

Commercialization of Intellectual Property: Manhattan Partnerships for Innovation

BACKGROUND

With the enactment of the Bayh-Dole Act in 1980, American universities have become increasingly involved in technology transfer—the protection and licensing of intellectual property (IP) originating from the institutions’ research endeavors. Prior to 1980, the federal government retained title to IP created on federally funded research projects, and the IP was lost to commercialization as a result. The Bayh-Dole Act changed that by allowing universities to retain title and requiring that commercialization efforts be explored. The federal government retains rights for use of the IP.

Most universities that have benefited financially from the Bayh-Dole Act have done so by patenting inventions emanating from the institution’s sponsored research projects and licensing those inventions to major corporations. In optimal situations, the royalties and other revenues derived from those licenses exceed the expenses incurred in protecting and licensing the IP, but few such technology transfer operations are highly profitable.

K-STATE TECHNOLOGY TRANSFER

Kansas State University has been involved in technology transfer for many years, and the KSU Research Foundation [KSURF, an affiliated 501(c)(3) founded in 1942] facilitates these efforts. IP created at K-State that has the potential to be protected, licensed, and commercialized is assigned to KSURF. However, because there is no way to predict with certainty which technologies will be successful, a portfolio approach is used, i.e., technologies are screened for commercialization potential and the IP portfolio is “shopped” to potential licensees. Some technologies end up being licensed; some don’t.

Since 1995, KSURF has worked in collaboration with the Mid-America Commercialization Corporation [MACC], one of three innovation centers in the Kansas Technology Enterprise Corporation [KTEC] economic development network. The stakeholders that created MACC include KTEC, the City of Manhattan (with the Chamber of Commerce), and K-State. MACC’s mission is to promote technology-based economic development in Manhattan and the region, principally by facilitating technology transfer and the start-up of new, technology-based enterprises. To fulfill those tasks effectively, MACC must have access to K-State technologies with commercial potential, so teaming with KSURF was an obvious first step.

In the partnership that developed, MACC focuses on external activities by assisting KSURF in identifying potential licensees for K-State IP and negotiating the licensing terms on KSURF’s behalf. KSURF focuses on internal activities, primarily on identifying and protecting K-State IP and on managing the IP and license portfolios. In practice, though, the relationship between KSURF and MACC is transparent and seamless with staff from both entities working as a team across all interrelated activities.

During the early phases of the KSURF-MACC partnership, the traditional university approach to technology transfer was followed most often, whereby technologies are licensed to major corporations. There are problems with this approach, however, since most university research produces early-stage technologies that require significant investments in further development prior to successful commercialization. Many companies are reluctant to make these investments when they don’t have close working relationships with the inventors. K-State is disadvantaged by having few major corporations nearby.

THE TADAC PROGRAM

Fortune 500 companies commercialize only a small portion—perhaps 5 percent—of the IP that they have created, often investing considerable resources in research and development along the way. The reasons are many and varied for so little being commercialized, but the result is that the economic potential of the IP is lost or significantly reduced. Recognizing that, MACC launched the Technology Acquisition, Development, and Commercialization [TADAC] program in 1998 to acquire dormant or underutilized corporate technologies by way of tax-deductible donations. The intent is to foster the further development and commercialization of IP in the TADAC portfolio for local, regional, and national economic gain. In some cases this can be done via cooperative research with K-State. The rationale for a company to donate a technology is based on the potential tax advantage that can ensue.

Since the inception of TADAC, more than 10 Fortune 500 companies have donated technologies to MACC, with the resulting broad-based portfolio having an independent valuation for tax purposes in excess of \$300 million. The IP obtained to date falls generally in the following categories: environmental quality; life sciences; information and communication; material science; manufacturing; and transportation. The technologies are available to scientists at K-State and other universities for research and development purposes, and they are available for licensing.

An example of a research opportunity emanating from the TADAC program involves an herbicide donation by *DuPont*. K-State agronomists have demonstrated extensive weed control for crabgrass and creeping bentgrass with the patented compounds. Corn and sunflowers are unaffected. The donated herbicide can be produced at low cost, and it can be applied at lower rates than many existing commercial products. As a result, the product offers significant commercial potential, and K-State research will be critical to realizing this potential. Accordingly, MACC is treating the technology in a manner similar to K-State technologies, with any royalty returns being shared with the researchers and their departments, as well as with KSURF.

