

# Update 2010

## Innovation Areas:

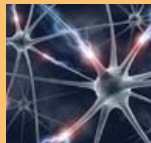
### Energy



### BioDevice/ BioPharma



### Medical Imaging & Brain Medicine



### Nano-technology



### Imaging & Digital Media



## Overview

The Utah Science Technology and Research initiative (USTAR) focuses on leveraging the proven success of Utah's research universities in creating and commercializing innovative technologies to generate more technology-based start-up firms, higher paying jobs, and an expansion of Utah's tax base.

The March 2006 legislation that created USTAR provides funding to:

1. Recruit top-level researchers
2. Build state-of-the-art interdisciplinary research and development facilities
3. Form science, innovation, and commercialization teams across the state

In four years of operation, USTAR is on or ahead of plan in its three program areas – Research Teams, Building Projects, and regional Technology Outreach.

### Research Teams

As of June 30, 2010, USTAR had recruited nearly three dozen top researchers to the University of Utah (U of U) and Utah State University (USU). These innovators have come from Harvard, MIT, UCLA, Case Western Reserve and other leading institutions.

Here are some highlights, which compare actual FY2010 results to those projected for that year in the Economic Prospectus developed for USTAR in 2005:

- USTAR researchers have created six new companies, more than double projections.
- USTAR innovators have generated a portfolio of intellectual property, which will fuel economic impact far into the future. Eighty-seven invention disclosures have already been filed, 189 percent of projections.
- Through June 2010, USTAR researchers have brought more than \$44 million of new out-of-state research funding to Utah. That's 185 percent of projections.
- Including all research grants committed for future years (through FY2014), USTAR researchers account for \$103 million in new funding. That's 199 percent leverage of Utah's research investment (\$52 million) to date.



Utah State University's new USTAR BioInnovations Building  
Photo by Jared Thayne

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- Based on jobs created through extramural research funding\*, USTAR has created an estimated 1,984 jobs, slightly ahead of projections (106 percent). This includes more than 800 construction jobs at USTAR building projects.

### Building Projects

USTAR funding supports construction of state-of-the-art interdisciplinary research and innovation facilities at the U of U and USU. Each structure will provide research teams with strategic core facilities to advance innovation and commercialization in their respective focus areas. These facilities should prove to be “industry magnets” for collaboration.

Ribbon cutting at USU’s BioInnovations Building took place Oct. 7, 2010, with research teams projected to take occupancy in December 2010. The U of U building is progressing toward an early 2012 opening. Both projects are within budget.

### Technology Outreach Innovation Program

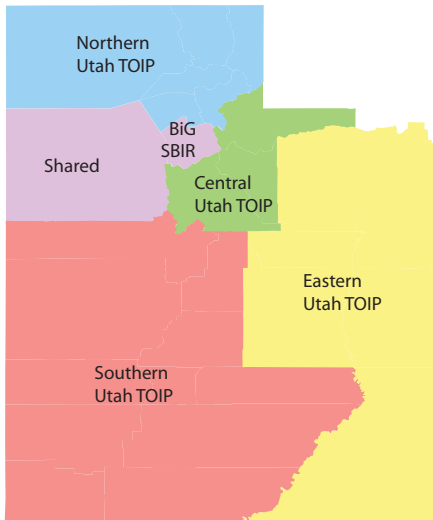
USTAR’s Technology Outreach Innovation Program (TOIP) is the engine to drive commercialization activities. TOIP’s mission is to support the accomplishment of USTAR’s financial, employment, and research objectives by lending experienced leadership, deep business understanding, and functional expertise to the most promising opportunities and focus areas.

The regional program is led by industry-experienced directors deployed across Utah. Each director heads an Outreach Center located at one of the state’s higher educational institutions. The directors assist in expanding the transfer of new


or improved technologies from state universities to existing companies and advancing cutting-edge research on behalf of Utah’s leading firms.

Besides working with scores of emerging and existing technology businesses and entrepreneurs in their regions, the directors have pursued regional initiatives.

In FY2010, USTAR Technology Outreach staff conducted projects that supported companies, entrepreneurs and researchers in 19 of 29 counties in the state. In addition, USTAR staff have provided critical assistance to Utah Cluster Acceleration Partnership efforts, the Governor’s 10-year Energy Plan committee, and other initiatives. More detail on these activities is provided later in the report (pages 12 -13).



A new effort coordinated by TOIP has been the Technology Commercialization Grant program, which strives to encourage collaboration between local industry and regional and research universities. Some 68 projects were funded by Sept. 2010, and progress has been encouraging (page 14).



“This is my 29th year at Weber State University and I’ve seen lots of programs come and go during that time. Of all the programs I’ve seen, I think the USTAR project has the greatest ability to have an impact on the future of Utah’s economy.”

– Ann Millner, President Weber State University

\* BEBR study (2009) indicates every \$1 million in extramural research funding generates 20 jobs.

# Organization

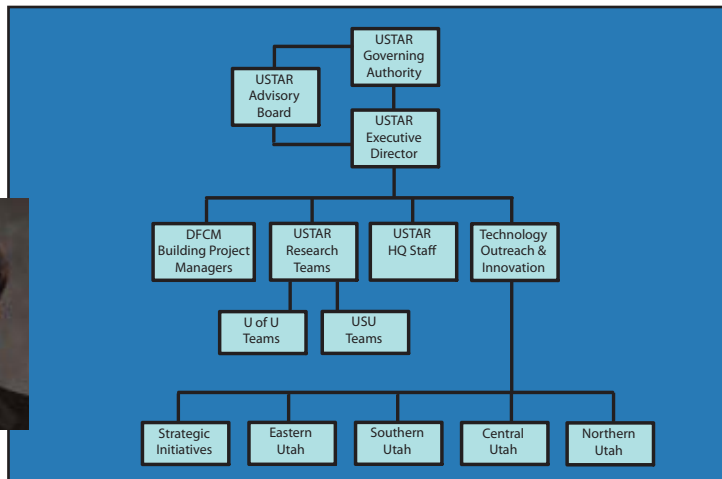
The USTAR Governing Authority board is an experienced and committed team of ten leaders with diverse experience in inventorship, entrepreneurship, financial capital, university research, and running and growing companies.

