



Utah Science, Technology and Research Economic Development Initiative

CATALYST FOR HIGH-PAYING JOBS & BUSINESS CREATION

USTAR: THE TRACK RECORD

The Utah Science, Technology and Research (USTAR) Economic Development Initiative proposes a significant investment in Utah's future. A couple of important questions naturally follow: How risky is this investment? And is there any track record that demonstrates the effectiveness of the USTAR concept?

The answer is that USTAR is not a high-risk proposition because it simply proposes to dramatically accelerate what is already happening—but in a manner that is much more focused, organized and effective. Utah's two research institutions, the University of Utah and Utah State University, have excellent track records on technology commercialization. Patterns and models of transferring university research from the halls of academia into profitable and competitive commercial businesses are well-established and encouraged.

At least 120 businesses have been directly spun out of university research over the last 20 years, with dozens more second and third generation businesses (some of them enormous successes) evolving from the originals. USTAR will significantly boost the scale of R&D and business commercialization by building, recruiting and funding world-class research teams targeting disciplines where multi-billion dollar markets exist and where Utah already has distinct competitive advantages.

Utah's two research institutions have long discarded the mindset that the pursuit of basic research is mainly for the sake of academic inquiry and to provide a better teaching environment. Today, the universities encourage researchers to also become entrepreneurs and to commercialize their inventions in new companies that make the world a better place and that are commercial successes. Under USTAR, the commercialization of basic R&D will be greatly improved and accelerated, both in targeting technologies with high commercial potential, and in providing the nurturing entrepreneurial environment organized specifically for technology commercialization.

Even without the optimum environment that will be provided by USTAR, Utah has many examples of successful businesses spun out of university research. Here is a sample:

Utah State University

USU discoveries and technologies have formed the basis of more than 60 new companies, including well-known firms such as Hyclone Laboratories, Campbell Scientific, and Sorenson Communications. In the last two years, seven new companies have been formed, a period in which licenses and startups have increased by more than 500 percent and related revenues have quadrupled. Among the recent highlights:

- **Andigen** creates induced blanket reactors (IBRs) that can produce electricity from animal waste on farms and ranches. A typical 1,000-cow dairy or 6,000-pig farm using an IBR can produce enough electricity for more than 100 homes. The business has expanded with new IBR facilities in central and southern California, Idaho, Colorado, Montana, Wisconsin, Canada and Africa.
- **CastleRock Engineering, Inc.** has the ability to sort tiny particles by size without ever coming in contact with them. Particle sorting is an important task in a variety of technical processes, so the commercial applications are very broad.
- **Gemini Life Sciences** develops apomixis, a process in which a plant naturally produces a genetic clone of itself. The technology dramatically increases crop yields of such major staple crops as wheat or rice, speeding up the breeding process by 60%. A 30% yield increase on rice, alone, could feed an additional one billion people.
- **Kuchera Defense** manufactures and sells USU-developed ODIS (Omni-Directional Inspection System) robots, which are low-profile, high mobility robots that use a camera to quickly inspect the underside of vehicles for dangerous and contraband materials. They have been deployed in Iraq, Afghanistan and Washington, D.C. and are already credited with saving lives.
- **LiveWire Test Labs, Inc.**, locates faults on aging electrical wiring, which reduces danger, down time, and maintenance costs on older electrical systems. The technology has many uses and may become instrumental in preventing costly or catastrophic power failures.
- **RappidMapper, Inc.**, constructs USU-invented 3-D cameras for use in architecture, landscaping, construction, surveying, engineering and design. Using this technology, users can sit at their desks and “walk-through” photos, analyzing and designing as though they were at the actual location of the picture. It has applications in many disciplines.
- **SP Communications** is licensing USU algorithm technology that eliminates the echo created on a speaker phone or cell phone when two people talk at the same time. The technology can be applied to hearing aids, performance audio, video conferencing, speech and voice recognition, hands-free devices, and voice-over IP.
- USU also has a partnership with J.R. Simplot Co., a \$3 billion agribusiness firm based in Boise, Idaho, on advanced cloning technologies to produce superior beef and milk cows. A Texas company is negotiating to license the technology.

