



4,000+

Startup Companies

spun off by American universities, active in 2013

14,995

New Patent Applications

filed by universities in 2013

5,198

Licenses Executed

by universities in 2013



CSU**VENTURES**

Colorado State University

2014 ANNUAL REPORT



CSU VENTURES Innovation at Work

Innovation is a critical gear to drive economic progress, and Colorado State University is proud once again to have had a profound impact through its investment in research, innovation, and technology transfer. This annual report tells a great story about the productivity of Colorado State's faculty and the importance of their work on some of the most challenging issues of our day.

In fiscal year 2014, Colorado State's innovation efforts yielded 122 invention disclosures, 49 patents issued, and 246 inventors disclosing inventions to CSU Ventures — all record highs — and a record-tying 41 licenses. The long-term growth of CSU innovation efforts is demonstrated in a 95 percent increase in the number of active startups since fiscal year 2010 from 22 to 43. Nearly 500 people were employed at CSU startups last fiscal year, most of these in Colorado.

Colorado State is proud of this record – and proud to serve as a hub of innovation and game-changing ideas. In that spirit, we are pleased to share this CSU Ventures annual report.

Sincerely,

Dr. Tony Frank
President, Colorado State University



As noted by President Frank, the innovation pipeline at CSU continues to grow and strengthen with record high marks achieved in a number of key innovation categories. Notably, participation by CSU faculty and researchers in the formal invention process was at an all-time high in 2014. This participation is the first step in the process of CSU innovation having impact via patents, licenses, and startup formation with the ultimate goal of benefiting society.

CSU Ventures continues to strive to create and participate in an innovation ecosystem that benefits CSU and CSU innovators. For example, relationships with Innovation Center of the Rockies and Rocky Mountain Innosphere help define commercialization pathways and provide outside expertise to assist in technology and market assessments. Additionally, these partnerships are instrumental in recruiting human talent for CSU startups and connecting them with a number of important resources.

We hope that you find this annual report informative and encourage you to contact our office whether you are a CSU innovator, an investor, an entrepreneur, an alumnus, or someone who is simply interested in engaging in the innovation process at CSU.

Sincerely,

Todd Headley
President, CSU Ventures



“CSU Ventures helped me find a way to work with this company and get the project funded.”

Arun Kota, mechanical engineering professor,
Colorado State University

Researcher wins grants with help from CSU Ventures

Though he’s worked at Colorado State University less than a year, Arun Kota could be a poster child for how CSU Ventures can aid researchers. The mechanical engineering professor has won two grants – both of which required Colorado-based funds.

The grants were funded through the state of Colorado’s Advanced Industries (AI) Accelerator Programs, which were created in 2013 to spur growth in high-tech industries and promote public-private partnerships.

Kota, who develops coatings for a variety of products, is teaming with a Fort Collins-based company to develop a filter that better separates butanol – a biofuel made from fermentation broth – from water.

Kota is working with another Colorado-based company through his second AI-funded grant – a relationship that CSU Ventures also helped foster.

The La Junta-based company sells drying equipment and systems and also dries and processes seed products for customers.

Kota’s team will provide the company a non-stick coating that keeps the seeds from adhering to the drying equipment.

Invaluable help

Kota first met with CSU Ventures last fall and has since used the organization to find industrial partners and identify potential funding sources. He said the help has been invaluable.



Colorado ranked

5th

most entrepreneurial state

*(2013 Kauffman Foundation’s
Entrepreneurial Index)*



“I am truly honored to receive this award — my students and collaborators have worked very hard for many years to transfer our technology to the clinic, and it’s so much fun to finally see the fruits of that labor pay off.”

Sue James, professor and department head of mechanical engineering at Colorado State University

Mechanical engineering professor earns award for innovative excellence

The CSU Ventures Award for Innovative Excellence is presented to a researcher who is not only an innovator, but someone whose innovations have been transferred to industry and are exhibiting strong potential for commercial success. With this award, CSU Ventures seeks to recognize research excellence and acknowledge the impact that a researcher’s innovation has outside of the University, on the lives of many people around the world.