The board holds public meetings monthly. See the “Events” tab at [www.innovationutah.com](http://www.innovationutah.com) for details.

- Dinesh Patel, Ph.D., Managing Director, vSpring Capital (Chairman)
- Spencer P. Eccles, Executive Director, Governor’s Office of Economic Development (Vice Chairman)
- Scott Anderson, CEO, Zions Bank
- Cynthia Burrows, Ph.D., University of Utah
- Jim Dreyfous, Managing Director, Pelion Venture Partners
- Richard Ellis, Utah State Treasurer’s Office
- Hunter Jackson, Ph.D., CEO of Navigen Pharmaceuticals
- Rich Linder, CEO, Coherex Medical Inc.
- Dan Olsen, Ph.D., Brigham Young University
- Charles J. Precourt, vice president and general manager, ATK Aerospace Systems, Space Launch Systems



Dinesh Patel



USTAR staffing is comprised of regional technology outreach staff (directors, analysts, and interns) and headquarters personnel. As mentioned previously, TOIP offices work with local entrepreneurs and businesses, provide strategic consulting to the university USTAR research teams, and pursue regional initiatives.

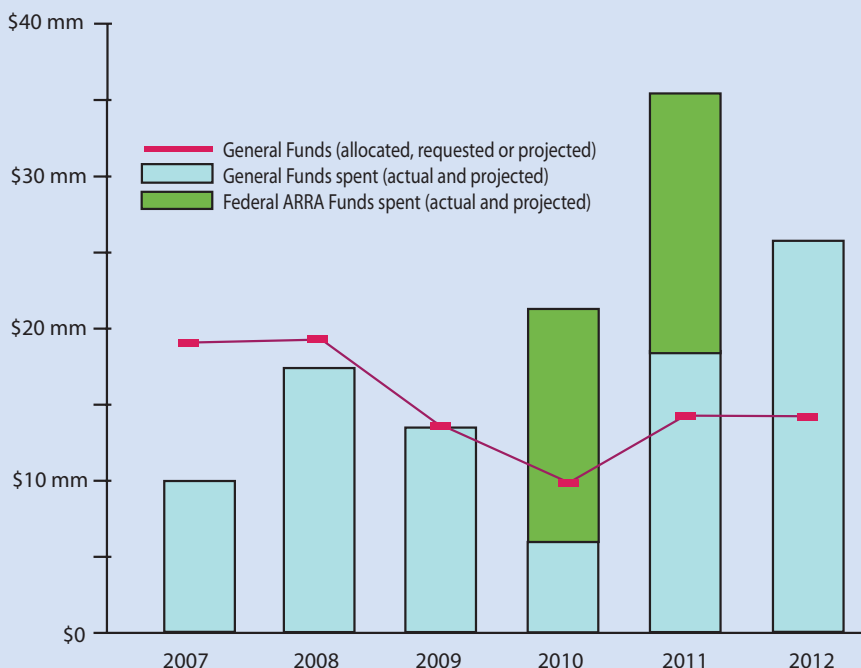
The headquarters team supports the TOIP offices, and provides executive administration, accounting/finance, and marketing communications services. Strategic initiatives include financial and human capital support for the BioInnovations Gateway and SBIR-STTR Assistance Center.

# Funding

For its research and Technology Outreach components, USTAR has or is projected to receive General Funds allotments as follows:

Fiscal Year	Funding
2007	\$19,250,000
2008	\$19,324,500
2009	\$14,450,100
2010	\$10,223,200
2011	\$14,501,300

Senate Bill 240 in the 2009 Session provided federal American Recovery and Reinvestment Act (ARRA) funding of \$33,000,000. With these funds, and with nonlapsing carryover, USTAR’s actual and projected spending over the same time period can be seen in the chart to the right. Federal funds are being used aggressively to augment state General Funds.

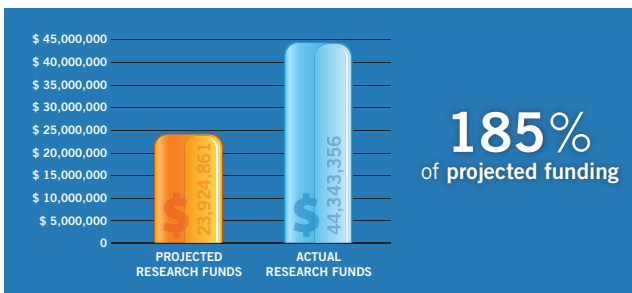


# Metrics of Success

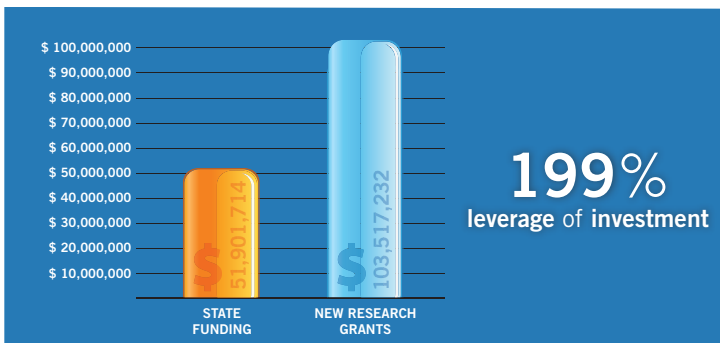
The USTAR initiative is a long-term, multi-year effort. Our growth is projected to occur in four phases, from the launch of research teams (Phase I) to new company/job creation (Phase IV). In reality, this growth is not so much sequential, but rather taking place along a continuum. Nonetheless, results to date are positive and indicate the initiative is on or ahead of plan in all key metrics. USTAR is in the phase where we are seeing significant gains in federal grants attracted to the state, as well as a high number of disclosures and patents filed.

As of June 2010, USTAR had 34 senior researchers in place. In terms of employment in FY2010, 185 FTEs were employed in USTAR research statewide.

USTAR researchers have filed 87 invention disclosures, a leading indicator of potential commercialization. This is nearly double the rate projected at USTAR's inception. To date, USTAR researchers have also filed 28 provisional patents and nine patents, also ahead of projections.