THE FOCUS ON START-UP COMPANIES

KSURF and MACC have focused more attention in recent years on licensing to local start-up companies as an alternate approach to licensing to major corporations. This method directly addresses MACC's local economic development/job creation mission, and in many cases it offers greater potential for significant financial returns on K-State IP. However, it does so at greater financial risk.

In this alternate model, KSURF or TADAC supply the technologies upon which the venture is based, and MACC provides business leadership for the start-up until the new company matures sufficiently to employ its own management team. Most entrepreneurship models nationally are deficient in this aspect, and MACC's managerial role in this regard is critical to the success of the venture. When K-State IP is involved, the creator of the IP usually has some role in technology development within the company. By launching a venture with K-State IP, KSURF and MACC secure equity positions in the company based on their contributions. If TADAC IP is involved, KSURF may or may not have a role and an equity position.

One difficulty with company start-ups is that KSURF and MACC must defer repayment of their expenses for many years—or permanently if the venture fails, as many start-ups do. The investments by KSURF and MACC often amount to tens of thousands of dollars, so there is considerable risk in pursuing this approach. Moreover, because of the magnitude of the investments and the associated risks, it is difficult to undertake a large number of start-up ventures simultaneously.

START-UPS WITH SBIR AWARDS

The federal Small Business Innovation Research (SBIR) program is a key component of the start-up company model that has developed, and without it, the commercialization of K-State IP locally would be nearly impossible. The intent of the SBIR program is to facilitate the development of early-stage technologies to foster their commercialization. As such, SBIR funds can serve some of the functions of very early-stage seed capital but with the advantages of not diluting KSURF or MACC's equity positions or of

having to be repaid. SBIR Phase I awards provide up to \$100,000 for six months of work to establish proof of concept. Depending on the federal agency, Phase II awards provide from \$300,000 to \$750,000 or more for two years of additional development work.

K-State, KSURF, and MACC have been exploiting the SBIR program to launch local start-up ventures since 1996, and the cumulative funding from this source exceeds \$10 million. Initially, the start-ups may be “virtual” companies, having no dedicated facilities or company-paid employees. Procedures are in place to allow start-up company employees to conduct early portions of the work in K-State laboratories, with the costs for use of the facilities covered by the SBIR award. In the first ventures of this type, a new Kansas company was created for each different technology. However, because these efforts often fail at the proof-of-concept stage, a technology development company has now been created to solidify these efforts—Kansas Advanced Technologies, LLC.

TECHNOLOGY DEVELOPMENT COMPANY

KANSAS ADVANCED TECHNOLOGIES [KATS], LLC.—KATS serves as a technology development enterprise focused on securing early-stage funding, primarily SBIR awards, for KSURF and TADAC IP. As technologies mature with the infusions of SBIR funding and other resources, decisions are made as to the future potential for commercialization. In some instances, it may be appropriate to license the enhanced technology to a major corporation. In other cases, rolling the technology out into a separate start-up venture is the better choice. Either way, the value of the IP will have been enhanced.

START-UP COMPANY OVERVIEW

Each start-up venture is unique. That said, in a “typical” scenario: (1) KSURF works with the K-State researcher(s) to patent a new invention; (2) KSURF, MACC, and the K-State inventor(s) determine whether a start-up venture is feasible and desirable; (3) MACC works with the K-State inventor(s) to develop one or more SBIR proposals; (4) a Phase I award is received by the company (KATS will receive the funds in the future); (5) the proof-of-concept work is carried out in the campus laboratories of the inventor(s) with facility use paid by the SBIR award; (6) a subsequent Phase II award is received by the company, and the project is moved from campus laboratories to the Kansas Entrepreneurial Center; and (7) venture capital and/or private investment money is obtained to move the development forward. In most cases, recent K-State graduates are underpinning the staffing of these start-up ventures.

THE KEC TECHNOLOGY INCUBATOR

The Kansas Entrepreneurial Center [KEC] serves as a business incubator, providing facilities and administrative support for technology-based start-up companies in Manhattan. The KEC is a controlled affiliate of MACC, with sponsorship by the City of Manhattan, the Manhattan Chamber of Commerce, Riley County, Pottawatomie County, K-State, and the KSU Foundation. The offices of KSURF and MACC are located within the KEC at 1500 Hayes Drive, Manhattan, KS 66502–5068. In optimal situations, start-up ventures will mature and “graduate” from the KEC into larger facilities locally, in some cases to space in the K-State Research Park.