Susan James, professor and department head of mechanical engineering at CSU, received this year’s Award for Innovative Excellence. James’ research has led to the development of a bio-inspired material known as BioPoly™. This material has been exclusively licensed to a subsidiary of Schwartz Biomedical Company in Indiana and is currently generating royalties for Colorado State University.

The subsidiary, BioPoly, is focusing on orthopedic applications of the material such as total joint replacements and a knee resurfacing implant that is currently available in Europe. This resurfacing implant is uniquely designed to replace only the damaged portion of the knee cartilage and can be done using minimally invasive surgery. This means much less trauma to the patients and they can begin walking immediately after surgery, allowing for an expedited recovery. The resurfacing implant will be available in the United States once FDA approval is received.

Over the last 20 years (1995 – 2014) CSU Ventures has received 16 invention disclosures from Dr. James, many of them directed toward the work that led to BioPoly™. During this time span, a total of 39 U.S. and foreign patent applications were filed on these innovations. To date, six of these applications have now issued as five U.S. patents and one Canadian patent.

Faculty and researchers honored at college recognition ceremonies

CSU Ventures awarded 69 inventors with patent plaques on 37 issued patents and 15 plant variety protection awards to researchers and faculty members at four college recognition ceremonies including: Agricultural Sciences (15), Veterinary Medicine and Biomedical Sciences (11), Engineering (35) and Natural Sciences (23). These ceremonies are designed to honor outstanding achievements during the academic year.



Meeting the growing demands for agricultural innovation

Agriculture is one of the most important economic drivers in Colorado contributing over \$10 billion to its economy in 2011. Today's agricultural operation is technology intensive, and as a land grant university, Colorado State University serves as a significant source of innovation to Colorado agriculture.

CSU researchers contribute to Colorado's vibrant agriculture sectors and economic growth with innovations ranging from new varieties of crops to better methods for soil enrichment to recycling farm waste into biofuels. These innovations stem from multiple disciplines and colleges across CSU, beyond agricultural sciences.

Did You Know?

CSU's wheat and potato plant breeding programs continue to make regional and global impacts while returning a source of revenue for further research.

CSU's Potato Breeding and Selection Program developed approximately 60 percent of the potato varieties that are planted in Colorado fields.

New potato cultivars, some with different skin/flesh color combinations, provide Colorado potato producers opportunities to enter and compete in new markets across the globe.

Of all the cultivars released since 1997, those developed by Colorado ranked first in the US. (based on the top 25 cultivars accepted for seed certification in the U.S. in 2013.)

The value of the Colorado potato crop totaled nearly \$213 million in 2013, making potatoes tops among all fruits and vegetables and fourth among all crops produced in Colorado.

As the agricultural industry rapidly adopts advancements in technologies, CSU Ventures continues to evaluate new avenues and opportunities for transferring more CSU innovations to the agriculture sector.

In 2014, CSU Ventures worked with a variety of local and regional ag organizations to bolster efforts and create a strong network for commercializing CSU research. Some of these activities included: joining a local group focused exclusively on ag innovation; working with CSU faculty who are focused on the ag value chain in Colorado; connecting Colorado companies interested in new agriculture technologies to CSU researchers; and connecting venture capitalists in the agricultural space with CSU researchers.