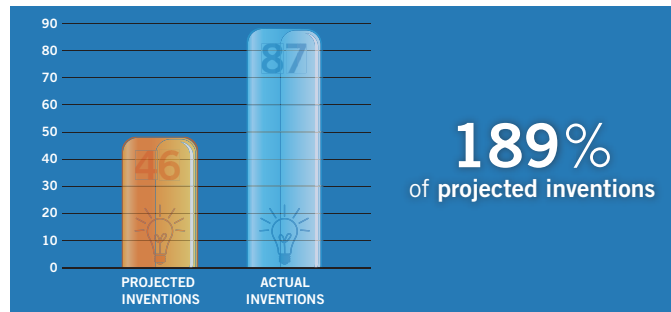
Through FY2010, USTAR researchers have won nearly double the outside funding originally projected at USTAR's inception.



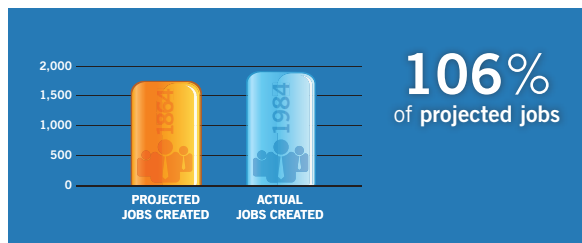
In aggregate, for fiscal years 2007-2010 combined, the state's investment in USTAR research teams totaled \$52 million. USTAR researchers have won grants worth \$63 million (through FY2014) and commitments for an additional \$40 million, primarily in federal energy research funding. **This represents 199 percent leverage of state funds invested in USTAR research to date.**

*NB - The Economic Prospectus published in 2005 was based on research team and Technology Outreach funding through FY2010 of \$103 million. To date, actual funding has been \$63 million. To formulate the baselines used in this annual report, we have adjusted the Economic Prospectus predictions to 61.4 percent of those published in 2005. For a copy of the Economic Prospectus, visit <http://www.ustar.utah.edu/Documents/ExecutiveSummary.pdf>*

Equally important, USTAR is beginning to see progress in a metric that was expected to blossom in the later stages of the initiative, the creation of new companies. To date, USTAR researchers have started or attracted six new companies to the state, more than twice the number indicated in economic projections developed in 2005 when USTAR was formulated.



USTAR researchers have filed an ahead-of-projections 87 invention disclosures, a key first step toward commercialization.



Including estimated jobs generated by the inflow of federal and industry sponsored research dollars, USTAR is on track with job creation.

*For more information on the BEBR study that indicates every \$1 million in research funding leads to 20 jobs, visit <http://www.bibr.utah.edu/Documents/uebr/UEBR2009/UEBR2009no2.pdf>*

# Research Teams



## BioDevice/BioPharma

- Biomedical Device Innovation
- Cell Therapy & Regenerative Medicine
- Personalized Medicine
- Advanced Nutrition
- Synthetic Bio-manufacturing
- Veterinary Diagnostics/Disease

## Nanotechnology



- Wireless Nanosystems
- Nanotechnology Biosensors
- Micro & Nano Systems Integration

## Energy



- Biofuels
- Fossil Energy: Carbon Engineering
- Intuitive and Solar Buildings
- Alternative Energy

## Imaging Technologies and Digital Media

- Imaging Technology
- Advanced Sensing & Imaging
- Space Weather
- Digital Media

## Medical Imaging and Brain Medicine



- Circuits of the Brain
- Diagnostic Neuroimaging
- Nanoscale & Biomedical Photonic Imaging

USTAR focus areas are:

- Based on existing University strengths
- Have vast commercialization opportunities and address large and strategic global markets
- Leverage Utah industry strengths

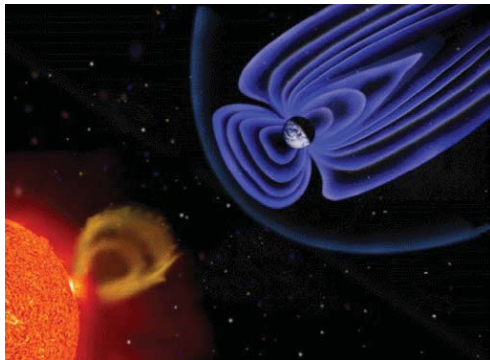
The strategy is to attract all-star research faculty from outside the state with a reputation for innovation and commercialization. In effect, USTAR seeks to bring “rainmakers” to the state’s two public research universities to work with our existing experts on bigger and more challenging efforts.

# USU Feature Stories

## Space Weather: In Gear with the Ionosphere

The USU Space Weather Center (SWC) is a USTAR research team that has its eyes on the skies. The ionosphere has its own weather patterns, and these affect communication and navigation systems. These patterns can be monitored and their effects predicted, and the SWC is developing applications to mitigate adverse space weather impacts on technical systems.

One such application is the iPhone app SpaceWx, which shows real-time space weather using current images of the sun including flares, coronal mass ejections and disturbances to the solar wind, all of which can disrupt satellite commu-



nications, cause radio communication frequencies to change, and reduce the accuracy of GPS receivers.

In the future, the SWC intends to develop predictive capabilities for use

by the Federal Aviation Administration, commercial airlines, and the Federal Emergency Management Agency's emergency backup communication.

The SWC has an eye on commercialization too. SWC executive director W. Kent Tobiska is also president of Space Environment Technologies (SET), a privately-held company that conducts space science research, provides space weather operations and develops space systems standards. SET is a major content provider for SpaceWx.

In 2010, SET opened a corporate office in North Logan on the USU Innovation Campus. "The company was motivated to locate personnel and facilities in North Logan from its close ties with the USU USTAR SWC," said Tobiska. "The North Logan SET office not only will handle the company's administrative functions but will also provide an exciting, newly expanded networking capability for SET's operational servers."

SET's main customers are the U.S. Air Force, National Oceanic and Atmospheric Administration, NASA and National Science Foundation agencies, as well as international commercial aerospace firms that use SET's solar forecasts for helping with satellite operations.

## USU Team Creating Powerful Single-Cell "Factories"

Americans use 29 million tons of plastics annually, and plastics compose 50 percent of landfill bulk nationwide. Biodegradable plastics created by single-cell organisms could dramatically reduce that impact.

