listened to the conversation about this shrinking of the middle class, and the President says, and I think rightly so, that if you are going to rebuild our economy, it is going to have to be from the middle class out. I also believe that it is from the bottom up. And education represents from the bottom up. And I am a big believer in early childhood education.

Doctor, you have an Office of Entrepreneurship and Innovation Partnerships here. Can you talk a little bit about maybe some of the products that you have come up with and what you have seen happen because of that?

Mr. SAMMAKIA. Sure. So one of the biggest ways that that office participates in helping local companies and companies around the State and around the country is in licensing some of our ideas and some of our patents to those companies. And the number of licenses we have had has grown substantially over time. We are very happy to work closely with companies that way.

We also have a very strong advocacy in terms of anyone who on campus comes with up an idea and wants to start a company, we allow them to start here in the pre-incubator, with the idea that we would then move them out into the community and help them start the company.

One real success story which we are very proud of is a company called Sigrity, which was started by one of our faculty from the IEEC that was mentioned earlier. That company developed software that computes noise that happens in electronic systems, both electrical and electromagnetic noise, which is a really important problem for industry. So the software started getting used by big companies, namely Intel and IBM, for their package designs.

And then eventually the faculty member decided that he wanted to do this full-time. He ended up leaving the university and moving his company to San Jose, where it became a really successful company. Sigrity now is used in almost every processor design that happens in this country.

Recently, he was here giving a talk, and he said, "If you say 'Intel inside,' you should also say, 'and Binghamton inside,' as

well." So we are really delighted to hear that. It was a wonderful——

Chairman HANNA. He does say that?

Mr. SAMMAKIA. He said that in his talk here, of course.

However, that company grew to be around 150 employees, some of which are in Rochester, New York, the majority in Silicon Valley, of course. And they recently got bought out by an even larger company, and the product is now getting even wider use.

And the university got over a million dollars in licensing fees out of that one patent. So that is really a success story for the university and for the company, for the country in terms of job creation and opportunity. That work could have been done elsewhere just as easily. So that is an example we are very proud of.

But our biggest impact is working with industry directly by licensing some of our ideas to them, and then they use them in many different ways.

Chairman HANNA. Certainly. Thank you.

You know, Mr. Schwerin, you touched on something that I don't know if it is generally understood, and that is—although it ought to be—that you have to make a profit in order to use the kinds of deductions that benefit companies to further their business interests.

And what you said was, and correct me if I am wrong, is that grants to companies that are startups are more important than tax write-offs to people who aren't making any money.

Mr. SCHWERIN. Because you may not live to see the day.

Chairman HANNA. You may not live to see the day.

Mr. SCHWERIN. Yeah.

Chairman HANNA. So, implicit in that is that you are saying that the government has a role in funding innovative companies that may not be successful. Because, clearly, if they were, they wouldn't be talking about——

Mr. SCHWERIN. When you don't need the money, there is no shortage of folks willing to lend it.

Chairman HANNA. Would you like to talk about that? Because, you know, that is the kind of thing that gets a lot of pushback, from where I am. I mean, if you have more to say about it.

Mr. SCHWERIN. Well, I just thought it was quite forward-thinking, and I haven't seen it in too many instances. I mentioned two of them that we took advantage of.

You know, again, this was a little-known—the QDTP program was a little-known aspect of Obamacare that I think germinated from Senator Menendez' interest in the medical device companies in New Jersey, but it certainly had a national impact.

It had a very, very small window for application. There was very little exposure about its existence. And, certainly, nobody in this community knew about it. I was fortunate enough to come upon it, and we applied, and we were fortunate enough to qualify.

But, you know, that was a very, very helpful infusion at a time when we really needed it. And, again, it was specifically for, you know, medical device research and development of translational research—so it is not just blue-sky research; it is for, you know, clinical applications—for companies with fewer than 250 employees.

Chairman HANNA. Is that what made you say that you think there should be, effectively, a clearinghouse of information? I mean, because you said you fell on it, so I assume that it was an accident that you learned about it and that——

Mr. SCHWERIN. I had a family connection to Senator Menendez' office.

Chairman HANNA. Is that what it was?

Mr. SCHWERIN. Yeah.

Chairman HANNA. Well, that is fine, too, you know.

Mr. SCHWERIN. So I was fortunate. But, you know, once I knew about it and I went looking for it, I found references to it coming from, you know, law firms, large accounting firms that, you know, have a pipeline into this sort of information. And I felt this was kind of an unfair playing field, that, you know, outside of the major sweet spots, as I said, where this information is commonly disseminated and these, you know, professional support institutions like accounting firms and like law firms—I mean, you should never write your own contract, you should never try to do your own taxes; you should stick to your core competency. But if we are in an environment where this is not typically understood, these incentives are not particularly well-publicized, we are going to miss out for no good reason.

So I thought there ought to be a one-stop shop. I am not sure—I don't want to take the, you know, local development agencies off the hook here, but Congress, I think, is—I mean, that is where this stuff emanates, and perhaps there could be a more institutionalized way of disseminating it.

Chairman HANNA. You know, I sit here not knowing if there is. And I am sure there is a place to go, but I will be the first to admit if you want to find something in government, there are so many different layers. So that is something worth thinking about, and I appreciate it.

Maybe you could give me an idea of what kind of threshold—I mean, the government isn't going to put money in someone's pocket simply because they think they have a good idea. Could you describe for me something to me that might work?

I am sure there are application processes and that kind of thing, but where should that impetus come from and what should it look like? When the government invests in something that is essentially venture capital through a grant, there has to be some basis to do that that is responsible and protects the public's interest. Otherwise, everyone, you know——

Mr. SCHWERIN. Well, you know, in these sort of two real-world examples, one federally-supported and one State-supported through Tax and Finance, we had to document what these funds were going to be used for. And, frankly, they were funds for which expenses had already been expended. So we had to demonstrate not with, you know, descriptions of the research that was going on, with pictures and with diagrams and with a rationale for how this was going to be used in a commercial way.

