*SUNY Excels in
Research and Innovation*

SUNY RESEARCH AND INNOVATION STRATEGY

Develop International Partnerships

Hire Research Faculty

Support Students in STEM

STRATEGIC FOCUS
CAMPUS LEVEL
SYSTEM LEVEL

Submit Large Proposals

LEARNING AND DEVELOPMENT

Develop Industry Relations

Address Big Data

ALIGN ORG AND $ TO VISION

Provide Effective Administration

METRICS AND DATA

SUPPORTING INFRASTRUCTURE

January 2016

Prepared by

SUNY RF

The Research Foundation for
The State University of New York

Contents

INTRODUCTION

SUNY is committed to a big idea — *The Power of SUNY* — that we must sharpen our efforts to more fully activate SUNY's intellectual assets and capacities to advance prosperity and well-being for the citizens of our great State. In our SUNY Excels performance system, we have crystallized our commitment to performance in the critical areas of

- Access – to the diverse range of population to a diverse range of postsecondary educational programs through a geographically distributed comprehensive system of diverse campuses
- Completion – enabling those we serve to achieve their goals, whether a degree or simply one course
- Success – so our students are prepared for the most successful possible launch into further education, career and citizenship

Two other critical areas in which we are measuring performance are **Inquiry** and **Engagement**, which includes our economic impact – sharing our expertise with the business, agricultural, governmental, labor and nonprofit sectors of the state, enhancing the well-being, quality of life and the health of the people and the regions of the state, and translating innovation into new ideas, products, devices, services, and businesses.

Governor Andrew Cuomo's bold innovation agenda, including *START-UP New York* and the other complementary components of the Governor's agenda are designed to grow New York's economy through optimizing its innovation ecosystem and, in particular, building the partnership between SUNY's highly capable research enterprise and the state-wide commercialization and technology community. The scale and potential of SUNY – its very systemness – must be leveraged to achieve New York's ambitious goals. This systemness provides the opportunity to leverage our diversity, not only among our campuses and their communities, our faculty and their research interests, but also the backgrounds, ages, races, and stages of life of the people who power research and innovation at SUNY.

Importantly, research and innovation enhance the educational experience for our students – both undergraduate and graduate. Students learn from faculty on the cutting edge of knowledge and have the opportunity to work in research labs, learning problem-solving and other key skills.

This strategy for research and innovation at SUNY does not begin from a stand-still. Some innovation initiatives have been in initiated in recent years, and several initiatives are yet to begin. Thus, a key function of this strategy is to help us all stand back a bit and take a look at what we already are doing—to better organize our thinking so that we can see the entire frame; see how the parts fit together; and supply initiatives to fill any gaps.

This strategy has been developed jointly by SUNY and the Research Foundation for SUNY. And, it also incorporates guidance contributed by many dedicated private sector volunteers who serve on the boards of SUNY and its Research Foundation and on the SUNY Research Council.

We look forward to making and measuring shared progress—in applying our smart people and our smart ideas to create a bright future for New York's people, businesses, and communities.

STRATEGY AT A GLANCE

Vision	Goals	Strategies	Key Performance Indicators
SUNY will be a key engine of revitalization for New York State's economy and enhance the quality of life for the state's citizens	**1: INCREASE RESEARCH CAPACITY AND PERFORMANCE**	• Recruit research-performing faculty in high priority areas and provide them with the support that will make them successful • Help faculty to write and submit large multi-disciplinary grant proposals, especially to federal sponsors • Build platforms to support data intensive research • Provide faculty with efficient and effective Sponsored Program Administration – so they can focus on research and not administration • Develop strategic international partnerships	1.1 Sponsored Program Expenditures ($) 1.2 Research Expenditures ($)
	2: TRANSFORM ECONOMIC OUTCOMES	• Develop strategic relationships with industry and foster business development and job creation	2.1 Business and Industry Expenditures ($) 2.2 Invention Disclosures (#) 2.3 U.S. Patent Applications Filed (#) 2.4 U.S. Patents Issued (#) 2.5 License and Option Agreements Executed (#) 2.6 Royalty Income from Licensing ($) 2.7 New Startups Formed to Commercialize SUNY Technologies (#) 2.8 Number of Operational Startups (#) 2.9 SUNY-born Technologies, Products, and Services Publicly Available (#) 2.10 Ratio of Inventors Engaged in Sponsored Programs to the Total Number of Inventors (#)
	3: ENHANCE STUDENT OPPORTUNITIES	• Expand SUNY students' participation in research to support applied learning and to materially increase SUNY's supply of New York's STEM-educated workforce	3.1 Undergraduate and Graduate Students Paid on Sponsored Programs (#)

SUNY will be a key engine of

revitalization for New York State's economy

and enhance the quality of life for the

state's citizens

Research and Innovation helps SUNY achieve its vision (as articulated in *The Power of SUNY* strategic plan) and supports SUNY's goals of Access, Completion, Success, Inquiry, and Engagement by:

- Facilitating the discovery of new knowledge and applied innovations that address public and social needs.

- Enhancing student experiences – learning from faculty on the cutting edge of knowledge, being afforded opportunities to work in research labs, learning problem-solving and other key skills.

- Attracting the most talented researchers to New York and supporting them with a world-class research infrastructure. Promoting diversity and inclusion to drive excellence.

- Providing a globally competitive knowledge workforce and skilled entrepreneurs and innovators.

- Creating attractive regions, cities, and communities that inspire talented people from all over the world to make New York's communities places of choice to start or re-locate exciting businesses.

For the purpose of this strategy, we are defining "research" as:

creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications

and "innovation" as:

the promise of research: to enable significant positive change and to improve society, including new technologies and approaches that are fundamentally better or require fewer resources

KEY PERFORMANCE INDICATORS

SUNY is pursuing the following three big, measurable goals related to research and innovation:

- Increase Research Capacity and Performance
- Transform Economic Outcomes
- Enhance Student Opportunities

"Experience has taught me that you cannot value dreams according to the odds of their coming true. Their real value is in stirring within us the will to aspire. That will, wherever it finally leads, does at least move you forward. And after time you may recognize that the proper measure of success is not how much you've closed the distance to some far-off goal, but the quality of what you've done today."