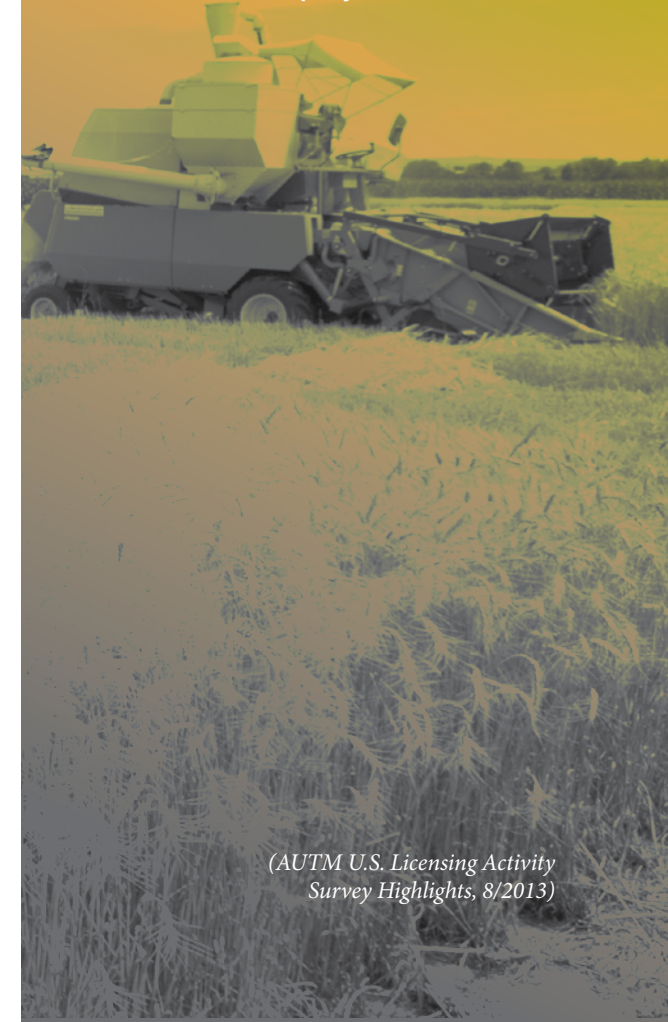
In 2014, over 60 percent of the 2.85 million winter wheat acres in Colorado were planted with varieties developed by CSU to produce higher yields, resist diseases and insects prevalent in Colorado, and optimize milling and baking quality for both domestic and export markets.

Wheat is grown in 40 of the 64 counties in Colorado and supports more than 15,000 jobs.

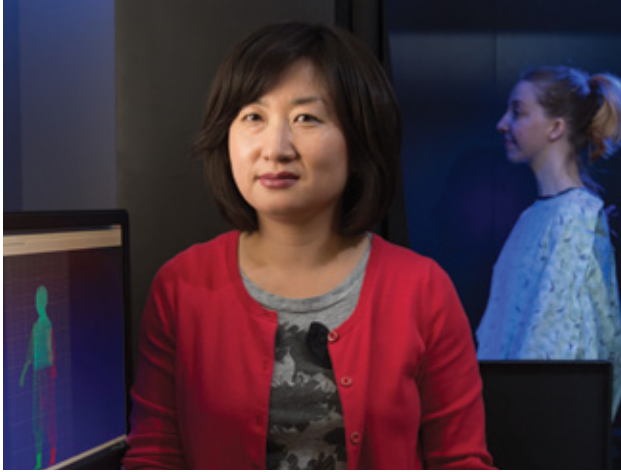
More than 80 percent of the annual wheat crop grown in Colorado is exported to more than 60 countries.

\$36.8
billion

in net product sales were generated, and startup companies started by 70 institutions employed 15,741 full-time employees



(AUTM U.S. Licensing Activity
Survey Highlights, 8/2013)



“We think we can design a garment that is more appealing to patients and helps them feel covered but also functions the way nurses and doctors need it to.”

Juyeon Park, professor in Colorado State University's Department of Design and Merchandising

New program funds research in social sciences, humanities and arts

New hospital gowns designed for better comfort and function. A computer-based tool that measures preschoolers' motivation to learn. A school-based violence and bullying prevention curriculum. Those are just a few of the projects CSU Ventures funded through its new Creative Works Commercialization Awards program.

CSU Ventures launched the new program this year to support innovative research projects in the social sciences, humanities and the arts – areas that often fall outside of the traditional focus of most technology transfer offices.