So this was for specific projects already under way. And the documentation was pretty rigorous. So I think the public was protected.

Chairman HANNA. So you are comfortable with that?

Mr. SCHWERIN. In these cases, I was. I mean, this was done, as I said, very quickly. And, you know, as it turned out, there were so many applications, especially for the Federal program—so, on the one hand, I am saying that we don't know about it; on the other, I am saying that there were lots of applications, but they are not coming from, you know, places like upstate New York.

Chairman HANNA. Sure.

Mr. SCHWERIN. We ended up doing just as well as larger companies, because they threw their hands up in the air and said, we don't know how really to evaluate all of these applications in this, you know, 60-day time window, so we are going to give everybody the same amount of money.

Chairman HANNA. Uh-huh.

Mr. SCHWERIN. So I would say that is the best way to do it.

Chairman HANNA. Mr. Pray, could you give me a real-life example of an instance in which the RPA worked with the IEEC department at Binghamton University? Is there a specific product you developed?

Mr. PRAY. Sure. There was one in particular where we had advanced into some signal processing circuit cards we were designing for a customer that had a lot of ball grid array devices on it. They are called BGAs.

In a ball grid array device, there is an electronics package where all of the conductive locations of getting in and out of that integrated circuit are on the bottom of the chip. So when you mount them on a circuit card, you can't access them anymore; they are hidden underneath. And when you start having manufacturing problems in those areas, it is very, very difficult to go in and find out exactly where the problems are.

So we took a couple of example cards and we brought them over here to the IEEC, and we started out with X-ray inspection. So we took—and we were able to look at all of these different layers. You can focus the depth of the X-ray very, very accurately to very, very small increments. So we could look at the layer at the circuit board where the conduction points are supposed to be and work our way up through the electronics package and actually find where the voids were and where the problems were.

In that case, we didn't actually find those with the X-ray. What we ended up doing then was having them do a destructive analysis on the circuit card itself. And they found that there were some problems with the printed circuit boards we were buying from a vendor. I don't remember which vendor it was, but it was out west. And there were actually problems with the circuit card manufacturing itself that they were able to find in the IEEC labs by going and stripping that circuit card in very, very small layers and taking pictures. And it was through that that we actually found faults in the card in the manufacturing process.

Chairman HANNA. Amazing.

Mr. PRAY. Yeah.

Chairman HANNA. Doctor, as you know, I have always been supportive of high-tech incubator projects. As many of our local, State, and Federal elected partners representing this region are, Cornell also has an incubator—I forget, maybe you call it a system. But

they developed many companies from Cornell that are still in the area.

Can you give me an update on where your projects are and what is out there, what is going on?

Mr. SAMMAKIA. So, yeah, it is a really important project. When you think about the entire food chain for economic development and technology transfer in this region, we have everything except for a high-tech incubator. That was the missing piece.

On campus, we have pre-incubation. We have quite a bit of space in this building and other buildings where companies can start when they are very small. And then at some point, they need to get into a point where they start building products but they are not full manufacturing, and that is where the high-tech incubator will go.

President Stenger saw that very clearly when he first came here and made it one of his top priorities to raise the funds to build such an incubator. He has successfully raised just over $11 million out of our estimated need of $13 million to construct the building and prepare the land. That funding is a combination of State and Federal funding.

So we are really pleased that we were able to raise $11 million. And we are convinced that the remaining $2 million we will be able to raise over the time it will take to construct the building. So we are very confident this project will be successful.

The location is identified, on Hawley Street in downtown Binghamton. The land has been acquired and all the properties on it have been acquired, and we are in the process of finalizing that stage. We expect the building to be constructed over the next couple of years. A really exciting project that will make a big difference.

Chairman HANNA. You know, what is interesting to me, since I have been in Congress—and I have been in business for 30 years; this is all rather new, so I am very honored to be among you and to listen to you—is that, in the last 20 years, about 98 percent of the jobs we have created in this country have been service-related jobs.

And Congress talks about all jobs as if they were the same. We look at an unemployment or employment rate, when we know that there are tens of millions of people out of work or underemployed. And even those who are employed aren't building middle-class lives like I was fortunate enough to build for myself, and my parents. And the paradigm has changed in this country.

And I would ask you to comment on this because, clearly, I have an opinion about it, but that if we do not engage in education to build those value-added, transferable, salable goods, if you will, to the rest of the world, we will continue to see the decline of our middle class, which is what you have said in your opening statement.

Mr. SAMMAKIA. And that is exactly right. I mean, that is why I find the concepts like the NNMI so exciting, because it is about building intelligent manufacturing that is affordable in this country. So it is not just any manufacturing; it is the kind of manufacturing we can build and sustain.

Chairman HANNA. So I am putting words in your mouth, so correct me, but so what we are saying here is, if we do not stay at

the cutting edge of everything new, we are almost, by definition, falling behind.

Mr. SAMMAKIA. You are absolutely right. I mean, again, we are at a point where anything that becomes fully commercialized and straightforward to build will get built elsewhere. So we need to be technically aware of that, and we need to be at the cutting edge of technology and stay there and create jobs in the sector, which is related to technology and which is really affordable in this country. I mean, that is the whole key, affordable——

Chairman HANNA. Right. And it isn't just about creating doctorates——

Mr. SAMMAKIA. Correct.

Chairman HANNA.—or master's degrees. In this district, throughout, there are machine companies, that you need a very high degree of technical skill to operate what used to be a basic milling machine. I can think of dozens of those.

So undergraduate degrees that provide—and graduate degrees that provide a wide variety of skill sets still have a chance to have people do what are traditional jobs, but the need to be technically proficient in those jobs is much higher than it used to be. On-the-job training isn't quite the same.