University of Utah

The Dec. 2, 2005 edition of the Chronicle of Higher Education (page A25) ranked the U. 16th in the nation in 2004 for licensing revenue and patent activity, putting the U. ahead of numerous prestigious research universities (164 institutions were surveyed). The high ranking will not be a surprise to people familiar with the success of the U.’s research commercialization efforts, which have produced such top firms as Myriad Genetics, Evans & Sutherland, NPS Pharmaceuticals, ARUP, Sonic Innovations, Cephalon, and Watson Laboratories. In all, more than 60 firms have emerged out of research at the U., with 44 currently housed at Research Park. These “park” companies have added more than 4,700 jobs to the state’s economy and the annual economic contribution exceeds \$600 million.

A few of the success stories:

- **Sentrx Surgical Inc.** produces an array of hydrogel-based products designed to promote scar-free healing and tissue regeneration. Based on university research conducted by Dr.

Glenn Prestwich, who is Presidential Professor of Medicinal Chemistry at the U. and director of the Utah Center of Excellence in Therapeutic Biomaterials, Sentrx has developed a synthetic version of a natural material known as extracellular matrix (ECM), which serves as the scaffolding that cells use to grow and differentiate into tissues that make up the organs of the body. Sentrx's synthetic ECM has diverse applications in health care, including wound repair following accidents or surgery, healing chronic wounds in diabetic or bed-ridden patients, repair or reconstruction of bone and cartilage in joint restoration, growth of new blood supplies to oxygen-deprived heart tissue, the repair of ruptured eardrums and damaged vocal cords, and even the reconstruction of breast and facial contours.

- **Echelon Bioscience** is another company formed by Dr. Glenn Prestwich. Its ambitious mission is to help defeat cancer and other deadly illnesses. In his university research, Prestwich achieved breakthroughs in the field of cell signaling, discovering specific lipids within cells that control major cellular functions such as cell replication or cell death. Prestwich became one of the few people in the world capable of synthesizing and producing these lipids, which are highly valued in the scientific community for discerning cell pathways of various diseases. As the demand increased for the lipids, he started a company to produce and sell them to scientists and laboratories involved in lipid cell signaling research. Cell signaling discoveries are leading to drugs that will help control diseases such as cancer, diabetes, inflammation, infections and cardiovascular diseases. Echelon has patented its specialized lipids and produces synthetic, derivative forms that have multiple uses in a laboratory. Its markets include academic research institutions worldwide, and also commercial pharmaceutical companies. Echelon is also working on formulating its own cancer drug.
- **Bunnell, Inc.'s** mission is to save babies. The firm develops leading-age technologies for the treatment of critically ill infants and children. Its Life Pulse Ventilator is used in hospitals to treat a variety of infant respiratory diseases. Since its invention by Dr. J. Bert Bunnell, who was assisted by the University of Utah-sponsored Innovation Center, the Life Pulse Ventilator has helped health care professionals save the lives of more than 38,000 infants. Since 1995, Bunnell has experienced an average annual growth rate of 20%, and recently had its best year ever with a 36% increase in sales.
- **Myriad Genetics, Inc.,** is the world's leading cancer predictive medicine company. It specializes in the discovery and sequencing of disease-related genes and the elucidation of their biochemical pathways. It is a biopharmaceutical company focused on drug discovery and development in the areas of Alzheimer's disease, cancer and antivirals. Myriad has made significant breakthroughs in cancer testing and treatment, offering the most accurate clinical tests available to determine predisposition to several cancers. Myriad licenses technologies from the University of Utah and provides funding for research at the U. It was started on the basis of research funded by the state's Centers of Excellence program.
- **Cephalon** is one of the world's fastest-growing biopharmaceutical companies. Its mission to deliver industry-leading growth by achieving the most efficient and sustainable means of delivering new value to the marketplace. Cephalon specializes in drugs to treat and manage neurological diseases, sleep disorders, cancer and pain. The firm employs more than 2,300 people worldwide with operations in the United States and Europe.
- Other companies include: Attensity, BioCentrex, Ceramatec, Cimarron Software, Cognetix, Cyberkinetics, Darbick Instructional Software, DataChem Labs, Diacor, Engineering Geometry Systems, Erqoweb, Expression Genetics, Femtoscan, Fiore Automation, Genta, Idaho Technology, Hydra Biosciences, Innovative Caregiving Resources, IOMED, James W.

Bunger & Associates, Korr Medical Technologies, Macromed, MedQuest Products, Medtronic Gastro/Uro, MicroMath, Mineral Technologies, Nu Skin/Pharmanex, PartNet, Parvus, Pharmadign, Postnova Analytics, Process Instruments, Rocky Mountain Research, Rosetta Inpharmatics, Sarcos, Sensicore, Signature Immunologics, Techniscan Medical Systems, Tepnel Lifecodes, TerraTek, TheraDoc, Tramontane, Universe Partners, Versa Power Systems, Viewpoint Manufacturing, Visual Influence, and Zars.