USU's Synthetic Bio-Manufacturing Center (SBC) is applying advanced genetics to "teach" small single-cell organisms to create valuable chemical compounds, such as bio-plastics, biofuels or pharmaceuticals.

The SBC has engineered a common e. coli organism to excrete high levels of bio-plastic compounds that are biodegradable, sustainable, and carbon neutral. Cells are taught these tricks via "BioBricks," which are defined DNA sequences that enable living cells to construct new natural products. The SBC team has already created more than 50 novel "BioBricks."

Future organisms will only need sunlight, simple sugars, and carbon dioxide to generate these compounds. SBC technology aims to provide valuable materials for high-value industrial manufacturing processes, while reducing carbon emissions.

Future applications of bio-plastics include resins, coatings, films, adhesives, fibers and medical materials, such as biodegradable sutures. The technology also has applications in alternative energy, with single-cell organisms modified to produce precursors for bio-diesel and other fuels.



## CASI: Using Lasers for Cleantech

The Center for Active Sensing and Imaging (CASI) at USU is developing laser technology called LIDAR for remote sensing and 3D imaging. Like its cousin RADAR, LIDAR (Light Detection and Ranging) bounces laser light off of objects to accurately measure the size, shape and location of land, buildings, and even the air.



Two technologies under development by CASI reached the Rocky Mountain region semifinalist stage in the national CleanTech Open contest. VolumeWind™ utilizes laser sensing to help the wind power industry more effectively site wind towers and increase power generation efficiency.

“We can launch a small balloon and a laser range finder and an optical tracker to establish an accurate three-dimensional trajectory for the balloon, from which we can get the wind speed every place that balloon visits,” said USTAR investigator Alan Marchant.

DIAL Emissions Monitoring deploys remote sensing of volatile organic compounds (VOCs) and other substances to help the oil and gas industry reduce production-related pollution.

“USTAR provides the initiative, they provide the direction, they provide specialized resources to help researchers in the university setting recognize the commercial applications,” Marchant said.



CASI's Alan Marchant prepares to map wind patterns using laser-tracked balloons.

For more information on USU's USTAR teams, visit:

<http://www.innovationutah.com/advancedsensingandimaging.html>

<http://www.innovationutah.com/spaceweather.html>

<http://www.innovationutah.com/syntheticbiomanufacturing.html>

<http://www.energydynamicslab.com/>

## Energy Dynamics Lab: Revving up Commercialization

USTAR and the organizations it supports have had a positive impact on Utah's cities and towns through several initiatives. USU's Energy Dynamics Laboratory (EDL) provides several examples.

With the help of \$500,000 in funding from USTAR, EDL was formed in 2009 to create transformational, systems-level solutions to America's energy challenges. EDL's three primary business areas are clean and unconventional fossil energy, advanced electric transportation, and intuitive or intelligent buildings. EDL also has focused efforts in biofuels and wind characterization.



EDL engaged with Park City to develop a comprehensive review of different

renewable energy technologies the city could deploy. The study evaluated the technical and economic costs and benefits of a wide range of efforts including natural-gas vehicles and anaerobic digesters to create biofuels. The city's Sustainability Office is using the study to evaluate possible initiatives.

### Biofuels: Sustainable waste-to-bioproducts

Collaboration between the USU Biofuels Center and the City of Logan has resulted in the creation of the “Sustainable Waste-to-Bioproducts Engineering Center.” The new Center has focused on using algae to remove phosphorus and nitrogen from the city's wastewater lagoons. This project will modify 460 acres of wastewater lagoons to cultivate and harvest algae, and then use that algae to make biofuels.

The biofuels, including natural gas and biodiesel, will be used as local sources of power for Logan City and as fuel for the city's solid waste trucks. This sustainable waste-to-bioproducts project is expected to save the City of Logan approximately \$100 million in alternative equipment and, in addition, the algae project will eliminate wastewater aeration costs of over \$250,000 annually.



# USTAR Buildings: Industry Catalysts Coming Online

## Building Utah's Research Capacity

Leading researchers and industry will utilize two state-of-the-art interdisciplinary research and development facilities on the rise in Utah as a result of a key program of the USTAR initiative. The building construction process is being led by Project Managers from the Department of Facilities and Construction Management (DFCM).

Currently the projects are proceeding in budget. In addition, it is estimated that the projects are employing as many as 800 construction workers in the second half of 2010.

The primary purpose of these buildings is to give our research teams top-of-the-line facilities in which to conduct their work in USTAR's key innovation focus areas.

The secondary purpose - also critical - is to foster the connection between industry, entrepreneurship and research. Each facility will serve as an industry magnet, encouraging collaboration between researchers and industry experts.

"This building is making a huge difference already. In fact, I just came here from an interview with a real star researcher that is here looking at us because of this building."

- USU President Stan L. Albrecht, Aug. 2010



Funding for the projects came in March 2006 when State legislators created a \$160 million USTAR building fund. The universities provided a \$40 million match, bringing the entire building budget to \$200 million. The legislation required both of the research universities to donate land and make significant contributions towards cost prior to construction. Through June 30, 2010, approximately \$117 million in state funds have been spent on the projects.

USU donated a 33,000 square-foot building in Innovation Campus which is being used to house the existing innovation teams. The Legislature and Governing Authority approved the donation of Building 620 to satisfy the university's \$10 million contribution, and USU has provided land at no cost for both buildings.



Ribbon cutting at USU's 110,000 square-foot building took place Oct. 7, 2010. Research teams will move into the facility in Dec. 2010.

## USU

The USU building will house researchers pursuing advanced nutrition, veterinary and other life science efforts. This 110,000 square-foot building is located in USU's Innovation Campus in North Logan. USU facilities are to include:

- Bio Safety Level 3+ lab
- Vivarium and life science labs
- Clinical nutrition center

No other non-military building in the state has this level of Bio Safety capability, and USU has already received inquiries from industry regarding potential projects.

Gramoll Construction is the Construction Manager General Contractor (CMGC) and AJC Architects is the Architectural and Engineering (AE) firm and design team lead. Payette Associates is designing some of the lab space. USU expects to achieve Leadership in Energy and Environmental Design (LEED) Gold Certification for the building.