If you would like to speak to that?

Mr. PRAY. I can tell you from our experience. So we compete in the marketplace with all of the consumer goods that are out there that serve lots of different functions in image processing and things of that nature. And customers are often willing to accept that if it is going to cost them less money, even if it doesn't quite meet what they want.

So a company like mine has to go look for these niche marketplaces, where there is nothing else out there right now commercially or consumer-available that does what the customer needs. And we have to design things that are state-of-the-art, that have the same kind of reliability that people expect out of it, you know, the same kind of manufacturing quality, but fit these niche marketplaces, and make it affordable to manufacture them here in the United States.

All of our products are manufactured here in the United States—electronics and electromechanical and mechanical assemblies. And, you know, we get a great deal of savings out of IEEC, in that the kind of equipment we use here of theirs would cost us millions of dollars that we don't have to invest into it. So we are able to keep our products competitive and build them state-of-the-art, you know, through local manufacturing places here by working with IEEC and our design teams, you know, to stay abreast and stay ahead of it.

And the kind of jobs, you know, that our company creates are high-paying jobs. We have to compete with large companies for our employees, so we have to provide the same kind of benefits and the same kind of resources available. You know, we provide full medical, dental, vision insurance, and we provide the tuition-assistance program. And they are very good-paying jobs.

Chairman HANNA. You know, Cornell University has a cyclotron. You know that?

Mr. PRAY. Uh-huh.

Chairman HANNA. And they have people from all over the world access that. They are adding new ports to it now, something we helped them with. And it is just a remarkable facility. There is a lot to be happy about in this region.

I want to ask you, Mr. Schwerin, you noted in your testimony that Sonostics might be interested in being a tenant at the new high-tech incubator under development. Do you want to talk about that?

Mr. SCHWERIN. A couple of weeks ago, we actually moved from the existing innovation center, which is a small incubator downtown supported by the county, up to the startup suites here at the university, in part because of a second license that we negotiated for additional technology so we can offer additional services. And we looked at that as sort of a graduation from, you know, the incubator downtown.

The new incubator that is planned is a whole different animal, in terms of its not being simply cubicles or an empty room but it would have wet labs and be appropriate for the kind of high-tech company that is, you know, rightfully spawning from the university.

And, actually, we have been approached by the county, asking if we would like to be, you know, a tenant when that time comes. And we would be honored to be part of that. Sonostics doesn't require wet labs, but the ability to continue research on the technology that we have licensed here, as well as delivering the service on site, is something that we must do to stay ahead.

I mean, you know, we are in the healthcare field, and so we are not manufacturing lots of widgets. We are trying to change the face of how some, sort of, ill-served or underserved fractions of the population are treated. And, today, the expenses are too high and the outcomes are too poor for some of the chronic conditions that we are dealing with.

So I like the idea of having the incubator house, you know, a plethora of different companies serving different fields.

Chairman HANNA. What you are saying is that the sunk costs—the costs that you would have to undertake are prohibitive, but when they are shared costs and when they are sponsored, there is no telling who will go there or what can come out of it.

Mr. SCHWERIN. That is right.

Chairman HANNA. Is that fair?

Mr. SCHWERIN. That is right. And, frankly, you know, the existing incubator downtown is really not simply for high-tech. We are one of the few high-tech companies that were in that incubator. But I just—I would like to be associated with that.

Chairman HANNA. I want to ask all of you about something a little more controversial. It is not in any of my notes. It is my personal opinion that people with doctorates, people with STEM degrees who come to this country should have a much easier way to stay here and to get whatever is required to allow them to do that, to the extent that I would say, if someone graduated from Binghamton University, they should all but have a stamp with their diploma, you know, that you can stay here.

Have you seen instances in your career, Doctor, that have forced good people out of the country simply because of the waiting time?

And I know the lead time is sometimes, I have heard, as much as 9 years. I would like to know about that.

Mr. SAMMAKIA. I agree with you 100 percent. I think this is a very important issue, and I think it does cause a problem for our graduates.

When I first came to this country, it was a fairly straightforward process to get a green card. After getting my Ph.D., you had to apply and within a year to 2 years you were able to get your green card, which really means that you are a citizen except for voting, so you had all the rights of an American.

Today, unless you are in the absolutely top echelon of maybe 1 or 2 percent—they categorize that as distinguished scientists—it is a really long and difficult process. The process can take up to 9 years to get a green card.

In the meantime, the candidate may not be able to leave the country, so they are trapped. In many cases, you have young, single people who are in this country who would like to go back to their country and get married, perhaps, and come back, you know, just real-life issues like that, and they can't deal with it. And, in many cases, they give up and leave.

Chairman HANNA. Sure.

Mr. SAMMAKIA. Top-quality scientists.

Chairman HANNA. What I have heard and what is also explicit, I should say, in your statement, people don't need as much as they used to to be here to practice their skills. Yet we are training people in skills that we need, and we don't have an easy way for them, and for us, to benefit from that.

Mr. SAMMAKIA. You are absolutely right.

And the other challenge now is that there are opportunities for these people elsewhere. So if they are from China or India, for example, that is a growing infrastructure. They are our competition, and we are essentially forcing some of them back.

Chairman HANNA. Sure.

Mr. SAMMAKIA. So that is it a really important issue for growing technology in this country.

Chairman HANNA. Gentlemen?

Mr. PRAY. Well, I kind of have the opposite problem in my shop, because we do a lot of ITAR-restricted work with the government, so we have to have all U.S. citizens in our place. So, you know, even when we bring in SPIR students, we have to declare on there it has to be a U.S. citizen that comes into our facility.

Chairman HANNA. Uh-huh. Well, you know, what is interesting——

Mr. PRAY. But I have had customers of mine who have had foreign students working for them that they loved and wanted to hire and couldn't because they got sent home.