CSU Ventures awarded more than \$40,000 to six different projects at Colorado State University through the Creative Works program.

Campus Corps will use its \$5,000 creative works grant to develop training materials for CSU students serving as mentors to their at-risk peers. Campus Corps is a service learning course in the College of Health and Human Sciences.

Four of the grants went to professors in the College of Health and Human Sciences.

“Our core mission is to promote health. I am so pleased that the innovative work our faculty is doing will be available to a broader constituency through commercialization enhancements made possible through this funding,” said Jeff McCubbin, dean of the college.

Goal of Creative Works

The goal of the Creative Works program is to help fill the gap between the fundamental research funded mostly by federal grants and the marketplace.

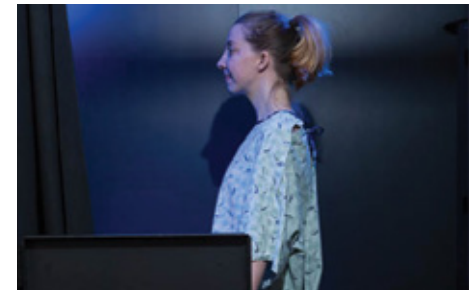
This type of proof-of-concept fund is designed to help these researchers advance their product or program to the point they can be deployed to a wider audience.

“Innovation isn't limited to just engineering or chemistry, it occurs in many fields and disciplines,” said Rodman Tompkins, director of licensing and business development for CSU Ventures.

Minding the gap:

CSU redesigning the hospital gown

Juyeon Park, a professor in CSU's Department of Design and Merchandising, is leading a team to overhaul the shapeless hospital gown, which U.S. hospitals have used since the 1920s. Seeking medical advice, Park and her team in the College of Health and Human Sciences are working with two Northern Colorado hospitals now part of University of Colorado Health to ensure they get input not just from nurses, doctors and other medical staff, but patients themselves.



Proof Of Concept Funding

Filling a key gap between basic research funding and private sector investment, proof of concept (POC) funding gives researchers the opportunity to demonstrate the technical and commercial feasibility of their research. CSU Ventures awarded more than \$700,000 in POC funding to CSU researchers in 2014; this was approximately double the POC funding awarded by CSU Ventures in 2013.

POC funding was made available to CSU researchers via several different POC programs, two of which were created in 2014:

Bioscience Discovery Evaluation Grant Program (BDEGP)

Amount Awarded: \$402K

Number of Awards: 9

Colleges: (6) Agricultural Sciences, Engineering, Health and Human Sciences, Natural Sciences, Veterinary and Biomedical Sciences, Warner College of Natural Resources

Departments: (7) Chemical and Biological Engineering, Chemistry, Design and Merchandising, Ecosystem Science and Sustainability, Environmental and Radiological Health Sciences, Horticulture and Landscape Architecture, Mechanical Engineering

Advanced Industries (AI) Accelerator POC Program

Amount Awarded: \$267K

Number of Awards: 5

Colleges: (3) Engineering, Natural Sciences, Veterinary and Biomedical Sciences

Departments: (4) Electrical Engineering, Mechanical Engineering, Environmental and Radiological Health Sciences, Chemistry

Creative Works Program

Amount Awarded: \$41K

Number of Awards: 5

Colleges: (3) Business, Health and Human Sciences, Liberal Arts

Departments: (5) Design and Merchandising, Education, English, Human Development and Family Studies, Marketing

“The research and discovery that happen at CSU returns huge benefits to Colorado in terms of economic activity and innovation.”

President Tony Frank, Colorado State University

Colorado placed

3rd

among peer states and above the national average output for patent activity in 2013

(The State of Innovation:
Colorado 2014 Report)



Powerhouse Energy Campus takes innovative approach to advancing energy technology

Completed in 2014, the Powerhouse Energy Campus has transformed the historic 1930's Fort Collins Municipal Power Plant into a five-acre site housing Colorado State University's Energy Institute. The expansion to the existing EECL facility adds approximately 68,000 square-feet of innovative laboratory, office, meeting, classroom, and business incubator space, distributed over four stories.