## Project Employment

Timeframe	Total Workers
Jul - Dec 09	594
Jan - Jun 10	894
Jul - Dec 10	810
Jan - Jun 11	750
Jul - Dec 11	450

Quarterly estimates of the number of workers involved in USTAR building projects (Source: CMGCs).





The James L. Sorenson Molecular Biotechnology building is rising on the U of U campus. It is - literally and figuratively - at the crossroads of upper campus health sciences and main campus engineering.

“What is unique about this facility is that this is probably the first and only one in the country that allows medical doctors, engineers and scientists to work together on the interface between health-care-related problems and advances in engineering. We’re not first to follow, we’re first to lead.”

- Florian Solzbacher, U of U  
Director of Nanofabrication

### U of U

At the U of U, Layton Construction, Inc. is the Construction Manager General Contractor (CMGC) and Lord, Aeck & Sargent Architecture is the Architectural and Engineering (AE) firm and design team lead (with local collaboration with Prescott Muir). Construction of the 208,000 square-foot facility should be complete in the first quarter of 2012. The U of U facilities are to include:

- Nanofabrication
- Small animal imaging
- Advanced optical imaging
- Vivarium, neuroscience and biotechnology labs

In the spring of 2009, the Sorenson Legacy Foundation donated \$15 million, and the new building is named the “James L. Sorenson Molecular Biotechnology Building - A USTAR Innovation Center.” Other large donations include \$1.25 million from the Micron Technology Foundation.

Layton Construction is working to make the building as vibration-proof as possible to ensure high-sensitivity scientific instruments work in an optimal fashion. In one location, a mat footing supports nanofab equipment and the hefty columns and floors above it. The footing is 91 feet long by 39 feet wide and is five feet deep, containing nearly 600 cubic yards of concrete. The building’s floors are engineered for little structural movement or vibration when anchored to these stout footings, foundation, columns and walls.

“The building site both physically and academically unites the health sciences campus with the main campus and its basic research resources. It will house one of the most advanced nanofabrication facilities in the world, which alone should

help the university attract significant, large federal research grants,” said Dinesh Patel, USTAR Governing Authority chairman.

“More importantly, the building will encourage our talented researchers to cross traditional boundaries at the interfaces of medicine, pharmacy, engineering, computer science and life sciences,” Patel said.

The energy efficient building (planned for LEED Gold Certification) should reduce energy use and cost from current laboratory code requirements by a minimum of 40 percent.

### USTAR Invests in U of U Accelerator

USTAR’s infrastructure investments do not stop at the research buildings. The U of U’s Technology Commercialization Office opened a new incubator and prototyping facility in September 2010, thanks in part to a \$500,000 investment from USTAR. The Accelerator:

- Enables companies to be started with less capital, boosting the number of start-up opportunities.
- Provides client companies access to equipment and resources, increasing speed of development.
- Encourages interaction between its client companies to develop new partnerships.
- Offers unique opportunities to train students and provide researchers with prototyping resources.

# U of U Feature Stories

## The Brains Behind Connectomics

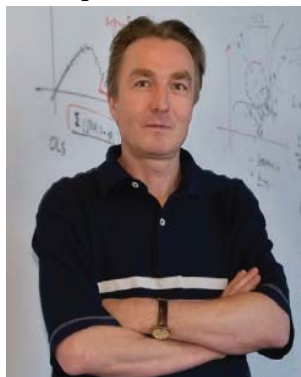
The goal of the U of U's Imaging Technology team is to develop technology and computer modeling that lead to earlier detection and more effective treatment of Alzheimer's, autism, Multiple Sclerosis, depression, schizophrenia, and other debilitating conditions.

The team – anchored by USTAR researchers Guido Gerig, Tom Fletcher, Orly Alter and Tolga Tasdizen – puts Utah at the international forefront in the field of neuroimage analysis.

The team also includes “incumbent” U of U experts such as Scientific Computing and Imaging (SCI) Institute director Chris Johnson, as well as professors Sarang Joshi and Ross Whitaker and a cadre of graduate students and highly skilled staff members. At its core, the team of experts exemplifies a cross-functional collaboration between the U of U's SCI and Brain Institutes and the Utah Center of Advanced Imaging Research (UCAIR).

The team uses MRI and other technologies to analyze brain morphology and function. Insights into brain development may lead to new treatment strategies, such as drugs for the prevention, recovery, and cure of mental disability at earlier stages. The team has established the Utah Center for Neuroimage Analysis ([www.ucnia.org](http://www.ucnia.org)) to provide service, support and advanced research for quantitative image analysis associated with challenging biological and clinical applications. On the commercial front, the team has filed a provisional patent on a novel method of coupling MRI image analysis with statistical analysis to identify individuals with neurological disorders.

The researchers are also investigating the connectivity patterns of neurons, a study called “connectomics.” Transmission electron microscopy (TEM) can provide huge data sets for dense reconstruction, but the bottleneck is analysis of those data sets. The team is targeting the development of new analytical software to solve the bottleneck, and early talks with channel partners to distribute the software are already underway, with the ultimate goal of increasing licensing revenue to the university.



Guido Gerig

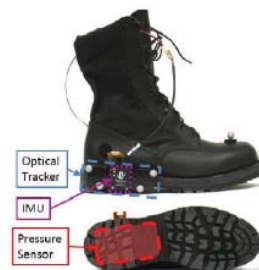
## Wireless Nanosystems Team Gets Hot

Taking advantage of “greener pastures,” four nanoscience experts have relocated to the U of U from Case Western Reserve and other institutions. The researchers - Carlos Mastrangelo, Massood Tabib-Azar, Darrin Young and Giancarlo Lazzi - have demonstrated remarkable energy and productivity since coming to Utah.

Under a \$3 million federal grant, these scientists and engineers developed a “nanotorch” that can etch or add materials at an extremely small scale. This technology could improve the heating properties, efficiency, and manufacturing costs of computer chips.

The team is also developing wireless sensors to allow the Armed Forces to more accurately track the location of troops, leading to fewer casualties and quicker medical response. Thanks to a federal contract, the team has developed a “smart boot” with nanoscale sensors inside that help pinpoint a soldier's location on the battlefield.