Chairman HANNA. One of the things—I have only had this job 2 years and a little over 6 months, right? The 24th District, the old district, had over 20 universities and colleges: Hamilton, Colgate, the entire SUNY system, Ithaca, Hobart, just on and on and on. And I visited them all, and the story was the same, only it was more in reference to New York. You know, we have tens of thousands of young people getting educated here, and they can't find a way to make a living in New York that is based on the skill set

that they had gained. You know, it is a tough environment. But my point is that the same thing is happening nationally.

Let me ask, because we have a little bit of time—we have another appointment. And I can't tell you how grateful I am to have such like-minded people in one place, because this does help us. We can go back and stand up for something that I believe in, which is that we are missing out in this country on focusing on the number-one thing that has been transcendent for mankind forever. And that is, you know, education and how you value it and how you reinforce it.

And, you know, there is not nearly the degree of importance put on that conversation, I believe, as there should be and needs to be. And my concern is that we are falling behind at an accelerated rate, that the rest of the world knows how we got where we are and were and understands at least, if not better than us, as well as us on how to compete with us.

And we are becoming globally—you know, we are still a great country. We do a lot of things wonderfully. In manufacturing, we are still—unless something changed in the last few days, we are still the number-one manufacturing country. And people are coming back here.

But in order to keep that a constant, we need to focus on what you do here and learn the very clear difference between what we regard as an expense in Congress and what we regard as an investment in Congress. And that is the essence of the conversation.

You know, you talked about sequestration. It was a hamfisted thing because everything was sort of treated alike, for a lot of reasons that I don't need to get into. But, you know, you have in me and in our staff, who are all better educated than I am, a great belief in that.

So I want to thank you all.

And if anyone would like to say anything, we have a couple of minutes. If you want to close with anything, go ahead. Normally, everybody gets 5 minutes, and somebody hits a gavel, but we don't really have to do that here.

Mr. SAMMAKIA. Well, I would like to repeat my thanks to you for holding this event at Binghamton. I think this is a really important discussion to have.

I would also like to thank Donna Lupardo, who—I don't know if she was here when I made my opening comments, but her role in building this infrastructure has been absolutely crucial. So thank you, Donna.

And, again, thanks for having us.

Chairman HANNA. I mean, how blessed—you know, IBM, who is not here as they were, certainly—I mean, this is—Binghamton is the birthplace of so many wonderful things. And it still is, because you are here and Binghamton University is here. And I am really grateful for that.

Go ahead, sir.

Mr. SCHWERIN. I would like to echo what Dr. Sammakia said. I appreciate the opportunity to participate here. And we are honored to be part of this family, you know, from the Binghamton University community.

Mr. PRAY. Yeah, I would echo that. I am very thankful that you held this forum and I had the opportunity to come and speak. And, you know, Binghamton University has been a great asset to us.

Chairman HANNA. Well, thank you. Thank you all for being here.

I would like to thank the audience for being here, too. It is important. It is a Monday morning, and people got up and got out, and I am very grateful.

I have to formally ask unanimous consent that Members have 5 legislative days to submit their statements and supporting materials for the record.

Without objection, so ordered.

This hearing is now adjourned.

Thank you, everyone.

[Whereupon, at 11:07 a.m., the Subcommittee was adjourned.]

APPENDIX

Congressional Field Hearing 8–5–13 at Binghamton University

Higher Education and Entrepreneurship:

How Partnerships between Universities and Small Business Can Grow Jobs

Congressman Richard Hanna

Testimony provided by: Binghamton University Vice President for Research Bahgat Sammakia

I want to welcome you all to the Binghamton University campus, specifically our Innovative Technologies Complex. When we were asked to host this event, we thought this location would be the perfect setting for the topic addressed by this hearing. Exiting things are happening here at the University, many of them right inside the walls of these buildings.

You have asked me to testify about the role higher education can play in helping small businesses advance technologies and create jobs. Binghamton University has a long history as well as a strong reputation for working with companies large and small. We also work closely with governments both large and small. We play a vital role in transferring the knowledge and innovations created and developed on our campus to the broader community.

We have partnerships with large corporations such as IBM, GE, Microsoft, Analog Devices, Corning and BAE, which has a large presence right here in Greater Binghamton. These are just a few examples. But just as important, we have partnerships with smaller companies such as Sonostics, which is growing a company right here in Binghamton with technology that was born at our university. We also work closely with a small firm in Oneonta, Custom Electronics Inc., to improve ultra-capacitor technology. Again, these are just a few examples of our relationships with small business and the types of technology research we are committed to developing.

Before getting too far into the discussion of our role promoting small business growth, I want to take a few moments to talk about the University and its vision and mission. Our president, Harvey Stenger, has a vision for the University to become the premier public university of the 21st century. It is our mission in the research division to support that vision. We wholeheartedly support it because it is a vision of excellence. One of the main initiatives under our new Road Map strategic plan is to be an institution that is path-breaking in its academic and research pursuits.

As I stated, our academic institution has a strong reputation for research and collaboration with the private sector. When talking about the work we do, I always want to make the point that we here at the University have scientists and engineers who make important discoveries and develop technologies that will have a positive impact on society.

Why do we believe this to be true? It is because this campus is grounded in the humanities and social sciences. Those who do not plant their feet on this foundation of liberal arts can still make important discoveries, but they may not be ones that are right from a social perspective. So again, while we make it a priority to focus on research, innovation, technology transfer and job creation, and we are successful in all of these important endeavors, we believe that what sets us apart is our history of excellence in these areas.

While Binghamton University works well with private industry and small business, we know we can get better, and we will get better. Under the guidance of President Stenger's Road Map and with the help of our NYSUNY 2020 Challenge Grant, we expect to strengthen our research efforts. It is with additional research faculty that our research and its impact on society and our economy will grow.