- Supreme Court Justice Sonia Sotomayor in *My Beloved World*

We will measure progress by following trends in the key performance indicators at a system level below.

1: INCREASE RESEARCH CAPACITY AND PERFORMANCE

1.1 Sponsored Program Expenditures ($)

1.2 Research Expenditures ($)

2: TRANSFORM ECONOMIC OUTCOMES

2.1 Business and Industry Expenditures ($)

2.2 Invention Disclosures (#)

2.3 U.S. Patent Applications Filed (#)

2.4 U.S. Patents Issued (#)

2.5 License and Option Agreements Executed (#)

2.6 Royalty Income from Licensing ($)

2.7 New Startups Formed to Commercialize SUNY Technologies (#)

2.8 Number of Operational Startups (#)

2.9 SUNY-born Technologies, Products, and Services Publicly Available (#)

2.10 Ratio of Inventors Engaged in Sponsored Programs to the Total Number of Inventors (#)

3: ENHANCE STUDENT OPPORTUNITIES

3.1 Undergraduate and Graduate Students Paid on Sponsored Programs (#)

SUNY Research and Innovation Strategies Summary

SUNY-led; RF-supported	Research Foundation-led; SUNY-supported	Jointly-led

Recruit/Retain Top Research Faculty	Proposal Development	Businesses, Jobs, Economic Impact
Master Innovators: Offer up to $1 million per start-up package to recruit world-class research faculty to SUNY.	**Federal Relations:** Garner intelligence and bring faculty to Washington.	**Industry Partnerships:** Attract business to NYS (START-UP NY). Develop industry relationships, remove barriers, connect industry with SUNY assets, and advance industry licensing of SUNY technologies.
NY SUNY 2020: Provide capital funding for selected campus projects designed to make SUNY a leading catalyst for job growth throughout the state and to strengthen academic programs and faculty recruitment and retention.	**Proposal Development and Submission:** Provide services and electronic tools for proposal development, routing, and compliance.	**SUNY Intellectual Property (IP):** Leverage the infrastructure and knowledge base across the enterprise to protect faculty IP and move it to the marketplace. Provide internal opportunity programs to foster innovation.
Research Instrumentation: Upgrade and support research instrumentation to ensure the productivity of researchers and advance the science of the future.	**System-wide Research Institutes:** Leverage system-wide research institutes like the Rockefeller Institute of Government and the NY Sea Grant.	**Start-up Companies:** Help launch start-up companies generated from SUNY innovation and support their growth through incubator space, insurance, and venture investment.
Recognition: Establish a culture of awards and recognition to celebrate the accomplishments of SUNY faculty.	**Interdisciplinary Collaborations (Networks of Excellence):** Assemble scientists and scholars from SUNY campuses to collaborate on a topic-specific, joint research program and enhance related applied learning of students.	**Small Business Development:** Provide expert management and technical assistance through SBDC to start-up and existing businesses across the state to solve business problems and foster entrepreneurship.
Communication: Widely broadcast and disseminate the outcomes of SUNY research and its impact on NYS and the world.	**IT Collaboration Platforms:** Find/connect faculty across and outside the system. Share documents securely, collaborate via video and text chat, and track shared milestones.	**Integrated Clinical Trial Network:** Design and develop a strong foundation for clinical trials to improve quality and compliance, reduce risk, and build SUNY-wide clinical trial information technology.
Sponsored Program Services	International Partnerships	Students
Reduce Administrative Burden for Faculty • Improved electronic tools • Training/ compliance focus in high risk areas • Operational efficiency and cost effectiveness • Talent management and succession planning	**Partnerships in Strategic Areas:** Sustain a limited set of authentic, mutually beneficial partnerships in strategic areas of the world — countries and institutions that are focused on R&D and are solving similar problems/grand challenges.	**Graduates and Undergraduates:** Expand SUNY students' participation in research to support applied learning.
		New York Academy of Sciences: Partner with New York Academy of Sciences to support student engagement in New York State's STEM research community.

STRATEGIES SPELLED OUT

How will we achieve the Vision and these Aspiration/Stretch Goals over time?

SUNY RESEARCH AND INNOVATION STRATEGY

To achieve the vision for research and innovation, the following strategies -- programs, initiatives and services -- are being implemented by campuses, SUNY System Administration and SUNY RF. The RF's annual Operating Plan and SUNY's annual budget request provide specific annual actions and investments from internal funds and external sources.

1: *Recruit research-performing faculty in high priority areas and provide them with the support that will make them successful*

- *Master Innovators Program*. Master Innovators (formerly Empire Innovation Scholars) is a state-funded program dedicated to recruiting and retaining world-class faculty who bring SUNY's research mission to life through applied research opportunities for students, dynamic partnerships with fellow faculty, and contributions to the vibrancy of campus communities, to the forefront of knowledge and to the health and economic vitality of New York State.

- *NYSUNY2020* is a program in which Governor Cuomo and Chancellor Zimpher partnered to provide capital funding for selected projects designed to make SUNY a leading catalyst for job growth throughout the State, to strengthen academic programs, and to

These strategies are all rooted in our commitment to research integrity as delineated in the SUNY Statement on Research Integrity, which states: "The State University of New York (SUNY) and the Research Foundation for SUNY (RF) are committed to excellence, objectivity, accountability, professional courtesy, fairness, good stewardship, and – above all – integrity in the conduct of scholarly research."

demonstrate that *New York is open for business.* Thanks to NYSUNY2020, campuses are directing resources to targeted programs and more than matching state funding with external sources and tuition revenue, which provides them the opportunity to hire new research faculty.

- *Research Instrumentation.* Funding under a proposed "SUNY Scientific Instrumentation Vanguard Program" would be distributed through a competitive process open to all state-operated campuses. Priority will be given to requests that serve a large user community and capitalize on recent advances or upgrades in precision, resolution, or measurement for a given instrument type. Campuses will be required to provide match from sources outside SUNY, including federal, industry, and philanthropic.

An example of a campus program to help faculty write and submit proposals: *University at Buffalo's Office of Research Advancement supports faculty in the pursuit of large scale multi-investigator, cross-disciplinary research grants and funding for institutional priorities related to UB's research strengths, as well as emerging initiatives.*

- *Recognition and Communication* Campuses, the Research Foundation, and SUNY System Administration promote via press releases, Websites, magazines and other vehicles the awards, discoveries, and innovations resulting from the outstanding work of SUNY's research faculty.