In addition to being home to a number of innovative and entrepreneurial faculty, staff, and students, the fourth floor of the Powerhouse Energy Campus also includes a clean-tech-focused incubator facility. The building represents a new model of collaborative space that fosters interaction and cooperation among researchers, departments, partners, and sponsors, combining efforts to grow the impact, reach, and reputation of energy, education, and research at CSU. CSU Ventures works closely with the Energy Institute and the Powerhouse researchers, to support the development of next generation of clean, renewable, and efficient energy technologies.

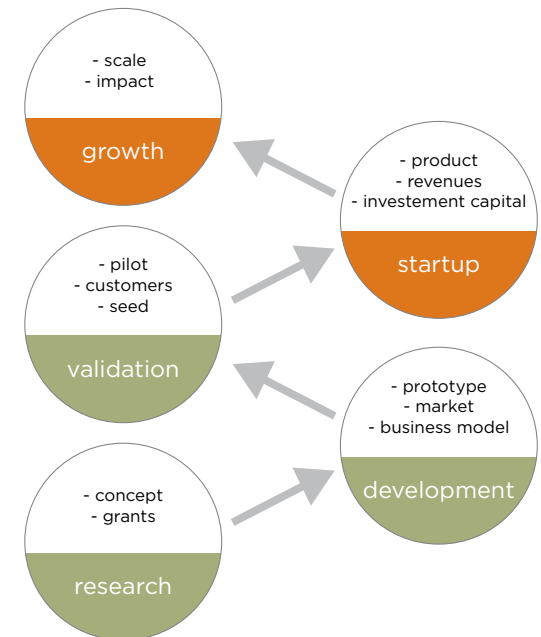
The new addition is certified LEED Platinum, with geothermal caissons, active daylight harvesting, 100% solid state lighting, a 24V DC microgrid, advanced metering, advanced controls with weather prediction, thermal mass, high efficiency skin (windows, insulation and exterior cladding), hydronic heating and cooling, as well as solar/wind/combined heat and power energy generation.

CSUV, RMI partnership moves technologies into startups

CSU Ventures partnered with Rocky Mountain Innosphere to create a "Technology to Market" (T2M) process to better evaluate the commercial potential of technologies that may have strong merit as a startup company. This process facilitates the transition from research and development in the University to validation and scale in the marketplace. The result is a stronger pipeline of startup companies formed to commercialize innovations from CSU faculty, while leveraging the resources of the Innosphere's business incubation programs. T2M also serves as a diagnostic tool, helping entrepreneurs and CSU Ventures prioritize and focus on the next critical step on their path to success.

Sixteen startup companies or faculty considering starting companies were evaluated and tracked during 2014. Five of these companies have received Innosphere client services and three have participated in Innosphere's pre-incubation programs as a result of this collaboration.

Building a strong pipeline of startups with the Technology to Market tool





“We weren’t thinking ‘company’ when this started. We were thinking (student) training. CSU Ventures got us started down that path.”

Dean Hendrickson, CSU’s associate dean for Professional Veterinary Medicine

CSU startup helps veterinary surgeons practice cutting and stitching techniques

Until recently, veterinary students used a variety of materials to practice their slicing and needlework, including fruit skins, pieces of carpet and dead pig’s feet.

But those materials left much to be desired and did not give students practice in dealing with blood oozing from a live animal. And while live animals for stitch practice were available, that’s a lot for some first-time flesh cutters to handle. Suture pads that simulate skin and tissue are available on the market for student practice, but there was nothing out there that mimicked the complexity of real tissue and actually bled.

Ultimately – after many, many iterations — Dr. Dean Hendrickson, clinical sciences professor and equine surgeon and Fausto Bellezzo, clinical sciences researcher devised a suture pad design that could

bleed, courtesy of an innovative vascular grid design that simulates tissue and vessel response along with artificial blood in a bag that can be height-adjusted to change the blood pressure.