THE K-STATE RESEARCH PARK

The K-State Research Park was developed in 2001 to promote cooperative relationships between K-State and private individuals, companies, and corporations. The primary activities conducted in the Research Park must be related to the teaching, research, service, and/or technology transfer activities at K-State. The KSU Foundation and K-State are developing the Research Park in a cooperative effort. The land on which the Research Park is located is owned by the Foundation and is contiguous with the K-State campus on Manhattan Avenue. This provides a potential site for companies graduating from the KEC.

START-UP VENTURE CAPITAL

MACC manages a seed capital investment fund, Manhattan Holdings, LLC, which can infuse early stage funding into new start-up ventures. This provides a source of funds for some costs not covered by SBIR awards. Along with KTEC and the City of Manhattan, the KSU Foundation is an investor in this fund and, as a result, shares in returns on investments.

GRADUATE INTERN PROGRAM

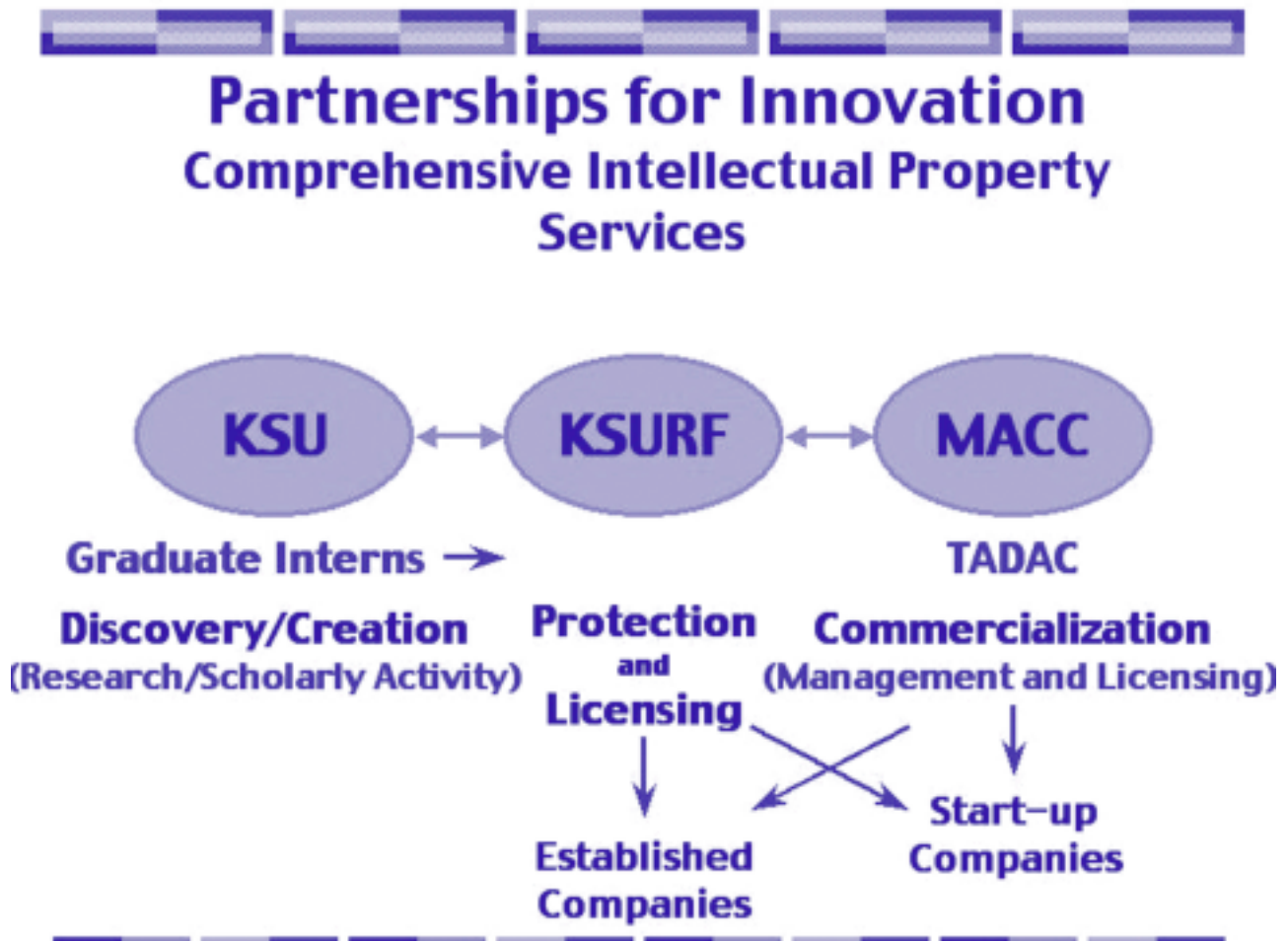
A graduate internship program is under development at K-State to provide students with practical experience in technology transfer. Sponsored by the Graduate School as part of the MBA Technology Entrepreneurship track, the program has a limited number of MBA interns currently taking part. They are participating in various