“This innovation overcomes the problem of lost GPS signals in places like Afghanistan where there is a lot of rugged terrain,” says Carlos Mastrangelo, professor of electrical and computer engineering.



A GPS signal can be affected when a soldier walks through a mountain canyon, thick forest, tunnel, or an urban building. In addition, some enemies also have the ability to jam the signal. The “smart boot” overcomes those issues.

Massood Tabib-Azar has also launched a new company - Utah Nano Wireless Health Systems - to commercialize engineering breakthroughs to help monitor blood pressure, EKG and other biological processes.

## Storing and Tracing Carbon Underground

With about one-third of the nation's carbon emissions coming from power plants and other large industrial sources, scientists have been looking underground for geological formations where those emissions can be stored safely and securely to reduce the amount of carbon dioxide (CO<sub>2</sub>) reaching the atmosphere.

Brian McPherson, a USTAR researcher working at the U of U's Energy & Geoscience Institute and an associate professor of Civil and Environmental Engineering, is considered one of the world's leading experts on carbon sequestration.



Brian McPherson

McPherson has several tests underway. One involves using colorless, nontoxic liquids called perfluorocarbon tracers used to track CO<sub>2</sub> injected into a coal seam. Scientists followed the CO<sub>2</sub>'s movement by tracking the tracers.

At Pump Canyon near Aztec, NM, the project injected about 18,400 tons of carbon dioxide along with the tracers into a coal layer about 3,000 feet below the surface.

For about a year, equipment in nearby coal bed methane production wells and in shallow bore holes throughout the area monitored the tracers and injected CO<sub>2</sub>. The technology can measure concentrations as small as parts-per-quadrillion. It can also tell the difference between artificially injected and naturally produced CO<sub>2</sub>.

The tracer technology can eliminate some of the uncertainty surrounding carbon capture and sequestration and answer some key questions about the behavior of CO<sub>2</sub> better than other geophysical tools, said McPherson.

A similar larger-scale test is scheduled to take place in central Utah early in 2011. This will involve injecting commercial-scale levels of CO<sub>2</sub>, and is one of only three projects of such scale in the country. His team recently won a \$5 million federal Dept. of Energy to augment this test.

For more information on the U of U's USTAR teams, visit:

<http://www.innovationutah.com/brainimagingtechnology.html>  
<http://www.innovationutah.com/wirelessnanosystems.htm>  
<http://www.innovationutah.com/carbonengineering.html>  
<http://www.innovationutah.com/diagnosticimaging.html>

## Combating Traumatic Brain Injury and Suicide

Deborah Yurgelun-Todd, a USTAR researcher at the U of U's Brain Institute, is trying to do something to reduce suicide rates among veterans and the general population. She and her husband and fellow research Perry Renshaw were recruited from Harvard University. Their research team is attracting more than \$10 million of research funding to Utah.



"Traumatic Brain Injury is a very important problem for returning veterans since it can incur a change in the brain's structure and the brain function. The team is looking at developing interventions such as natural products to provide cognitive enhancement," Yurgelun-Todd said.

She and Renshaw are working closely with USTAR staff to commercialize their research, including the potential launch of new company or licensing opportunities. "Without the support of the USTAR team, there would not have been the opportunity to bring these ideas into a product line or into commercialization the way we're doing it right now," Yurgelun-Todd said.

In 2009, Yurgelun-Todd was named director of the Veterans Administration's Mental Illness Research, Education and Clinical Center (MIRECC) in Salt Lake City. MIRECC was established by Congress with the goal of researching the causes and treatments of mental disorders and using education to put new knowledge into routine clinical practice in the VA.

As director, Yurgelun-Todd will foster collaborative in-state research and clinical efforts to reduce suicide rates and improve quality of life.

"Without the support of the USTAR team, there would not have been the opportunity to bring these ideas into a product line or into commercialization the way we're doing it right now,"

- Deborah Yurgelun-Todd,  
U of U Brain Institute



# Technology Outreach: Overview

## Technology Outreach Leadership



**Ted McAleer, Executive Director**  
 Location: Salt Lake City USTAR Headquarters  
 Background: Teleoptic Digital Imaging, LLC, SunGard SCT, Procter and Gamble, PepsiCo, and the U.S. Army



**Curt Roberts, Northern Utah**  
 Location: Weber State University  
 Counties: Box Elder, Cache, Davis, Morgan, Rich, Weber, and shared coverage of Salt Lake and Tooele  
 Background: VP for Nike working on Tech Ventures and Global Strategy



**Steven Roy, Central Utah**  
 Location: Utah Valley University  
 Counties: Summit, Utah, Wasatch and shared coverage of Salt Lake and Tooele  
 Background: Sun Microsystems, Andersen Consulting, LLP. Six Sigma black belt certification



**Jill Elliss, Southern Utah**  
 Location: Dixie State College, Southern Utah University  
 Counties: Beaver, Garfield, Juab, Kane, Iron, Millard, Piute, San Pete, Sevier, Washington and Wayne  
 Background: Decades of experience in regional economic development and small business



**Al Walker, Eastern Utah**  
 Location: USU - Vernal, EGI at U of U  
 Counties: Carbon, Daggett, Duchesne, Emery, Grand, San Juan and Uintah  
 Background: Questar, Amoco, General Electric, the U.S. Army



**Mary Cardon, SBIR/STTR Assistance Center**  
 Location: Salt Lake Community College- Miller Campus  
 Counties: All of Utah  
 Background: General Electric, small business management, and 15 years of management in newspaper industry



**Dr. Suzanne Winters, BioInnovations Gateway**  
 Location: Granite Technical Institute (GTI)  
 Affiliated Programs: Salt Lake Community College, Utah Valley University, GTI  
 Background: Battelle, Science Advisor for Utah under Governor Leavitt

USTAR's regional Technology Outreach and Innovation Program (TOIP) teams work with companies, entrepreneurs, regional higher education faculty, research university faculty and other economic development stakeholders to drive regional growth. As of June 30, 2010 there were 323 different TOIP projects completed or underway, including the following:

- Assisting entrepreneurs to launch three new companies, with five more underway
- Helping entrepreneurs raise \$8.9 million in private equity investment
- Opening the BioInnovations Gateway and Southern Utah Information Technology and Renewable Energy incubators
- Significant support to Utah Cluster Acceleration Partnership (UCAP) projects
- Assistance to dozens of entrepreneurs through Technology Commercialization Grants and Concept to Company efforts

USTAR spearheaded the PushButton Summit, the state's first comprehensive digital media industry conference. More than 300 attendees from Utah's burgeoning digital media cluster, academia, and government made new connections at the two-day event.

