

**North Carolina A&T State University**  
**Division of Research and Economic Development**  
**Technology Transfer & Economic Development Activities at A&T**

*Prepared by:*  
*Narayanaswamy Radhakrishnan/Wayne Szafranski*  
*November 2009*

The passage of the Bayh-Dole Act in Congress in 1980 provided the foundation for all universities' technology transfer efforts. A&T has used the rights granted under this legislation to protect and eventually commercialize innovations that have sprung from federally sponsored research programs undertaken by the University's faculty.

In 2003-2004, with a new mission on economic development assigned to the Division of Research and with a staff of one full time employee in the Office of Technology Transfer (OTT), we set out to establish a formal system of evaluating invention disclosures, providing appropriate intellectual property protection oversight, and develop pathways of generating revenue for the University derived from its patent portfolio. Additionally the Division of Research & Economic Development (DORED) used the services of a local firm, Seed Stage Associates, to assist in critically evaluating the potential of existing invention disclosures to determine which should be pursued as patentable ideas.

**Beginning with three issued patents and 18 invention disclosures in 2003, the University has expanded its patent portfolio to include 95 Innovation Disclosures, 19 issued patents and 28 patent applications today.**

As the procedures for addressing pending disclosures became formalized, DORED turned its attention to prosecuting the viable patent filings and ensuring that there would be a continued flow of new ideas by engaging faculty in each School and College to promote the concept of invention disclosure through the technology transfer system. A formal program takes place regularly throughout the academic year and has been expanded to introduce both graduate and undergraduate students to the concept of intellectual property protection and commercialization. In addition to explaining the invention disclosure procedure (which has recently been automated and integrated through the RAMSES system), faculty inventors are briefed on the potential to generate additional income through sharing of the net revenues resulting from commercialization of their inventions. **NC A&T has developed a relatively liberal policy of remitting one-half of the net proceeds (gross revenues less patent and promotional expenses) resulting from an invention/patent directly to the faculty inventors, with the remainder providing an income stream to the University.**

Following careful investigation of the existing patent literature (prior-art) and determining the market potential of an innovation, DORED/OTT decides whether to recommend a patent filing, maintain the invention as a trade secret or return the invention to the faculty member for additional development. If the University decides to file for patent protection, the typical route is to initially submit a preliminary patent application through one of several state-approved intellectual property law firms. Filing a

preliminary patent allows the legal team to perform a more thorough prior art search and collaborate with the faculty inventors to craft a suitable set of claims that provide the broadest protection possible. Filing a preliminary patent is the most common method of obtaining initial protection for an idea while minimizing overall cost of filing. Obtaining a utility patent can take several years and can be expensive. The Office of Technology Transfer makes every effort to perform proper due diligence when investigating an invention disclosure to mitigate the risk of unduly pursuing patent protection. This often involves using consulting firms who specialize in technical market and patent landscape research to determine the value of intellectual property on the open market.

Once the decision is made regarding the protection of the intellectual property, DORED/OTT determines the proper marketing strategy. In some cases it is best to find a unique licensee for un-patented or trade secret inventions, whereas a more typical route is to seek a licensee once the patent application is filed. This latter method is one that DORED/OTT has used to generate royalty revenues for licensing business practices, animal food supplements, and construction equipment design. In the past three years since these technologies were licensed, the University has received a total of over \$250,000 in revenue. We anticipate that this figure will increase substantially during the next several years as new, as yet un-patented, inventions mature in value. **Examples of recent inventions which have already or soon will be licensed are methods for extracting allergens from peanuts without affecting taste or nutritional content; a process that allows large composite material parts to be fabricated without the use of expensive ovens and therefore reduces overall cost; and a method for decontaminating polluted soil and water using a biodegradable material. In the future we anticipate that much intellectual property activity will be generated by the Engineering Research Center, *Revolutionizing Metallic Biomaterials*, which promises to impact orthopedic and cardio-vascular biomedical devices.**