aspects of the process: at K-State (receipt of grants and contracts and disclosure of IP); KSURF (protecting and licensing IP); and MACC (IP assessment and facilitating local start-ups). It is anticipated that the program will expand to include graduate students from multiple science and engineering disciplines and that the number of interns participating in the program will grow substantially.

KSURF IP START-UP VENTURES

NANOSCALE MATERIALS, INC.—*NanoScale* was the first start-up venture launched by KSURF and MACC, originally under the name of *Nantek*. Based on the work of University Distinguished Professor of Chemistry Ken Klabunde, *NanoScale* produces reactive nanoparticles with broad applications in environmental remediation and detoxification of hazardous chemical and biological agents. Started in 1995 as a virtual company, *NanoScale* hired the first employee in 1996 when an SBIR award was received. Since that time, *NanoScale* has received millions of dollars in SBIR awards and private venture funding; the company now employs numerous K-State graduates. *NanoScale* moved into a newly constructed corporate headquarters and research facility in the K-State Research Park in 2002, becoming the anchor tenant there.

AGRENEW, INC.—AgRenew was organized in 1998 to develop and commercialize products and/or processes based on the use of agricultural waste products and byproducts. AgRenew presently has two primary commercialization targets. One is derived from the research of Susan Sun in the department of grain science and



industry, and it involves making composite products from wheat straw and soy protein adhesives. The initial product is focused on edible, biodegradable containers for livestock feed supplements, and it is being developed in a strategic relationship with the industry leader in this field. The other target is derived from the research of Alex Mathews in the department of civil engineering, and it involves using fermentation processes to produce environmentally benign, non-corrosive, biodegradable road deicers.

NACELLE THERAPEUTICS, INC.—Nacelle was incorporated in 2000 to develop and commercialize treatments for cystic fibrosis based on the research of John Tomich in the department of biochemistry. Tomich's research team developed a novel family of transmembrane, ion channel-forming peptides that show great promise for cystic fibrosis therapy. Current work at Nacelle is being undertaken with collaborators at the University of Alabama, Birmingham, who have developed specialized animal models to assess treatments for the disease.

TADAC IP START-UP VENTURES

NUTRIJOY, INC.—Founded jointly by MACC and KSURF in 2000, *NutriJoy* was launched to commercialize a beverage technology from *Procter & Gamble*. The patented process allows milk protein and fruit juice to be mixed, yielding a shelf-stable product. One of the inventors, David Yang, was recruited from *P&G* to serve as the president of *NutriJoy*. *P&G* also included the rights to a proprietary calcium formulation that delivers a highly palatable calcium supplement that is more bio-available than any other form. It offers the only calcium nutritional supplement confirmed in clinical studies to increase bone mass in senior citizens. The first product taken to market by *NutriJoy* is *Cal-C™*, a calcium and vitamin C supplemented "smoothie" beverage available in four flavors. *Cal-C™* has shown strong customer satisfaction in marketing efforts launched in Kansas and Arizona. *Cal-C™* is also the subject of clinical research in K-State's department of human nutrition to determine its effect on bone density in pre- and post-menopausal women.

COMPACT ENGINE COMPANY, INC.—The *Compact Engine Company* was created in 2002 to pursue the further development and commercialization of the compact compression ignition (CCI) engine. The patent rights to the CCI engine were acquired via a donation from *Caterpillar*, and the exclusive rights are licensed to the *Compact Engine Company*—a "virtual" company initially, with no dedicated funding or paid employees. The opposed-piston compression ignition engine provides improvements in emissions, power density, fuel efficiency, size, weight, and fuel tolerance. While the CCI engine could fit any market from chainsaws to automobiles, a more immediate customer need has been identified in unmanned aerial vehicles for the Department of Defense. As a result, initial efforts are being focused there.

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