## TOIP Metrics

Working with local companies and entrepreneurs, TOIP staff completed 124 projects from June 30, 2009 to June 30, 2010. Some 199 projects are active, including 68 Technology Commercialization Grants:

Project Type	Completed	Active
Business development/Market entry	26	58
Assist with fundraising*	27	31
New companies launched**	3	5
SBIR proposals and other projects	24	4
Broker technology or licensing	3	0
Connect higher ed with business	15	8
Prototype assistance/IP development	4	60
Referrals	12	10
Other	10	23

\* Assisted clients with raising \$8.9 million in private equity investment

\*\* Assistance to entrepreneurs, separate from USTAR researcher companies (included in "Market entry" category).

# Technology Outreach: Key Initiatives

## SBIR-STTR Assistance Center

The federal Small Business Innovative Research (SBIR) and Small Business Technology Transfer (STTR) programs offer more than \$2.5 billion dollars annually to support the development of technology by small businesses across the nation. SBIR-STTR funding is an excellent source of early stage capital that doesn't require equity participation.



Mary Cardon (SSAC), Michael Keene (guest lecturer), and Ed Kimball (SSAC)

With critical support from Salt Lake Community College, GOED and others, USTAR Technology Outreach spearheaded the creation of the SBIR-STTR Assistance Center (SSAC) to help small business statewide capture a larger share of federal research dollars. SSAC is based at the Miller

Campus of Salt Lake Community College, and USTAR staff members run the center.

In FY2010, the center worked with 75 companies and entrepreneurs, and submitted grants representing \$1.8 million in federal funds. Three winning applications totaled \$280,000 of new funding for Utah companies.

## Cluster Acceleration Project

USTAR's regional Technology Outreach centers are supporting the Utah Cluster Acceleration Partnership (UCAP), an initiative sponsored by the Utah System of Higher Education, the Department of Workforce Services, and GOED. The objective of UCAP is to better utilize Utah's higher education assets to drive growth in critical economic clusters. USTAR TOIP personnel were instrumental in the Aerospace UCAP convened by Weber State University, and are active in the digital media and energy UCAP projects underway.



## BioInnovations Gateway

BioInnovations Gateway (BiG) is an incubator specializing in Utah's life science industry. BiG provides 25,000 square feet of wet and dry labs and office space for up to seven start-up companies to develop products.

What makes BiG unique is that it combines business incubation resources with workforce development. Students from six local high schools, Salt Lake Community College, and Utah Valley University work as interns for BiG clients. The companies have an opportunity to "try before they buy" training new workers for potential hire.



"We have an excellent pool of students to draw from, such that in the future, they can serve as employees and we've trained them to our specifications."

- Duane Ruffner, Symbion Discovery Inc.

Funding for the facility comes from a Department of Labor Workforce Innovation and Regional Economic Development (WIRED) grant, Granite School District, and USTAR. As of Sept. 2010, four clients are in BiG, and three are in active negotiation.

BiG has drawn national interest from the Department of Labor, National Science Foundation and many communities looking to stimulate technology economic development.

## Collaboration

In addition to our alignment with higher education institutions, USTAR collaborates with key proponents in growing Utah's innovation economy, including the Governor's Office of Economic Development (GOED), Salt Lake Chamber of Commerce, Utah Technology Council, EDCUtah, MountainWest Capital Network, Grow Utah Ventures, Wayne Brown Institute, regional Chambers of Commerce, SBDC offices, SEED initiatives, angel investor groups, and others.

# Technology Commercialization Grants Driving Results

In an effort to bring innovative new technologies to market, USTAR launched the Technology Commercialization Grant program. The regional higher education track launched in mid-2009 and later in the year, USTAR funded similar programs at the state's two research universities. Between the regional and research TCG programs, 68 projects have been approved in the first rounds. The typical grant amount has been in the range of \$30,000, and to date, progress has been encouraging.

As of Sept. 30, 2010, 19 projects have successfully completed a product prototype, a critical step in commercialization. Some 27 disclosures or patents have been filed, and co-applicant companies have signed seven new sales distribution agreements with outside partners, a promising indicator of market viability. TCG applicants have also raised more than \$2.4 million in private equity investment, in part due to USTAR's collaboration. USTAR is conducting two more rounds with deadlines of Sept. 30, 2010 and Dec. 31, 2010.

"The TCG grant has accelerated our development substantially and should allow us to get this out of the lab and into the field and customers' hands in the next few months, where it would have taken at least a year otherwise."

- Bruce Gale, U of U, Early Cancer Detection Platform

Southern Utah University collaborated with Cedar City-based IDT Services to work on RFID technology to track railcar wheel sets. The technology promises to improve safety and reduce maintenance costs. SUU students on the project are under the direction of Prof. Shalini Kesar.



"The USTAR grants allow students to use their skills with local businesses. The students are putting into actual practice what we teach in theory. I think USTAR does a fantastic job to let faculty get that exposure out to students."

- Shalini Kesar, Information Systems, Southern Utah University

"Programmer/developer time is beyond the scope of many bioscience funding structures and USTAR funding made possible the commercial development of this product. It helps us achieve things that just cannot get accomplished in traditional structures."

- Bryan Jones, U of U, Using Computational Molecular Phenotyping to Create High Value Drug Discovery Biomarkers

## Markets Targeted:

Biomedical technology	26
Information technology	13
Alternative energy	9
Homeland security	4
Industrial coatings/composites	4
Transportation	3
Agriculture	2
Aviation	2
Environmental sciences	2
Outdoor products	2
Telecommunications	1

## YTD Results:

19 new product prototypes

27 new patent or disclosures filed

7 new sales distribution agreements



"It's exciting that we caught the attention of the Department of Energy and national lab staff, and that they are interested enough to make time in their busy schedules to see what's happening in Utah. USTAR backing the commercialization of these technologies certainly added to their interest in learning more."