An alternative to licensing University owned intellectual property is to provide a commercial vehicle in the form of a spin-out company. University sponsored spin-outs typically involve the creators of the technology in developing the core products or methods so that the company can begin to generate its own cash flow and may one day be self sustaining. Alternatively, the spin-out company may be acquired by a larger company to obtain licensing rights to the University's IP. In any event, the OTT routinely provides assistance to our start-up companies in the form of business plan advice, consultation in the hiring of the start-up's management team, technical assistance and faculty consultation coordination, and networking to secure financing and business opportunities. This deep involvement of the Technology Transfer office in the initial phases of company growth is not typical of most university start-up operations, and serves to illustrate the commitment of this office to the success of the intellectual property owned by the University. Since 2005, NC A&T has spun-out four companies based on the intellectual capital developed at the University. These companies are:

**Provagen**: A biotechnology company based on a patented technology to synthesize, isolate and purify a unique binding protein, Protein V. Dr. John Allen (School of Agriculture), the inventor of this technology, has demonstrated that this material has the

potential to replace the industry standard binding protein due to its ability to perform effectively over a wider range of species. Protein V is also being investigated as a potential treatment for autoimmune diseases such as ALS. Provagen has received significant start up funding from the NC Biotechnology Center and is using these funds to complete a preliminary clinical trial, scale up two manufacturing processes and develop improved purification techniques. In addition to the initial Protein V patent, three additional patent applications on various aspects of Protein V manufacture and uses have been filed.

**Premier Analytics:** **Dr. Christopher Doss**(College of Engineering) has turned his passion for Stock Options Trading into an educational and service based website that demystifies the complexities of this investment vehicle. Utilizing proprietary analytical software, Dr. Doss has established a website ([www.OptionsProsperity.com](http://www.OptionsProsperity.com)) that provides members with up-to-date information and educational advice on successful strategies used in trading options. Since its inception in 2007, Premier Analytics has received advice from OTT on establishing a corporate identity, analyzing competition and business opportunities.

**Filtara:** Based on a University licensed nano-membrane technology (**Dr. Vyas, then a PhD graduate student and Dr. Lou (College of Engineering)**), Filtara has proposed the development of a compact, efficient oxygen concentrator for use by patients with breathing problems such as asthma or COPD. The new membrane allows for the miniaturization of typically bulky equipment that limits the mobility of the patient. The company was founded by a group of NC State MBA students who had performed an analysis of the technology for the Office of Technology Transfer as a part of our due diligence effort. With the assistance of OTT and the inventors, Filtara's founders developed a business model that received start-up funding to assist in further development of the technology. The company is now seeking venture funding to develop a prototype model of the device.

**Advaero Technologies:** The latest spin-out from NC A&T draws on both intellectual property licensed from the University and design and composite material engineering expertise that has been developed over the past 25 years. **The inventors are Drs Ajit Kelkar and Dr. Ron Bolick (College of Engineering/CSE)**. Advero is run by serial entrepreneur, Greg Bowers and the company has licensed the HVARTM composite material curing technology from NC A&T. This technique allows for the low cost and transportable manufacture of very large composite material components, such as wind turbine blades. In addition, the company has successfully entered the aircraft component re-engineering market by designing and supplying parts for Navy helicopters. The company has, with the University's help, begun the demonstration of very large component manufacture (applications in wind turbine blades, for example) and anticipates that the HVARTM technology will be generating royalties for the University within the next twelve to eighteen months.

As the University's main tie to commercial enterprise, DORED serves to attract industry's attention to the research resources available at NC A&T and provide outreach to the regional and state communities in matters involving business development,

entrepreneurship and representation in economic development groups. Working with industry, (especially the Defense industries where we have strong contacts) to attract new research opportunities to the University, has resulted in the University's faculty beginning new fields of applied research and to introduce both graduate and undergraduate student researchers to industrial employment opportunities.