2: Help faculty to write and submit large multi-disciplinary grant proposals, especially to federal sponsors

- Provide system-wide *federal relations services and state relations services* to garner intelligence, help appoint faculty to federal agency committees and increase awareness of SUNY's excellence in Washington, D.C. and among New York State agencies.

- Provide system-wide *proposal development support* to facilitate the development and submission of major proposals that involve multiple campuses and partners outside of SUNY.

- Better leverage *systemwide research institutes* – Rockefeller Institute of Government, a national, independent organization that researches and publishes on public policy issues, with a particular focus on the 50 states and the local governments within them, and NY Sea Grant, a statewide network of integrated services promoting coastal vitality, environmental sustainability, and citizen awareness about the State's marine and Great Lakes resources.

- Provide programs that facilitate collaborations and build on SUNY's capacity:

- *Networks of Excellence*. Networks of Excellence assemble scientists and scholars from the various SUNY campuses to collaborate on a topic-specific, joint research program and enhance related applied learning of students.

  o Build *IT Collaboration Platforms* to connect SUNY faculty researchers. To bring SUNY from a collection of rather isolated campuses to an integrated collaboration platform is one critical step to drive research growth and innovation in New York. Also support campuses to build an integrated high performance computing and advanced analytics platform; develop necessary protocols for sharing existing and new computational

Campuses conduct grant writing workshops. To supplement these campus programs, the SUNY Center for Professional Development offers a course called "Grants and Proposals: If you Write It, They will Fund" For the spring 2014 offering, the RF was able to award twelve (12) scholarships to individuals at Stony Brook University, University at Albany, Binghamton University, and Purchase College in roles ranging from Graduate Students, Research Associates, Adjunct and Associate Professors, and administrative campus support. These individuals will participate from their respective campus locations with no travel expenses incurred, yet the course allows for group discussion, collaborative online activities, and peer review. The "homework" completed by the students results in a working abstract, applicable to the individual's field of study.

assets; stimulate research and innovations via collaboration platforms; and provide a resource to facilitate the training of data and computational scientists.

- *Build an integrated clinical trial network.* Design and develop a strong foundation for clinical trials that will improve our processes for quality and compliance, greatly reduce the risk in our clinical trial operations and build SUNY-wide clinical trial information technology for data capture, sharing, and collaboration.

- *Mentor junior faculty.* The SUNY Distinguished Academy comprises faculty who have achieved the highest level of academic excellence, a rank that can only be designated by the Board of Trustees; these faculty are available to mentor junior faculty as they write and submit research proposals.

3: Provide faculty with efficient and effective Sponsored Program Administration – so they can focus on research and not administration

- Streamline administration through improved *electronic tools* used by campus administrators and faculty researchers, e.g., preaward systems and automated time and attendance systems
- Focus training and *compliance* efforts on high risk areas identified through enterprise risk management and audit
- Implement means to assess and increase *operational efficiency* and cost effectiveness
- Focus on *talent management* and succession planning system-wide

4: Develop strategic international partnerships

- Sustain a limited set of authentic, mutually beneficial partnerships in strategic areas of the world -- countries and institutions that are focused on R&D and are solving similar problems/grand challenges.

5: Develop strategic relationships with industry and foster business development and job creation

- Facilitate industry collaborations and partnerships

Quote from a VPR to the SUNY Trustee Committee on Research and Economic Development: *"What steps do we take to try to increase research on the campus? . . . We feel very strongly that one of the key things for having faculty even to be more productive, is to alleviate the amount of administrative burden they have, so we look at how do we change our procedures within our Sponsored Projects Office. How do we change our procedures that would make it easier, so that the faculty member doesn't have to do everything by themselves? How do we set up programs, working with us and the RF, looking at what, how do we change our systems? To make it easier, right? It should be automatic that someone's alerted that they have a graduate student, for example, coming off with a grant, so that they don't have to really think. Cause you want them to concentrate their thoughts on more productive things. So, anything you can do like that is useful."*

➢ *SUNY AIR* is a strategic initiative of the State University of New York, supported by SUNY RF, with the goal to influence strategies and policies, develop intelligence on industry interests, understand and organize SUNY assets, and cultivate enhanced levels of engagement with industry. Efforts with SUNY AIR feed and inform other projects, such as SUNY Networks of Excellence, the SUNY RF Integrated Clinical Trials Infrastructure, and other areas such as student applied learning experiences. Academia and industry each have different but complementary perspective and skill sets - both are needed to solve critical problems facing society. SUNY AIR is designed to stimulate positive, productive relationships among faculty, administrators, and industry innovators seeking to study and help address complex problems.

➢ Work closely with SUNY campuses and SUNY Administration in support of industry partnerships. The approach is to nurture initial interest (such as trade shows and events) to increasing levels of engagement (leadership meetings, research collaborations, internships/co-ops, START-UP NY applications, workshops) to programmatic sponsorship (collaborative research, proposals) and finally to strategic partnerships (multi-factorial joint partnerships, executive sponsorship).

➢ The *Strategic Partnership for Industrial Resurgence (SPIR)* program leverages the extensive engineering resources of the SUNY system (the Engineering Colleges and Programs at Stony Brook, Buffalo, Binghamton and New Paltz) to help industry in the State compete more effectively. SPIR provides technically advanced multidisciplinary assistance on a fast turnaround basis to help companies improve their market posture, retain existing employees and create new jobs.

- Provide internal opportunity programs to foster innovation and move SUNY's intellectual capital to the marketplace

➢ *Technology Accelerator Fund* (TAF) is a proof-of-concept fund that provides funding for select SUNY-developed technologies to build and test prototypes, conduct head-to-head comparisons, or answer a critical validation questions prior to licensing or startup formation.

➢ *Industrial Master Accords.* An initiative to bring together sponsored programs and technology transfer professionals from across the enterprise to collaborate in creating best-in-class tools and agreements for use in our day-to-day work with industry. With support from a cross-functional team representing all of our research-intensive institutions, so far this year we rolled out three new industry-sponsored research agreement models and a new materials testing agreement, and accompanying guidelines for each.