During the next several years, we anticipate hiring an additional 150 faculty members. Those hires will be targeted in strategic areas where we already have a record of success: smart energy, neuroscience, molecular biology, computer science, nursing and bioengineering, just to name a few. The increase in faculty will allow us to reduce the student/faculty ratio and enable us to close the gap between Binghamton and other top schools in the areas of research and graduate education, which are among the biggest challenges we face in our quest to become the premier public university.

We also face other significant challenges in our research efforts on campus. As you most certainly are aware, the federal agencies that support a good portion of our research dollars, notably the National Institutes of Health and the National Science Foundation, have seen their funding stay flat or cut in recent years. Without the government's investment in R&D, we cannot be successful. In fact, we saw the first-ever dip in our overall research funding this year after two decades of steady growth.

We understand the economic climate and we recognize the challenges our leaders face in Washington. But we also know that a renewed focus on support for R&D and on higher education is a wise investment. "Science is not a luxury," the late John Marburger III, former science advisor to President George W. Bush and then-vice president for research at Stony Brook University, wrote in 2001. "Economists estimate that approximately half of post-WWII economic growth is directly attributable to R&D-fueled technological progress."

We are good stewards of the money we receive. With our Road Map strategic plan, our research efforts will become even more focused and we will identify new ways to build multidisciplinary collaborations for the good of society. Binghamton will make key con-

tributions to innovations in smart energy, health sciences and other fields. We are also exploring the possibility of creating a pharmacy school.

So how do we get our research to market? How do we transfer technology created on campus into jobs out in the real world? Our University's staff works closely with researchers on campus and provides technology, education, business and law support.

Also at the top of our toolbox is the commitment to foster an entrepreneurial spirit. That spirit is across campus, not just in our scientists and engineers but in all of our students, both graduate and undergraduate. Building Binghamton University's entrepreneurial ecosystem is at the heart of everything we do.

One of our most effective tools is our Office of Entrepreneurship and Innovation Partnerships. In this office, our staff has worked with faculty to build portfolios of intellectual property. Not all of our intellectual property is patented, of course, but we have patented a number of innovations. This is a complicated process that can take as long as seven years. And, again, that is just the patent phase. From there, it can take several more years to develop a meaningful product or service for industrial purposes and the commercial market.

When faculty, students or staff create an innovative process or product, the Office of Entrepreneurship and Innovation Partnerships serves as the campus resource to help assess, protect and leverage the underlying intellectual property rights. And while we have experienced many successes with bringing research on campus to the commercial market, we still experience gaps in support, especially at the proof-of-concept stage.

That is where additional state and federal resources could provide a tremendous bridge to help us connect the invention in a lab to the eventual launch of a company—a company that will create new products and, just as important, jobs for our community.

Just as we must reinvest in R&D, we also need to strengthen our commitment to education in the STEM disciplines: science, technology, engineering and mathematics. It is truly the only way to prepare the next generation of Americans and American companies for what we know will be a global race for prosperity and security.

In my travels to places such as India, Korea, Hong Kong and Taiwan, I have seen excellent models of infrastructure that supports scientists, industry and education. The exciting new National Network for Manufacturing Innovation (NNMI) program appears to be a step in the right direction as we strive to build manufacturing research that leads directly and quickly to job creation. Binghamton is participating in two proposals for this federal program, which brings universities and companies together in a meaningful way.

Another way we as a University hope to bridge the gap between mind and marketplace is by developing a high-technology incubator. President Stenger's proposed incubator has received priority support from New York State's Regional Economic Development

Council as well as crucial funding from the federal government's Economic Development Administration.

Binghamton University and the regional economic development community plan to build the incubator in downtown Binghamton to provide a unique entrepreneurial ecosystem for emerging companies. The Hawley Street facility will foster innovation, commercialization and job creation through collaborative efforts of academic, industry and government partners.

There is no facility in the region suited to new high-tech companies. Creating this infrastructure will ensure the region reaps the benefits of federal and state investments in the knowledge-based economy. The incubator will enable emerging companies to grow and relocate in the community.

Opportunities include access to a university-based skilled workforce and university staff charged with building relationships with industry; university multi-user facilities; human resource programs such as internships and co-ops; and university technology transfer and commercialization offices. The private-sector investment community will be encouraged to have a presence at the incubator as well.

Initiatives at the University, including the proposed Southern Tier High-Technology Incubator and the Center of Excellence in Small Scale Systems Integration and Packaging, provide stability to the region and an added boost to the regional and state economies.

I wanted to touch on two important federally funded programs also administered by our Office of Entrepreneurship and Innovative Partnerships; the Small Business Innovation Research Program and the Small Business Technology Transfer Research Program. As you all know, these two programs help the University help many small businesses in our region. They are at the heart of what this entire discussion today is about—our University using valuable resources like the ones provided by SBIR and STTR to encourage the conversion of government funded research into commercial applications.

Utilizing these programs, our University has been able to partner with and assist about a dozen companies since 2005. We are currently focusing on internal efforts to leverage these programs even more and identify additional companies in our region that can be helped by the resources provided by SBIR and STTR.

Additionally, the Small Business Development Center, a SBA-sponsored program administered by the University, assists entrepreneurs, business and industry in developing solutions for their problems. This leads to increased profitability for the entrepreneur and increased investment and job creation for the community. By assisting new and existing small business firms, the SBDC contributes to the stability and growth of the small business sector in the region.

Since its start in 1984, the expert advisors of the Binghamton SBDC have worked directly with 13,365 businesses, helping them

to invest $189,621,041 in the area's economy, and create or save 10,530 jobs.