The inexpensive suture pads can be used at least 10 times and wherever the student surgeon wants to practice.

The Colorado State University professors formed a startup company, SurgiReal, to bring their innovative products to the marketplace. One of the products the company is currently working to develop is a practice abdominal cavity. As the design is refined, SurgiReal is also evaluating what it would take to bring the product into production. All of the manufacturing is done at SurgiReal’s facility in north Fort Collins.

In 2013
universities introduced

719

new products created
by companies licensing
university technologies



(AUTM U.S. Licensing Activity
Survey Highlights, 8/2013)

t in f MAKING HEADLINES:

CONGRATULATIONS TO SUE JAMES FOR RECEIVING THE INNOVATIVE EXCELLENCE AWARD AT THIS YEAR'S CELEBRATE CSU AWARDS PROGRAM

INCREASED FB FOLLOWERS BY 64%

INNOVATION SYMPOSIUM SPOTLIGHTS UNIVERSITY RESEARCH EFFORTS

SOURCE: INNOVATIONEWS

COLORADO STATE UNIVERSITY RESEARCHERS CREATING NEXT GENERATION PROSTHETIC HEART VALVES

FORT COLLINS 2ND IN US TECH STARTUP DENSITY

CSU ON THE RISE IN SCIENTIFIC RESEARCH

SOURCE: THE DENVER POST

800 FOLLOWERS ON TWITTER

INTELLIGENT TEXTILES: DESIGN AND MERCHANDISING PROFESSOR RESEARCHES NANOTECH FIBERS

VETDC A FINALIST FOR RISING STAR AWARD

SOURCE: NCBR

FROM INNOVATIVE, TO TECHNOLOGY, TO SUSTAINABLE BUSINESS: THE EFLUX STORY

HOW TO MAKE BATTERY POWER MORE POWERFUL

SOURCE: POPULAR MECHANICS

CARBO ANALYTICS AWARDED 150K SBIR GRANT FOR BIOFUELS SUGAR ANALYSIS SYSTEM DEVELOPMENT

RESEARCHERS STUDY IMPACT OF COOKSTOVE EMISSION ON THE CLIMATE

SOURCE: COLOSTATE TODAY

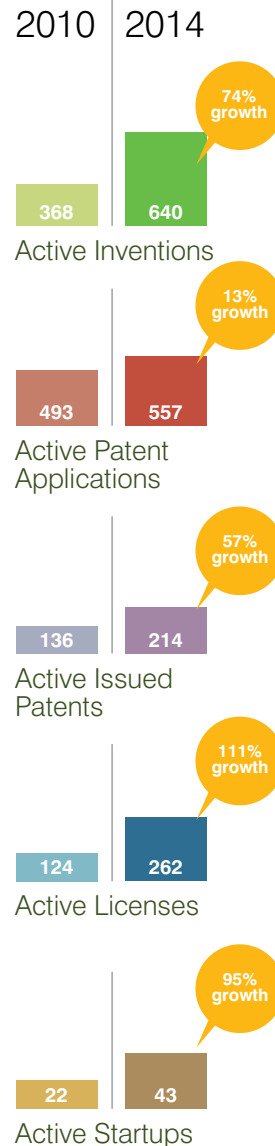
9 STARTUPS TAPPING THE \$600 BILLION CLEANTECH WATER SECTOR

SOURCE: FORBES

Highlights:

- CSU Ventures FY2014 totals for inventions, issued patents, and licenses equaled or exceeded historical records.
- CSU Ventures awarded more than \$700K in funding to proof of concept projects through the Advanced Industries Accelerator Proof of Concept Grant Program, Bioscience Discovery Evaluation Grant Program, and CSU Ventures Creative Works Program.
- CSU startup companies employed nearly 500 people in FY2014; most of these in Colorado.