Binghamton's new Freshmen Research Immersion program will provide training in research methods and introduce students to important concepts and laboratory techniques. Students will choose one of three focus areas: biofilms, neuroscience or smart energy.

➢ *SUNY Express License.* Best practice institutions across the U.S. offer an express license; a license agreement that is not subject to negotiation, which includes performance terms quite favorable to

the commercializing company. The essential trade-off is transactional speed and simplicity for reduced royalty rates. Ours is targeted to startups and spinouts, and is best for companies in which our researchers play a role because express deals go a long way to eliminate COI.

➢ *Innovation Services* is core business support for RF's centralized campuses. Key functions are IP management and licensing. At the moment we have five licenses in negotiation: one for Optometry for a NYC startup to develop new drugs for degenerative disorders of the retina; one for Buff State with a CNY startup for a 3D video game controller; one for Plattsburgh with a CA-based investment firm for the use of ultrasonic technology to eliminate invasive species from water; one for Canton to integrate an oil pump into firewood processors; and for Oneonta, an online express license for nontoxic imines – these are used to make any industrial compound from rust inhibitors to blockbuster drugs. For this work the inventor recently received the American Chemical Society's award for Incorporating Sustainability into Chemistry.

➢ *Innovation Community Chest* includes a comprehensive suite of over 50 tools for commercialization and business development staff to make quick, efficient, and cost-effective decisions when negotiating contracts, marketing inventions, and developing intellectual property, enabling efficient service to faculty and informed interactions with industry. Included within the Community Chest is access to the Association of University Technology Managers (AUTM) training suite, including more than 30 professional development programs, access to market reports and royalty and clinical trial benchmarks for negotiation of license agreements.

➢ Work closely with SUNY Administration to *modernize the SUNY patent and invention policy*, which was last updated in 1988. The patent policy is codified as a NYS regulation and subject to collective bargaining. When enacted, the new policy promises to relax administrative requirements on SUNY IP providing greater flexibility for campuses and enable sustainability of our commercialization program.

- Help launch start-up companies generated from SUNY innovation and support their growth

  ➢ *START-UP New York* is an initiative to transform SUNY campuses and other university communities across the state into tax-free communities for new and expanding businesses—originating in NYS or moving/expanding into NYS.

  ➢ *The Small Business Development Center network* of 24 regional centers delivers high quality business counseling and training to New Yorkers who want to start a business or improve the performance of an existing business

  ➢ Release a *Request for Information (RFI)* to better understand how to develop and launch a new *SUNY Venture Fund*:

    o Leverage SUNY's leading positions in New York for research, commercialization and innovation

- o Capitalize on a 29% return on investment from financings into SUNY startups observed from 2005 through 2014 (back-testing analysis);

- o Position SUNY startups as competitive for capital from **New York Ventures** as well as private funding;

- o Utilize SUNY's leading position for START-UP NY; and

- o Reduce the drain of SUNY startups out of New York to other states (California, Connecticut, New Jersey, Massachusetts, Virginia, Pennsylvania and others).

➢ *SUNY TURBO* is a program designed to 1.) provide vehicles to translate innovations into commercial products by creating new, SBIR/STTR-eligible ventures; and 2.) provide an array of services to increase the likelihood of company health, growth and investment potential. Consistent with RF's Mission, Vision and Values and the SUNY Excels goals of Inquiry and Engagement, the primary business needs articulated by our customers and addressed by this program are: access to alternative revenue streams to grow research and innovation, formative support for startups and access to an array of startup-ready entrepreneurs.

➢ *New York Innovation Showcase.* The New York Innovation Showcase is a presentation and networking event aimed at creating greater connectivity among SUNY-connected start-up companies and the investment capital community. Connecting SUNY's entrepreneurship community with New York's investment community helps create awareness of SUNY-related startups and SUNY programs.

➢ *SUNY Insure.* To spur new high-tech business opportunities and stimulate economic growth across New York State, the Research Foundation for SUNY has partnered with Amsure Associates to provide low-cost insurance to SUNY startups.

➢ *Student startup accelerators.* Engage SUNY institutions to help students form interdisciplinary teams to start real companies. Identify, connect and engage programs ranging from short three-day (weekend) boot camps to semester-long coursework. Bring together faculty who are practitioners of entrepreneurship, successful guest speakers and team-specific mentors. Successful student startups around the U.S. include Imgur (Ohio University), Lynx Labs (UT Austin), GoCrossCampus (Yale), Green Mobile (Univ. of Missouri), InternshipIN (Berkeley) among others. Augment the student accelerator program for professors seeking to commercialize university technology with industry or serve in lead technology roles for early-stage, growing tech companies.

6: *Expand SUNY students' participation in research to support applied learning and to materially increase SUNY's supply of New York's STEM-educated workforce.*

- *Graduate Student Stipends and Tuition Waivers.* To strengthen support of SUNY's graduate students and to attract outstanding students to New York State SUNY will continue to provide funding for Graduate

Assistantships and Teaching Assistantships, as well as tuition waivers to graduate students who attained an undergraduate degree through EOP/HEOP or SEEK programs, and to economically disadvantaged students undertaking study toward first professional degrees.

- *Undergraduate Research Experiences.* As a complement to SUNY Works – a program to ensure that all students have opportunities to participate in applied learning through internships and co-operative education - provide facilitated workshops, conference calls, and an online collaboration platform for professional development and to support campuses as they develop and implement plans provide mentored, authentic research experiences to more students.

- *Partnership with New York Academy of Sciences (NYAS).* Partner with New York Academy of Sciences to support student engagement in New York State's STEM research community.

- *Innovation Intern Program* is a partnership with the University of Albany Law School enabling the Innovation and Partnership Division to staff part-time, for-credit internships for law students each semester, enabling powerful applied learning opportunities and efficient service to faculty. Students generally focus on technology assessments across the system, supporting important work of commercialization staff. The program is modeled after successful programs such as the Columbia University.

PRIORITY AREAS OF FOCUS

SYSTEM-WIDE

The system-wide strategic focus areas are embodied in the Networks of Excellence. These areas were chosen based on SUNY's strengths and on our understanding of national and industry priorities.