Given the excellent track record, and the opportunity to dramatically increase the rate of business and jobs creation, Utah's business community has united behind USTAR as the most important economic development initiative in a generation.

Utah has an economic Mount St. Helens waiting to go off in its research universities. Whole new industries will arise in the next few years in the field of genetics and Utah has the opportunity to be in the middle of it. Some of the nation's top scientists have said that the genetics industry will be as big as the computer industry. The computer industry, while relatively young, now impacts essentially everything we do, facilitating innovation, efficiency and productivity in nearly every other industry. The field of genetics will do the same. It will become an immense industry in its own right, but it will also impact nearly every other industry, including manufacturing, agriculture, pharmacology, health care, homeland security, and so forth. Thousands of new businesses will arise in the field of genomics and thousands of existing businesses will be impacted, just as they were with computers and software.

The foundation of the genetics industry is The Human Genome Project, which took 13 years and cost \$300 million. A whole new world became possible with the publishing of the human genome in Science and Nature magazines in April 2003. Three Utah scientists were among the five scientists who launched the mapping of the human genome, one of the most ambitious scientific projects of all time.

The technologies that made it possible to decode the human genome also made it possible to harness microbes to decontaminate soil, grow crops with less fertilizer and water, and created information technologies that make it easier to check out at the grocery store. Utah is still at the center of the genetics world, and we have the map that no one else has, the Utah Population Database.

To understand the genetic basis of disease, a scientist needs to know the genetics of a lot of people who have the disease and are related, which means the disease is in the family's genetic code. The Utah Population Database is built on Utah's medical and death records merged with The Church of Jesus Christ of Latter-day Saints genealogical database, which allows scientists to find genetic patterns of disease by comparing families with the disease and families who do not have the disease. That is how Myriad Genetics discovered the genetic-link with breast cancer, and now it is possible for entire families to know their susceptibility and get diagnostic tests and early treatment to avoid the destiny that is in their genetic code. The Utah Population Database, with 11 million people, is the genetic map to the future, and it exists only in Utah. The closest thing to it is a genetic database in Iceland, with only 280,000 individuals.

In order to take advantage of Utah's tremendous assets and become the center for the genetics industry, Utah must bring in dozens of world-class research teams to develop the myriad opportunities that exist and spin off the businesses and high-paying jobs that will follow.

USTAR will dramatically accelerate that effort. But other states see the same opportunity and Utah faces enormous competition. Some 32 states have invested more than \$29 billion in research university economic development programs in the past four years. Some of that money is targeting Utah programs and scientists. They want to be where we are and they are putting a lot of money into getting on the genetics bandwagon. Harvard and MIT are jointly bringing together 400 scientists to work on discovering the genetics basis of cancer. Utah has the Huntsman Cancer Institute, which is a world scientific leader in the genetics of cancer, and it has the advantage of having access to the Utah Population Database. We have the opportunity to win in a game that is about our economic future, and we can't wait or we will be left behind.

Even without USTAR, Utah's population and economy will continue to grow. But the growth won't necessarily bring high-paying jobs that support a family. Utah's average wage has declined from 96% of the U.S. average in 1981 to only 82% in 2004. This decline has occurred at the same time Utah's technology employment has fallen from 67,000 jobs in 2000 to 56,000 in 2004. The trends in both salary levels and technology jobs must be reversed to ensure a strong economic future.

USTAR is Utah's moonshot. It is a Big Idea that will keep Utah in the center of scientific advancement and the associated commercial benefits that will make Utah a high-wage state. The Utah Taxpayer's Association recently said:

“Utahns can promote economic growth, create more jobs, and earn higher wages by focusing on high-wage ‘upstream’ industries such as pharmaceutical, biotech, IT and manufacturing, instead of subsidizing ‘downstream’ industries like retail and sports entertainment. A thriving upstream economy creates economic growth which the downstream economy follows.”

If we fail to support research at our universities and technology innovation outreach centers throughout the state, the research and scientists will go elsewhere. The billions of dollars in grants will go elsewhere. The new companies and new industries born of this research will go elsewhere. The economic benefits and jobs will go elsewhere. Tax revenues will go elsewhere. And, sadly, Utah's children and grandchildren will have to go elsewhere to find high-paying jobs.