Notwithstanding the economic downturn of the past twelve months, the portion of **industry sponsored research has steadily grown at NC A&T over the past several years from less than \$ 30,000 in 2003 to almost \$2M in 2008.** This is important to offset the increasing scarcity of federal and state research grants and because it forms a lasting bond between faculty and corporations that provides long-term research commitments to the University. In order to establish these corporate relations, DORED has reorganized the representation of our research efforts into eight interdisciplinary Research Clusters. Since industry has long recognized the value of approaching their research problems in an interdisciplinary fashion, they immediately recognize and feel comfortable with the Research Cluster concept. We have been told by all of our industrial partners that DORED is unique among the universities that they deal with because of our capability to solve their problems in a multi-faceted manner.

**The newly formed NC Biotechnology Center sponsored Center of Innovation in Nano-biotechnology (COIN)** represents yet another approach that DORED has taken in coupling the University's research capabilities and targeted economic development in the state. DORED was one of the initial promoters and founders of COIN as we recognized the potential for this industry oriented commercialization group to attract new nano-biotechnology based businesses to the Triad and provide a vehicle for funding start-up businesses based on our strengths in nano-biotechnology research. We also anticipate that COIN will play a key role in promoting the University's Engineering Research Center to commercial partners and help establish a basis for nano-biotech spin-out companies created by the ERC.

**NC A&T has a unique opportunity to expand its reach in economic development through the *Revolutionizing Metallic Biomaterials* ERC.** Designated as a Generation-3 ERC, the National Science Foundation has recognized that performing world-class research is insufficient to maintain this country's lead in innovation. Therefore, all Gen-3 ERC's have been tasked with forming close collaborative ties with corporations involved in the same technology space as the ERC and to utilize the research capabilities of the ERC to enhance product development for their corporate partners. Furthermore, the ERC is expected to generate new entrepreneurial businesses based on the research performed there. In the case of our ERC, we anticipate that the research performed by NC A&T and our partner institutions will impact the areas of biomedical implants and devices, cardiovascular treatments, regenerative medicine, corrosion science, nanotechnology based coatings and others. Over the next several years we are confident that both intellectual property and new business opportunities, possibly located in the Greensboro area, will result from the research being conducted at the ERC.

**As presented in the report from UNC General Administration: *Innovate, Collaborate, Accelerate* issued in September, the future for economic development in North Carolina depends greatly on the system's universities ability to reach beyond**

**their walls to engage the community with their intellectual capital and research expertise.** At DORED we have been laying the groundwork for such an effort for the past six years, however with the expanded roles of research outreach and technology transfer described in these latest findings, we believe that new areas of development are required. These include expanding the outreach to industrial partners to engage them in our unique research capabilities; engaging select public and private economic development groups to demonstrate the University's assets in attracting and retaining businesses to the local community and state; developing a pervasive culture of entrepreneurial thinking for both students and faculty, and supporting that effort by using the technology transfer and management model that has been proven in our existing spin-out businesses.

Instilling an all-encompassing entrepreneurial program on campus requires a coordinated effort and a major shift in thinking. Engaging faculty to consider the potential commercial implications of their research and how successful pursuit of innovations will enhance their future research efforts requires clear support from University administration. Students will directly benefit from this interaction as they are often involved in the innovative research and are potential employees of spin-out companies. Additionally, students who are encouraged to recognize the potential commercial value of their research work develop an increased sense of leadership and organization that will enhance their university experience. Working from our base of entrepreneurial endeavors in the past, DORED is best positioned to lead this effort by establishing the personnel to promote and disseminate entrepreneurial initiatives on campus, manage intellectual property issues, foster new company start-ups and develop the financial, corporate and economic development agency community contacts required to insure the success of new ventures.

## INTELLECTUAL PROPERTY PORTFOLIO

| <u>Cumulative Totals<br/>in August '03</u> | <u>Cumulative Totals<br/>as of August '08</u> |
|--|---|
| • Invention Disclosures<br>18              | • Invention Disclosures<br>95                 |
| • Patents Pending<br>3                     | • Patents Pending<br>28                       |
| • <b>Patents Awarded</b><br><b>4</b>       | • <b>Patents Awarded</b><br><b>19</b>         |

10