- Brain: investigating the frontiers of brain research, focusing in particular on neurosciences, neuroclinical services, and analytic sciences. Vision and brain mapping research are specifically emphasized.

- Energy, Environment, Economics and Education: conducting research related to energy and the environment, including associated economic considerations. Research topics include biosensors, water resources, climate change, and energy use.

- Health: performing basic, clinical, and public health research with a goal of solving problems related to human health. Areas of investigation include 3D printing, treatments for infectious diseases, biosensors, big data, and aging.

- Materials and Advanced Manufacturing: aiming to revitalize New York's manufacturing sector. Areas of investigation include biomaterials, energy materials, flexible electronics, green composite materials, digital and additive manufacturing, functional and responsive materials, and education.

- Arts and Humanities. seeking answers to contemporary problems related to human creativity and scholarship, promotes knowledge and discovery, and generally positions SUNY as a global thought leader.

- Teaching, Learning and Assessment. providing experts with a venue for conducting research on cognitive learning, learning and knowledge assessment, and innovative teaching strategies.

AREAS OF STRATEGIC FOCUS--INSTITUTIONS

Individual SUNY campuses, especially the doctoral-degree granting institutions, have developed plans for research and innovation that reflect the campus's mission, strengths and opportunities and the campus's unique position within its economic development region.

We acknowledge the contributions of all sectors within the SUNY system to research and innovation.

- The **comprehensive and technology colleges** perform sponsored research as well as other types of sponsored projects, e.g., training or public service, which also are important services that SUNY institutions provide, often supporting education, social services, or other aspects of community and economic development.

- The **community colleges** play a strong role in postsecondary education and training people for the job market – a very important element of a vital economic infrastructure in New York.

The following table provides a summary of **Areas of Strategic Focus** that have been identified by each of SUNY's doctoral-degree granting campuses:

University at Albany
• Climate, Environmental and Economic Sustainability - Predicting, Planning and Conserving our Environment for Future Generations
• Emerging Technologies - Improving Human Efficiency and Security through Computational and Forensic Sciences
• Human Health and Biomedical Sciences - Translating Science into Human Health
• Neuroscience – Improving Our Understanding and Knowledge of the Neuroscience
Binghamton University
• Addiction Sciences
• Biofilms
• Cybersecurity
• Development and Behavioral Neuroscience
• Electronic Systems Integration and Packaging/Advanced Manufacturing
• Energy Efficient Electronic Systems
• Energy Storage Technologies
• Health Systems Engineering
• Leadership Studies
• Materials Science and Engineering/Advanced Manufacturing
• Middle Eastern Studies
• Tissue/Biomedical Engineering
University at Buffalo
• Global Health and Well Being (GHW)
• The Genome, The Environment and The Microbiome (GEM)
• Learning and Accelerated Discovery
• Research and Education in Energy, Environment and Water (RENEW)
• Sustainable Manufacturing and Advanced Robotic Technologies (SMART)
• Sustainable Urban Transportation (SUT)

Stony Brook University

- Advanced Computational Science and Information Technology
- Advanced Energy Research and Technology Center (AERTC)
- Biosciences
- Cancer
- Energy
- Genomics
- Global Health/Human Origins
- Humanities, Arts and Select Social Sciences
- Imaging
- Infectious Disease
- Informatics
- Neurosciences
- Smart Power Management, Smart Grid/Microgrid
- Water Resources

Upstate Medical University

- Cancer
- Diabetes and Metabolic Disease
- Disorders of the Visual System
- Global Health, Infectious Disease and Vaccine Development
- Immunology
- Mechanisms of Disease
- Musculoskeletal Disease
- Neurodevelopment
- Neuroscience of Aging
- Public Health, Outcomes, Preventative, Rehabilitation and Health Disparities Research
- Pulmonary Disease
- Radiological Imaging
- Structure and Function of the Cytoskeleton
- Traumatic Brain Injury (TBI)/Concussion
- Virology

Downstate Medical Center

- Cardiovascular – Bench to Bedside
- Health Disparities – Population Psychiatry
- Infectious Disease – Clinical/Public Health
- Neurosciences – From Molecular Level to Psychiatry

College of Environmental Science & Forestry

- Biodiversity, Natural History and Biomimicry
- Ecological Design and Engineering
- Environmental Communications and Values
- Environmental and Natural Resource Planning, Policy and Management
- Environmental Health

- Eye Disease Models
- Natural Products and Sustainable Materials
- Social, Economic and Ecological Systems
- Visual Neuroscience
- Visual Perception and Psychophysics
- Water and Life

College of Nanoscale Sciences and Engineering at SUNY Institute of Technology

- Biotechnology
- Clean Energy
- Engineering, Physical, and Computing Sciences
- Environmental Health and Safety
- Humanities and Social Sciences
- Nanoeconomics
- Photonics
- Power Electronics
- Semiconductors

College of Optometry

- Clinical Research
- Traumatic Brain Injury
- Visual Neuroscience
- Visual Psychophysics and Visual Perception

ROLES AND COORDINATION

The chart on page 6 shows the system-level strategies and indicates which ones are SUNY-led and which are Research Foundation-led. This section describes the groups within SUNY that need to work together to realize the vision and achieve the strategic goals outlined in this plan.

FACULTY/CAMPUSES

It is self-evident that SUNY faculty is at the center of research and innovation. It is faculty who commit to inquiry and investigation to advance knowledge and better understand our world. Faculty researchers are increasingly working collaboratively and in an interdisciplinary way—to discover patterns and connections. And faculty researchers are reaching beyond discovery to application of new knowledge through the integration of theory and practice.

Campuses are where faculty work and perform their research. Campus administrators set campus priorities, hire faculty, provide space, equipment, and core facilities, and otherwise support faculty as they perform their research and innovate.

Campus offices for research, sponsored programs, human resources, and technology transfer—along with business offices—provide direct support as faculty prepare and submit proposals, develop relationships with industry partners, perform research, and turn innovations into products, services, and companies. Campus communications and outreach offices support research and innovation through promoting outcomes via campus Web sites, social media, magazines, press releases and other avenues.