- Steve Pruitt, Ares Transportation Technologies

# Virtual Innovation Network

USTAR's Marketing team under the direction of Michael O'Malley is supporting the TOIP program via an information technology architecture called the Virtual Innovation Network (VIN) that provides up-to-the-minute information on USTAR and fosters collaboration between outreach centers and other economic development stakeholders.

## Web Resources

One component of VIN involves USTAR's web sites. The primary site is [www.innovationutah.com](http://www.innovationutah.com) and includes detailed overviews of research teams, an interactive service map of entrepreneurial resources statewide, and details of TOIP services and initiatives. In 2010 to date, the site has received on average 4,600 unique visitors per month.

A second site, added in August 2009, is <http://newmedia.innovationutah.com>. Focused on social media, it provides updates on a weekly basis. It serves as a clearinghouse for the latest USTAR announcements, studies, and media coverage.

Highlights of the site include:

- The latest USTAR video and audio clips, including researcher interviews and local TV and radio stories.
- The top feed from <http://twitter.com/Innovationutah>, for breaking news on technology commercialization
- Official news releases and significant news stories
- Links to USTAR's weekly [www.utahpulse.com](http://www.utahpulse.com) stories
- The week's blog posting, with the ability to comment
- Related web sites and Facebook sites
- Upcoming events in Utah's "Innovation Ecosystem"

## Collaboration Resources

Three different tools support USTAR's online collaboration efforts. The first is a centralized database of stakeholder and client information. Utilizing Salesforce.com customer relationship management software, the database has project tracking and document management capabilities, allowing USTAR to coordinate the efforts statewide.

The State of Utah has a master contract with Salesforce.com and USTAR is an early adopter of the system. The Bangerter Commission Report on government efficiency cited USTAR's use of Salesforce.com as a best-practice example.

The second tool is a joint project with the U of U and local software company Knowledge Blue to develop a new software environment called Redspan. The system brings together stakeholders in the "innovation ecosystem" – researchers, entrepreneurs, private investors, government, consultants, and other experts – in a secure environment to evaluate new technology and start-ups. The system as projected will allow the analysis and scoring of business opportunities, and provide a mentoring environment for new start-ups.

The third tool - an online "knowledge networking" community called Digital Uproar - is specific to the digital media industry.

Launched in February 2010 at the PushButton Summit, [www.digitaluproar.com](http://www.digitaluproar.com) is a community-driven utility to encourage digital media artists, technicians, executives and other stakeholders to share and interact with ideas, events, places, products, and potential business opportunities.

Digital Uproar is based on a social engine technology called PlanetTagger developed by SpectrumDNA, Inc. (OTC BB: SPXA) of Park City. It is an integrated social marketing and messaging application that provides the members of the Utah digital media industry a way to post, share, and map information relevant to their industry and company.

# A Year of Progress: October 2009 to September 2010

Sept. 2010	<p>Brookings Institution study cites Utah and the West's alternative energy resources, including USTAR and business climate.</p> <p>USTAR funds assist opening of USU's Bingham Entrepreneurship and Energy Research Center in Vernal.</p> <p>U of U's Brian McPherson secures \$5 million DOE grant for carbon sequestration.</p>
Aug. 2010	<p>U of U USTAR team's "smart boot" nanotechnology may someday help military to track soldiers' locations.</p> <p>USTAR announces two new rounds of regional Technology Commercialization Grant program.</p> <p>USTAR cited in Bangerter Commission Report on government optimization for best-practice use of Salesforce.com.</p>
July 2010	<p>Patent issued to USU for USTAR-backed thermal spray technology.</p> <p>U of U USTAR researchers developing nanotorch to make smaller, more powerful electronics.</p> <p>USTAR Tech Commercialization Grant vehicle efficiency projects gain attention of DOE, National Labs.</p> <p>Space Environment Technologies opens corporate office in Logan, thanks to USTAR researcher Kent Tobiska.</p>
June 2010	<p>Richfield-based Easyloadpro.com releases new features thanks to Concept to Company sponsor support.</p> <p>USU Research Foundation names USTAR researcher Jeff Muhs as director of Energy Dynamics Laboratory.</p> <p>U of U's Brian McPherson announces successful test carbon sequestration "tracer" technology.</p> <p>USTAR's Eastern Region director Al Walker named to Gov. Herbert's new Energy task force.</p>
May 2010	<p>University of Idaho president points to USTAR as a best practice in economic development.</p>
April 2010	<p>U of U Brain Institute's J. Korenberg publishes genetic study of intelligence in Williams Syndrome.</p> <p>USTAR co-sponsored "Leonardo After Hours" events make City Weekly "best of" list.</p> <p>U of U announces 2010 Pilot Program in Imaging Research. MRI resources made available to researchers statewide.</p>
Mar. 2010	<p>IBM Center for the Business of Government profiles USTAR's federal stimulus approach.</p> <p>Hundreds of digital media industry, academic, government and other stakeholders attend PushButton Summit.</p>
Feb. 2010	<p>High-tech, clean-tech incubator launches in St. George with USTAR's help.</p> <p>30+ entrepreneurs attend GOED COE/USTAR education and networking session.</p> <p>USTAR-funded 3D seismic study promises more accurate oil/gas drilling, lower environmental impact.</p>
Jan. 2010	<p>USU team launches iPhone application for visualizing real-time space weather.</p> <p>U of U's Rajesh Menon wins international prize for "breakthrough" nanolithography.</p>
Dec. 2009	<p>U of U announcement cites impact of USTAR research investment on university company creation.</p> <p>Utah Technology Council creates new Life Science Executive in Residence with USTAR assistance.</p>
Nov. 2009	<p>Park City and USU Energy Dynamics Lab to tackle "green city" initiative.</p> <p>USURF creates Energy Dynamics Laboratory with USTAR funding.</p> <p>USU Tech Commercialization Office announces record number of patents and start-ups in 2009.</p> <p>USTAR Solar BioInnovations algae research facility on the USU Innovation Campus completed and occupied.</p>
Oct. 2009	<p>Grand opening of BioInnovations Gateway (new model for business incubation and workforce development)</p> <p>First round of Technology Commercialization Grants closes with 24 applications</p>