Active Portfolio



New This Fiscal Year

Inventions

2014 | Last 5y
122 | 590

Patent Applications

2014 | Last 5y
160 | 700

Licenses

2014 | Last 5y
41 | 196

Issued Patents

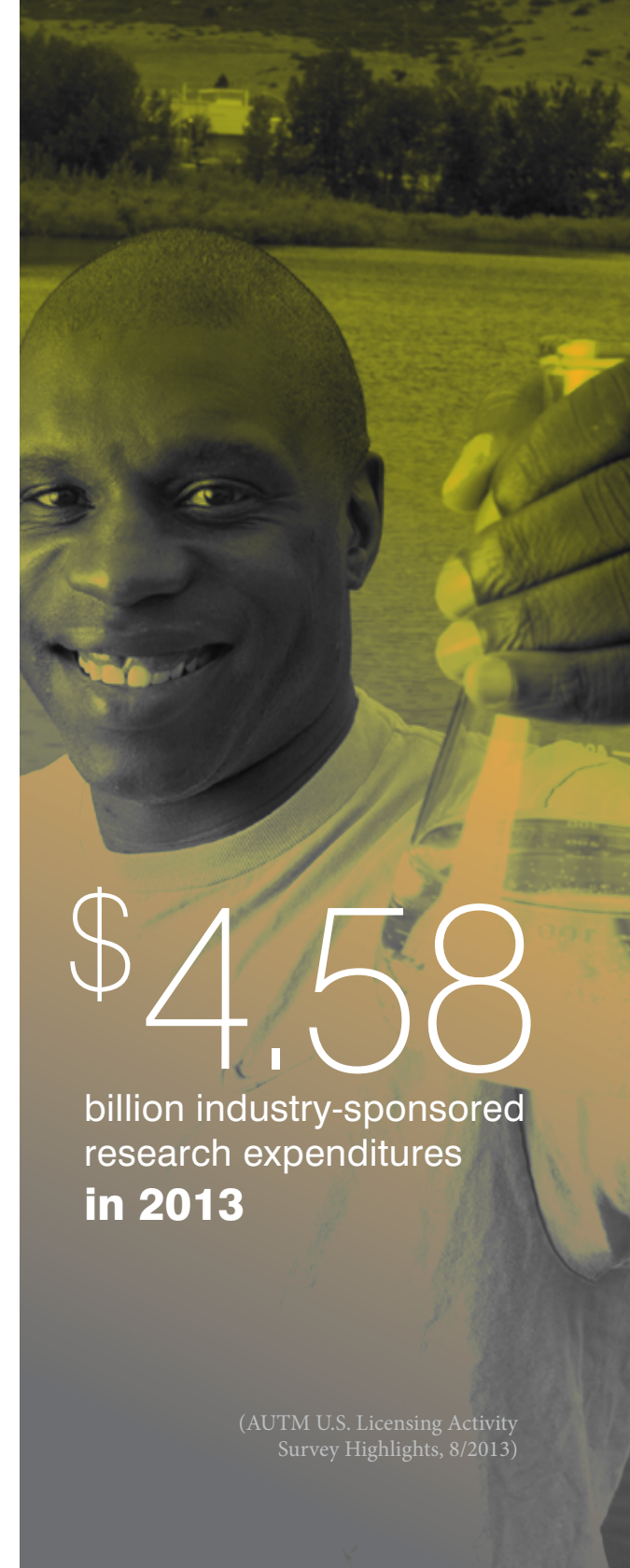
2014 | Last 5y
49 | 115

Startups

2014 | Last 5y
5 | 30

Revenue

2014 | Last 5y
\$1.27m | \$5.94



\$4.58

billion industry-sponsored
research expenditures
in 2013

Congratulations to these newly formed CSU companies in FY 2014:

Access Sensor Technology | MetriChip | Susmer | DeVirt | Immeo Biologics

(AUTM U.S. Licensing Activity
Survey Highlights, 8/2013)



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