Before wrapping up, I want to share with you a few statistics that underscore the University's influence on this region and its economic vitality. Our most recent study indicates this University's economic impact at approximately $965 million annually for Broome and Tioga counties alone, and $1.2 billion for New York State.

Based on fiscal year 2011—the most recent numbers available—Binghamton University accounts for an estimated 12 percent of the gross domestic product of Broome and Tioga counties through its direct and indirect expenditures, including salaries, goods and services, capital outlays, and student and visitor spending, which total over $622 million. When applied to the Binghamton Metropolitan Area regional multiplier, this $622 million grows to $965 million in total annual economic impact for the region.

In terms of jobs, Binghamton University employs nearly 5,000 faculty, staff and student workers, and supports an additional 5,500 full- and part-time jobs in Broome and Tioga counties, and 225 full- and part-time jobs beyond the region, for a total of 11,000 jobs in New York State.

As you can see, our reach is enormous and our impact impressive. We stand ready to continue to be that driving economic force for our community and an important resource for businesses across the country. With your support, we can continue to do great things: educate our students, make discoveries and create technology.

Thank you again for allowing me this opportunity to address you today as part of this field hearing. And thank you for choosing our campus to host this event. Binghamton University is proud of its academic reputation, our research accomplishments and all of our facilities on the main campus, downtown and here at the ITC. We are always eager to partner with our representatives in government and collaborate with the leading minds in commerce. If there is any additional information you require from us, please do not hesitate to ask.

Thank You!

Testimony of Chuck Schwerin

Chief Executive Officer

Sonostics, Inc.

Before the House Committee on Small Business

August 5, 2013

Binghamton, New York

Good morning, Mr. Chairman and Members of the Committee. My name is Chuck Schwerin and I am CEO of Sonostics, a five-year old start-up that spun out of research at Binghamton University's Bioengineering Department.

On the House Committee on Small Business website, Congressman Hanna sums it up: to unlock economic growth in this country, and certainly in the Southern Tier of New York State, it is imperative that we "foster an environment where small businesses can thrive."

Outside of the traditional start-up sweet spots of Silicon Valley, Research Triangle, and Route 128 outside Boston, there historically has been in either the institutional knowledge nor the raw materials for nurturing such an environment. For start-ups like my firm, Sonostics, it is akin to salmon swimming upstream in order to survive, let alone thrive.

Yet companies like Sonostics are exactly what are required to nurture a rebirth of the economic engine necessary to replace the manufacturing institutions that used to dominate this region. Communities like the Tri-Cities cannot expect 25,000 manufacturing jobs to walk through our doors anytime soon. But the good news is that New York State is blessed with numerous institutions of higher learning that have the ability to spawn dozens of innovative companies like Sonostics, providing well-paying jobs that should attract people back to the region and keep those already here.

While there is no shortage of research pursued within the New York State university system, a modest percentage historically could be deemed translational; meaning the purpose of the research was to create commercial utility. The research Sonostics licensed, converting muscle vibration to force to detect imbalance that is typically the cause of 80% of joint pain, can be directly translated to clinical efficacy. Since University faculty may devote up to 20% of their time to external ventures, the need for entrepreneurs to partner with research faculty to operate new ventures is critical.

If there is inadequate community support for innovative, high tech ventures, attracting individuals such as me, to a place like Binghamton, NY, can be a challenging prospect. I was very intrigued with the technology but also had a spouse teaching at the University, so the move was not so difficult. For this to become a trend, for outside entrepreneurs to seek, or be recruited to, start-up companies in upstate New York, institutional and community support for new ventures will be most important.

Growing a company that leverages University research demands critical steps. To reach a stage where investment becomes interesting to outside investors it is necessary to:

1. validate the technology
2. secure a license from the University
3. build a prototype
4. identify a market
5. recruit a team
6. generate revenue

In order to keep the lights on during the first five steps, a chief executive must also identify sufficient financial backing. Hence, the first years of Sonostics' existence were spent pitching to friends and family, to Angel investors, and translating the research idea to a commercially-viable product or service.

An early step involves negotiating a license with the Technology Transfer office of the University. Tech Transfer offices have two primary choices. They can either identify mature public or private entities to whom they can license the raw technology, or help the researcher/inventor build a team that can create new ventures that focus on commercializing the raw technology.

The former course of action may be simpler for the Tech Transfer officers to pursue, but the latter is a better generator of jobs, of which Sonostics is an example. We negotiated a favorable agreement for developing and marketing vibromyography, the non-invasive modality for detecting muscle imbalance, and worked closely with the University Tech Transfer office and the patent attorneys they selected to protect the intellectual property.

It is fair to say that Sonostics could not have survived without significant assistance from Broome County, the State of New York and the Federal Government. This aid included:

1. State support for the Centers for Advanced Technology—in our case we collaborated with the CAT at Stony Brook, which specialized in sensor technology and built our first prototypes;

2. State support for SPIR grants (Strategic Partnership for Industrial Resurgence), which subsidized our ability to leverage graduate student research using our technology in new ways that would be clinically advantageous for us;

3. QTDP (Qualifying Therapeutic Discovery Project Program), a NIH/IRS collaboration funded via the Affordable Care Act to encourage research and development in companies with fewer than 1000 employees;

4. QETC (Qualified Emerging Technology Company Incentives), a New York State Tax and Finance administered program that also rewarded investment in pure research that translated into commercial products;

5. Broome County Industrial Development Agency loans; and

6. Broome County Incubator space in the Innovation Center.

Continuance, rather than sun-setting, of State and Federal incentives, that either lowers tax burdens for profitable firms or provides grants to non-yet-profitable ones,, makes enormous political and economic sense.

Sonostics was not able to take advantage of the SBIR (Small Business Innovation Research) program because we did not have the necessary staff with proper academic credentials who could act as Principal Investigators and devote at least 51% of their time to the company.