SUNY SYSTEM ADMINISTRATION

SUNY System Administration provides support for programs that advance research and innovation. Each year System Administration allocates monies to support graduate student tuition to provide financial support to graduate students while they gain experience in research, teaching, special projects or other assignments related to their field of study. SUNY System also provides a separate fund to make tuition waivers available to graduate students who attained an undergraduate degree through EOP/HEOP or SEEK programs, and to economically disadvantaged students undertaking study toward first professional degrees.

System Administration provides funding through the Performance and Improvement fund to specific initiatives that advance the goals of SUNY Excels, including inquiry and engagement. System Administration provides many programs and services in support of research and innovation, including SUNY Learning Commons, Center for Professional Development, Innovative Instruction Technology Council, Center for On-line Teaching Excellence, STEM initiatives, STEM conference, Diversity initiatives, High-needs programs, and the SUNY Applied Learning Initiative.

SUNY System Administration also promotes research and innovation through its Web site, social media outlets, speeches and press contacts.

THE RESEARCH FOUNDATION

The Research Foundation for The State University of New York (RF) is the largest, most comprehensive university-connected research foundation in the country. The RF manages SUNY's research portfolio providing essential sponsored programs administration and innovation support services to SUNY faculty and students performing research in life sciences and medicine; engineering and nanotechnology; physical sciences and energy; social sciences, and computer

DRAFT

and information sciences. The RF moves SUNY ideas and inventions to the marketplace collaborating with business and industry to create new opportunity and new jobs for New York State.

SMALL BUSINESS DEVELOPMENT CENTER

The SBDC works with approximately 13-15,000 new state-based clients per year
- SUNY's SBDC hosts FAST (Federal and State Technology) outreach and service program for NY to increase utilization of SBIR/STTR, emphasis on inclusive diversity.
- SBDCs provide business and technical services to most incubators in the State University of New York
- SBDCs host Regional business plan competitions in conjunction with regional sponsors
- SBDCs are an integral part of the triage process to find a good fit for companies that apply to Start-Up NY. While any applicant company with five or less employees is referred directly to the targeted SUNY campus, those with 6to 50 are referred to the SBDC for development. The one-on-one counseling at the regional SBDCs is proving to be of value to companies qualifying for Start-Up NY and requiring access to capital.

SUNY CONSTRUCTION FUND

The SUNY Construction Fund supplies capital funding and construction services to support laboratories and smart classrooms.

GOVERNANCE AND ADVISORY BODIES

Faculty governance is resident within SUNY System Administration, including the University Faculty Senate and the Faculty Council of Community Colleges.

The Research Foundation helps convene the SUNY Research Council on behalf of the Chancellor and the Provost. This body lends deep and broad thinking and understanding to the question of SUNY's leadership as a 21st Century public comprehensive research-intensive university system. The Council considers and advises SUNY on strategies that encourage and nurture research as one of the primary missions of the University.

The SUNY Board of Trustees, especially its Committee on Research and Economic Development lends governance and oversight to SUNY's research and innovation mission. The Research Foundation Board plays a strong role in overseeing the RF's support of that mission.

21

SUPPORTING MANAGEMENT STRATEGIES

ORGANIZATIONAL AND FINANCIAL ALIGNMENT

We must ensure that SUNY and the RF are aligned organizationally to achieve SUNY's mission and its vision for research and innovation. Additionally, budgets must reflect the priorities and strategies outlined in this document and we must continue to work together to attract outside investment in SUNY and its research and innovation strategies.

DIVERSITY AND INCLUSION

SUNY's Diversity, Equity and Inclusion policy includes a Chief Diversity Officer for every SUNY campus as well as strategic plans to increase diversity among students, faculty, and staff.

LEARNING AND DEVELOPMENT

Learning and development supports employees, faculty, staff and the research community to strengthen their skills, achieve their professional goals and expand their knowledge and abilities. We must continue with mentoring, leadership training and continual education to foster growth and advance SUNY's research enterprise.
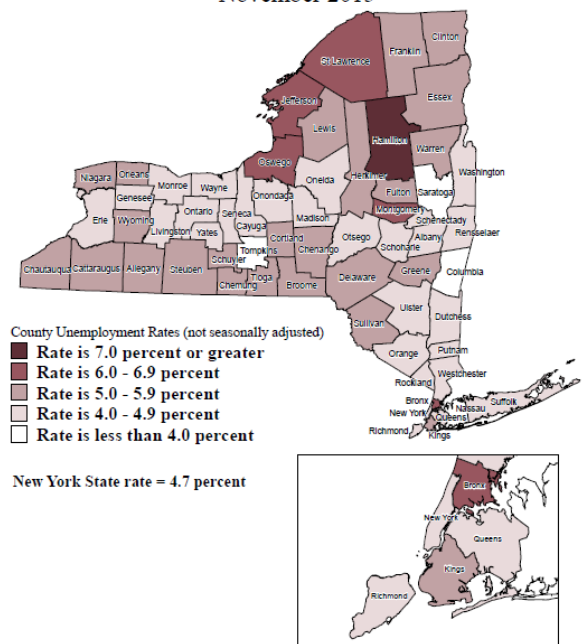
CONTEXT

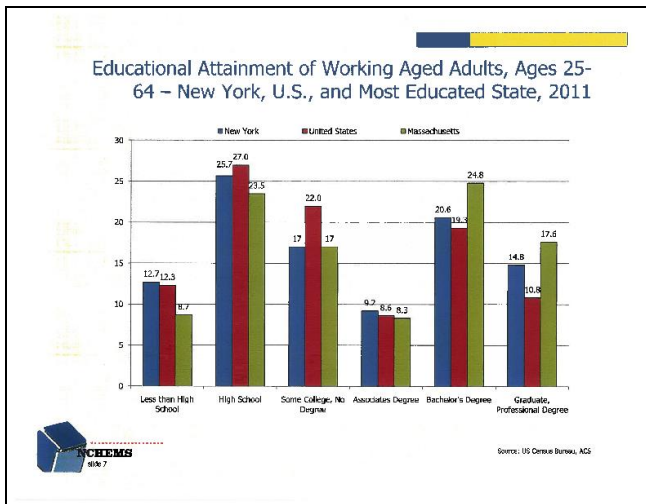**The Global Knowledge Economy**

In many ways, the State of New York and its great industrial cities led the US and the world in the age of the *Industrial Economy*. Today, some characteristics of New York's economy require revitalization or redesign, to better fit opportunities in the *Global Knowledge Economy*.