The concept of business incubators has also been important to the growth and survival of Sonostics. Broome County supports a

small innovation center for start-up businesses, that includes below-market rent, complimentary web access, printing and copying, reception, conference rooms and telephone access—all attributes that impact a young company's overhead.

What the incubator does not possess, state-of-the-art office and lab space for high-tech ventures, will be part of a new downtown incubator that is largely government-funded but under the aegis of Binghamton University. Such brick and mortar extensions of the University, combined with the just-passed Start-up New York tax benefit bill, should enable upstate communities with a university presence to more favorably compete against other states in the drive to attract entrepreneurial talent. Sonostics may well be one of the early tenants.

My recommendations for initiatives to support the growth of new, innovative entities include an over-arching reminder that incentives must recognize the life cycle of these kinds of ventures. Tax abatement policy is great for companies that already have reached a stage of maturity where there are taxes due. This is not the case during the first few years, typically. The benefit of QTDP or QETC, for Sonostics, was the ability to accept tax benefits as grants, not as carry-forward credits against some uncertain future profit picture.

Continued support for Centers for Advanced Technology (and Centers of Excellence) via State and Federal line items, enables small ventures to increase their chance of survival during the early years when resources are so scarce.

Finally, firms like Sonostics do not possess all the skills necessary to navigate the ever-changing regulatory shoals. We do not assume regulations will cease to exist. Rather, we want to be able to call upon professionals in the legal and accounting arenas who can ensure we are taking full advantage of the tools and opportunities that governmental entities provides. Outside of the traditional geographic hotbeds of innovation, these professionals are frankly not well-versed in the opportunities companies like Sonostics need. Continuing education support for legal and accounting professionals specifically in the area of innovation incentives would help grow small companies and improve the chances of success.

I appreciate your attention to this critical aspect of economic growth and thank you for the opportunity to provide you with my thoughts on this subject.

Respectfully,

Chuck Schwerin
CEO, Sonostics, Inc.

8/1/2013

RPA ELECTRONIC SOLUTIONS, INC.
1285 Chenango Street
Binghamton, NY 13901
(607) 771-0393 Phone
(607) 771-0658 FAX
CAGE: 5D7K6

The Honorable Richard Hanna
Chairman
Subcommittee on Contracting and Workforce
Of the Committee on Small Business
Congress of the United States
U.S. House of Representatives
2361 Rayburn House Office Building
Washington, DC 20515-0315

Thank you for the opportunity to discuss the merits of the relationship between a high technology small business such as ours (RPA), and a university research institution such as Binghamton University (BU).

We have found several business outreach programs provided by Binghamton University beneficial to RPA. We have taken advantage of two programs the university offers on a regular basis. Those programs are Strategic Partnership for Industrial Resurgence (SPIR) and the Integrated Electronics Engineering Center (IEEC).

The SPIR program allows our company access to graduate student resources to support internal research and development (IRAD) projects that our company undertakes. We submit a program plan to BU that describes the basic elements of the IRAD project as well as the specific talent that we are looking for to supplement our existing staff capabilities. The university then evaluates our program to ensure that it fits the goals of SPIR and if approved, forwards the description to the proper graduate department to determine what current students could fit our requirements.

The chosen graduate student(s) then work at our facilities for 20 hours per week for an entire 15 week semester. Together, we analyze the project and create a set of realizable goals to accomplish during this timeframe. We provide them with the necessary resources to be successful, and the university assigns a faculty advisor to support the project. The SPIR program and the business split the cost of salary for the student for the semester.

All parties involved in the process benefit greatly from this program. The student experiences the industry side of working in a high technology field, rather than the purely academic experience. He or she also is entitled to tuition reimbursement by the program in the same manner as a graduate teaching or university research assistant would be. The university faculty are provided with feedback on graduate students' ability to set and achieve specific goals. And the company has the ability to both advance our IRAD programs, but also to evaluate potential candidates for employment. RPA has evaluated approximately 10 graduate students since we began participating in the SPIR program, and has hired three of them as full time RPA employees, all of which are still on our staff.

8/1/2013

RPA ELECTRONIC SOLUTIONS, INC.
1285 Chenango Street
Binghamton, NY 13901
(607) 771-0393 Phone
(607) 771-0658 FAX
CAGE: 5D7K6

Each year, we are asked to evaluate the SPIR program for BU so that they can direct feedback to New York State lawmakers who oversee the budgets for State University of New York (SUNY) operation and programs. We always provide a positive review of SPIR, as even if an individual graduate student does not necessarily fit our requirements on either the planned project or as a future RPA employee, we consider that a positive effect of the process. We can determine which graduate students best fit our needs during a fifteen week trial period as a SPIR participant, without putting them directly on our payroll.

The IEEC department at BU has also been a great asset to small, high technology companies such as ours. This entity at the university provides us with access to both equipment, and research resources with respect to production of state of the art electronics.

A small technology business such as RPA must be capable of developing products that can compete on a global scale. In the electronics industry, consumer product production is almost entirely produced off shore. Off shore electronics assembly providers seek those products that will be produced in very high volume with associated large amounts of revenue. Profit margins on consumer level volume are rather small by percentage, requiring those assembly houses to obtain the highest level of process success leading to the lowest amount of errors and waste.

To attain such levels requires sophisticated electronics inspection and analysis capabilities for which the equipment can be quite expensive. Electron beam, x-ray, and other inspection devices are necessary to spot problems on a product that contains high density electronic components, often with hidden access to contact points between a carrier (such as a circuit board) and a component (such as a ball grid array – or BGA).

Companies such as RPA focus efforts on more niche electronics products, looking for gaps in the marketplace where a specific need cannot be readily filled by a large volume consumer product. In the case of RPA, specifically, we focus on real-time signal processing systems primarily for the training and simulation industry, although we do undertake efforts in other markets where we see a technology gap as well.