- Unemployment rates in New York State as of November 2015 provide some insight as far as the extent to which various regions of the state have recovered from the Great Recession. The highest unemployment rates are found in the North Country.

- In terms of changes in population by percentage between 2000 and 2010, Cattaraugus, Schuyler and Hamilton Counties have seen the greatest decline while Saratoga, Orange, and Rockland Counties have seen the largest increases. **Source: U.S. Census Bureau, Population Division, Release Date: September 2011**

- Reviewing the educational attainment statistics for working adults in the 25-64 age bracket reveals that over half (55%) of working age adults in New York State do not have a college degree and only about a third (35%) have a bachelor's degree or higher. Clearly, these numbers do not enhance the ability of residents to participate in a global knowledge economy. Source: NCHEMS
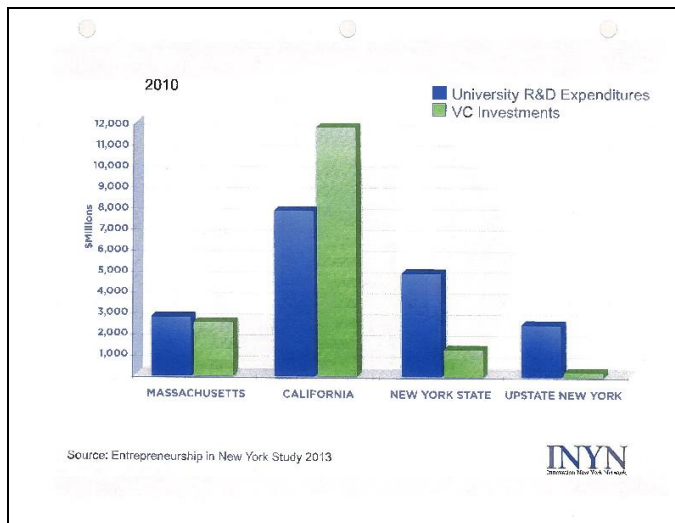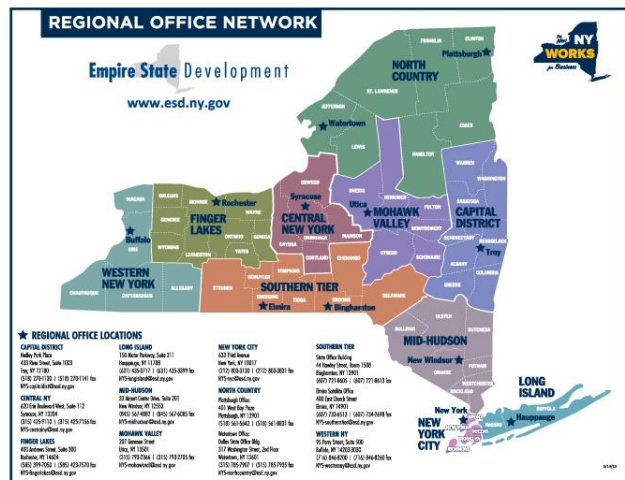

Source: NYS Department of Labor

- According to the Entrepreneurship in New York Study of 2013, venture capital (VC) investment in New York State in relation to the investment universities are making in R&D is dramatically lagging as compared with states like Massachusetts and California. In 2013, 49% of all R&D expenditures for NY State go to upstate NY

(roughly a 1 to 1 split), however only 4% of all venture capital funding in NY state go to upstate NY startups (roughly a 20 to 1 split).

- Small businesses comprise 518,000 of 519,500 firms in New York, or 99.7% of all businesses in our state; small businesses employ 3.9mm workers, 52% of the state's workforce; and, 92.4% of Technical, Professional and Scientific firms are small businesses. Source: Small Business Development Center

Today, the State of New York is rising aggressively to meet these new challenges of the 21st century. In the *Global Knowledge Economy*, competitive success for New York's people and communities depends heavily upon the **human capital** that our universities and colleges cultivate—with 21st century knowledge and skills. It also depends directly on **knowledge-based solutions** that our universities and colleges provide to business, industry, and public/social agencies. New York State is taking a regional approach to economic development, with 10 regional economic development councils creating and implementing strategic plans that encompass the public, private, and education sectors in the regions.

SUNY is the largest public higher education system in the world, with:

- 459,550,000 enrolled students
- 90,000 faculty and staff
- 3 million alumni
- 64 institutions/campuses
- Of the 64 institutions, 30 are community colleges and not governed through SUNY in the same manner as are the 34 "state-operated" universities and colleges. SUNY RF traditionally has served (and reports performance statistics based on) the state-operated institutions.

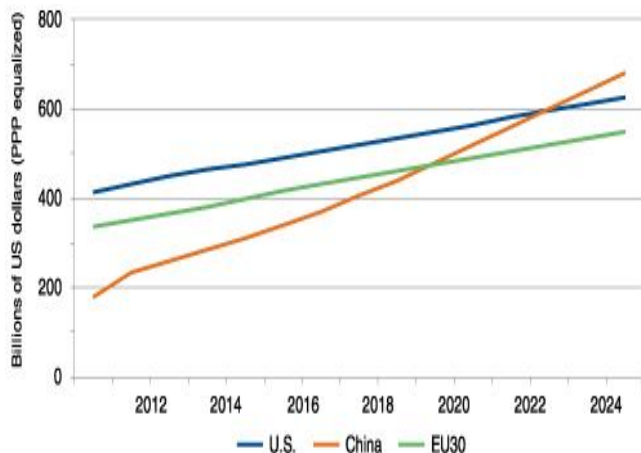In the realm of Research and Innovation, SUNY's activities encompass:

- Nearly $1 B in sponsored program expenditures
- $650 million in research expenditures (of total sponsored programs expenditures)
- 6 Centers for Advanced Technology
- 8 Centers of Excellence
- 17 Incubators
- The Small Business Development Center, SUNY's direct connection to the largest segment of our state's economy with an established network to service and track these efforts and outcomes.
- 1,000+ issued patents
- 700+ active licenses
- Over 70 active startups

Global R&D Trends

Research is a linchpin – it is core to the academic mission of SUNY and it is the creative endeavor that drives innovation. We must expand SUNY's performance in research and invest in growth of high-priority strategic research in areas ripe for leveraging economic development and impact. Research helps attract and retain excellent students because they want to study under stellar faculty. In addition to the economic benefit, research has a societal impact – a key component of the *Power of SUNY*.

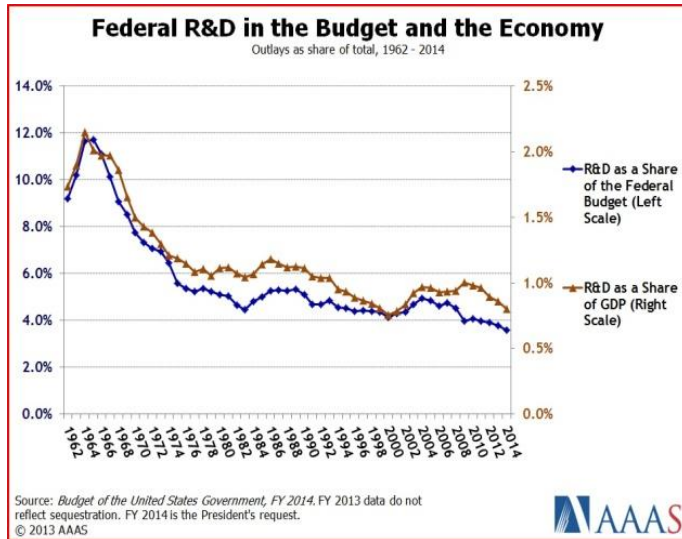Some challenges must be overcome:

- **Global R&D trends** are not expected to change significantly, but regional shifts are occurring. Just five years ago, the U.S., Canada and Mexico were responsible for nearly 40% of global R&D. That share has dropped to about 34%, with the U.S. shrinking from a 34% share in 2009 to 31%. Europe has experienced a similar decline from 26% in 2009 to less than 22% in 2014. Where the west has retrenched, Asia has advanced. In the same five years, Asia's share of R&D investments has risen from 33% to nearly 40%, with China rising from 10% to nearly 18%. China's high level of research intensity has now been sustained for nearly 20 years, and its total R&D investments are now more than 60% those of the U.S. The economic and political context in each of these regions suggest these trends are not likely to change in the near term and are likely to continue through 2020.

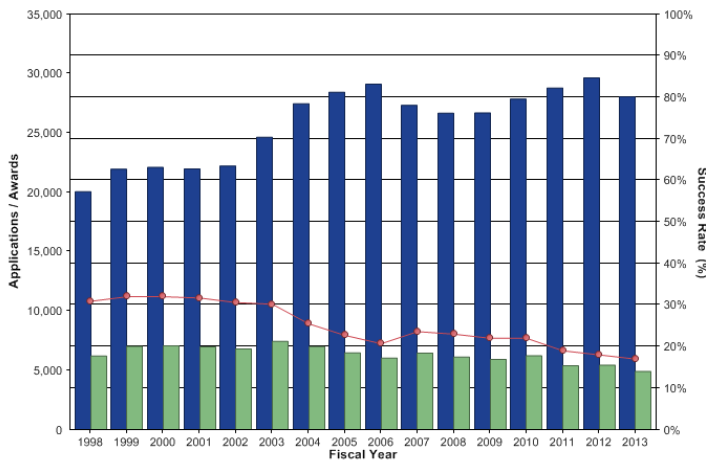Source: Battelle/R&D Magazine 2014 Global R&D Funding Forecast

- On the **federal level**, funding for R&D is expected to grow at only a very modest annual pace. Funding for R&D as a percentage of both the federal budget and GDP has been

25

on the decline for a number of years.

Federal R&D in the Budget and the Economy
Outlays as share of total, 1962 - 2014

Source: *Budget of the United States Government, FY 2014.* FY 2013 data do not reflect sequestration. FY 2014 is the President's request.
© 2013 AAAS

- A significant level of SUNY sponsored program activity results from funding from the **National Institutes of Health (NIH)**. NIH recently announced that proposal success rates have fallen to a record low 17% in 2013 from a high of about 32% in 1999-2000. This news highlights the need for new strategies targeted to increase research volume.

NIH Proposal Success Rates

Source: NIH IMPAC, Success Rate File

- Sponsored program expenditures **at SUNY** in FY 2015 were $899 million. While this is a large figure, it is not necessarily an impressive one, given the scale of the institutional enterprise. Of the total, $650 million is categorized as research expenditures. Other types of sponsored programs include training and public service. Growth by sponsor type in the past five years is telling: Federal funding is relatively flat, while industry sponsored activity has grown by 87%, mainly attributable to contracts of the College of Nanoscale Science and Engineering (CNSE).

Clinical Trials

Clinical trials provide an opportunity for SUNY medical schools to work with leading companies to test drugs, devices, treatments, and therapies to benefit the health of all New Yorkers. The table below summarizes the clinical activity running through the RF in FY2012-13.

Clinical Trials Through the RF in FY2012-13	
Total Expenditures	Over $10 Million
Number of Sponsors	268
Number of PIs	197
Number of Active Trials*	549
*As determined by expenditure activity. Source: RF Expenditure Profile	

Importantly, of the 268 sponsors of clinical trials in FY2012-13, 265 are companies where opportunities may exist to collaborate on additional clinical studies or other industry-sponsored research projects.

Students

Students are the lifeblood of SUNY. We want to expand SUNY students' participation in research and entrepreneurship to support applied learning and to materially increase SUNY's supply of New York's STEM-educated workforce. When students gain research experience in labs it helps them persist to graduation, especially in STEM fields, and produces more readily employable graduates. And the prospect of participating in authentic research experiences helps attract innovative and entrepreneurial students to SUNY. 13% of all SUNY degrees are in STEM fields (~10,000 per year). The data on the number of students participating in sponsored programs includes those who are paid to work on sponsored programs administered by SUNY RF and thus on its payroll.

State University of New York Students Performing Research / On SUNY RF Payroll		
	2011-12	2012-13
Graduate Students	3,632	3604
Undergraduate Students	1,636	1,607
Total	**5,268**	**5,211**
Source: SUNY Report Card		