Our lower volume, niche products, however, are held to the same or better standards for product quality than high volume electronics are. And, given the smaller volume and associated revenue, it becomes even more imperative that we achieve the same levels of product manufacturing process quality and low error / waste as consumer electronics production warrants. It would be very onerous for a small business to have to purchase the inspection equipment let alone to maintain the staff to support its proper use.

The IEEC at BU provides us with access to such equipment and has the staff trained to both operate several inspection systems and evaluate the results produced by them. We have taken advantage of IEEC systems to perform x-ray inspection of high density

8/1/2013

RPA ELECTRONIC SOLUTIONS, INC.
1285 Chenango Street
Binghamton, NY 13901
(607) 771-0393 Phone
(607) 771-0658 FAX
CAGE: 5D7K6

electronics, vibration and shock testing, destructive testing of failed products, and several other services they can offer. We are also asked to provide a yearly evaluation of the IEEC program for NYS lawmakers, and in those reports we can provide direct savings to our company based upon both design and manufacturing process improvement as well as those savings applied directly to equipment and labor that we would otherwise need to procure.

There are also other advantages of having access to Binghamton University resources that we take advantage of. Those would be to further educate our own workforce and to look for teaming relationships with BU faculty to compete for research contracts targeted towards RPA areas of interest.

We provide tuition assistance for our employees to attain advanced degrees in their field of practice. To date, we have partially or fully funded two Masters Degrees in Electrical Engineering, one Master Degree in Computer Science, and one Bachelor's Degree in Electrical Engineering at Binghamton University. While we have some cases where our employees are seeking their degrees from another university, the convenience of having a local, accredited university for our employees allows us to keep our workforce educated to those levels necessary to maintain the skills we need to compete with other small businesses in our field.

We have, in the past, also looked to BU for faculty partners to compete for Small Business Technology Transfer (STTR) contracts that fall within the purview of RPA's products and experience. We have not been as successful with this endeavor as of yet, which leads us to a conversation regarding how existing, local, small businesses could better succeed in BU teaming relationships.

The greater Binghamton area has a long history of providing products and services in the Training and Simulation marketplace. In fact, this was the home of the industry as founded by Ed Link and his Blue Box pilot training system. The company that Link built has been through many transitions over the years, of which only a fraction of its size during the 1960's, 70s, 80s, and 90s remains in the area.

However, the downsizing of the Link simulation company also sparked the creation of several small businesses that now compete in specific portions of Training and Simulation industries. Companies that target real-time visualization, display technology, control systems, medical, and new areas of interest in the simulation industry remain in region. RPA is one such company, having formed in 1995 as a result of workforce shifting to other regions of the United States by the owner of Link at the time.

These Link spinoffs have been successful at finding market-share for their products and services. We must continually advance our offerings to maintain competitive advantages and provide state of the art solutions. In the case of RPA, we have successfully used the SPIR and IEEC programs as previously described.

8/1/2013

RPA ELECTRONIC SOLUTIONS, INC.
1285 Chenango Street
Binghamton, NY 13901
(607) 771-0393 Phone
(607) 771-0658 FAX
CAGE: 5D7K6

RPA has also been very successful at competing for Small Business Innovation Research (SBIR) contracts, having won six Phase 1 awards, and five Phase 2 competitive efforts. But, these have all been without a university research partner. SBIR programs do not require an accredited academic research partner. STTR programs do require such a partner.

As previously mentioned, we did propose on one STTR effort with BU as our research partner. We have also done the same on one proposal using Penn State as the partner (the founders of RPA are both Penn State graduates). We did not win either of these proposed efforts.

Feedback from the BU teamed STTR proposal by the reviewing agency targeted a weak relationship between the topic area (a real-time visualization project for training and simulation) and existing BU research projects and areas of interest. Universities such as the University of Central Florida (UCF), Old Dominion, University of Iowa, and many others are acknowledged as experts in many training and simulation related fields. With companies in this area that are well established in specific portions of these fields, I believe it would be of direct benefit to the entire region to have a group of BU researchers with similar interests and areas of expertise. There are a few BU faculty who perform research and studies related to training and simulation, but these are not necessarily aligned with a specific need or needs of existing local businesses.

This is not to say that such research is not valuable. It is simply to point out that many local companies, including RPA, could benefit more directly from a closely aligned partnership with BU that would work towards a common set of research goals and areas of interest, helping to advance the products and services provided by an existing employer base in the region. Jobs in the training and simulation marketplace are exactly those targeted by education programs such as Science, Technology, Engineering, and Mathematics (STEM) initiatives which lead to excellent wages and benefits. Being able to compete with companies in other areas (with other university partners) for STTRs in the field of training and simulation would directly benefit the local economy and provide a measureable impact.

In conclusion, it is obvious that local companies find many direct benefits of having a high quality, local research university such as Binghamton University in our area. BU, specifically, offers many excellent programs of which many local companies take advantage. SPIR and IEEC have had direct, positive impacts on RPA. We have advanced our own products and employed best candidates as a result of SPIR. The classroom resources have supported us as well, in keeping our workforce educated to the levels necessary to compete globally in our field. We find some synergy with research projects at the local university, but could benefit in a greater capacity if there were a formal partnership between local training and simulation companies and researchers at BU. This could lead to advancements in many areas for which local

8/1/2013

RPA ELECTRONIC SOLUTIONS, INC.
1285 Chenango Street
Binghamton, NY 13901
(607) 771-0393 Phone
(607) 771-0658 FAX
CAGE: 5D7K6

businesses might not otherwise have the resources to take on themselves. The support from the local university is very helpful and appreciated by local businesses such as ours. But as with any partnership, we do see room for improvement in more closely aligned research that could benefit the entire region.

Respectfully,

Rick Pray
President
RPA Electronic Solutions, Inc.