

Key Factors in the Successful Evolution of Technology Transfer at Wake Forest University

SUBMITTED TO:

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September 16, 2002

Sponsored by UNC Office of the President and the National Science Foundation



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Executive Summary

In support of the North Carolina Technology Development Initiative (NCTDI), RTI International¹ (RTI) studied the evolution of technology transfer methodologies at Wake Forest University (WFU). Using a review of the literature and a series of interviews with key individuals, RTI developed the following seven key success factors related to the evolution of the WFU technology transfer function:

1. **Strong Administrative Support:** The language of technology transfer is adopted in mission statements, publications, and speeches. There are significant budgetary resources to pursue goals related to technology transfer. The strategy of WFU's Office of Technology Asset Management (OTAM) is supported at the vice-president level.
2. **Organizational Structure:** On the organizational chart, OTAM reports on the financial side, one level below the top (to the Chief Operating Officer [COO]).
3. **Adequate Resources:** WFU has a portfolio of commercializable technology, and sufficient budget to hire top technology transfer talent and invest in commercialization efforts, including resources for start-ups and speculative patenting.
4. **Staffing:** WFU has dedicated resources to hire a leader with a technical background, experience commercializing university technology in North Carolina, and the capability to foster a cooperative environment for innovation within the university. The continuity of the leadership further enhances the effectiveness of OTAM.
5. **Cultivating an Atmosphere for Innovation:** WFU engages its researchers in the technology transfer process and provides the support services needed to "productize" their science. OTAM is also well-connected with local, technology-based, economic development groups.
6. **Risk Acceptance:** Accepting the inherent risk in commercialization, OTAM built business practices to mitigate the risk factors.
7. **Commercialization Process and Strategy:** OTAM is committed to effective strategies and philosophies, including speculative patent filing, keeping legal fees in check, making many deals, and investing in resources for start-up companies.

A list of suggestions based on the success factors and the combined experiences of the professionals affiliated with OTAM are included in the recommendation section. The suggestions will be helpful to those charged with introducing technology transfer into a university setting.

¹ RTI International is a trade name of Research Triangle Institute.

I. Introduction

The North Carolina Technology Development Initiative (NCTDI) has engaged RTI International (RTI) to investigate the best methodologies to introduce technology transfer practices into the university culture by outlining the evolution of technology transfer methodologies at Wake Forest University (WFU). The goal of the effort was to pinpoint the factors that most significantly contributed to the successful evolution of the Office of Technology Asset Management (OTAM) at Wake Forest University from its inception, through the recent reorganization, to the present.

RTI used literature searches and information gathered from interviews to develop the list of success factors and recommendations. The literature search included a review of OTAM policies and procedures as well as published literature on the best practices in university technology transfer. RTI interviewed the following people, who serve the roles listed at WFU:

- Spencer Lemons, Director, OTAM
- Dean Stell, Assistant Director, OTAM
- Rodney Moore, Assistant Director (II), OTAM
- Marti Poe, Administrative Assistant, OTAM
- James Smith, Dean for Research, Office of Research, WFU School of Medicine
- Stan Mandel, Executive Professor and Director, Angell Center for Entrepreneurship
- Doug Edgeton, Chief Operating Officer (COO), WFU School of Medicine
- Reid Morgan, General Counsel, WFU School of Medicine
- Bill Dean, President of the Idealliance Piedmont Triad Research Park
- Louis Kucera, Professor of Microbiology and Immunology and Senior Vice President and founder of Kucera Pharmaceutical Co , a WFU spin-out company
- Michael Morykwas, Inventor of a wound-healing device known as V.A.C.®, which is being developed by licensee Kinetic Concepts, Inc.
- Paul Dawson, Developer of IBAT, a cloned gene that is an ileal bile acid transporter.

Based on the information from the interviews and the literature search, a list of seven success factors was developed. The success factors represent the key components of the OTAM experience, without which OTAM would have had great difficulty evolving. The success factors were chosen based on the number of times they were mentioned in interviews and upon the importance that the interviewees attached to each.

The success factors are discussed in *Section III*. Each success factor maps to several practical recommendations, provided in *Section IV*, for those charged with introducing technology transfer into the university culture.

II. Background

The technology transfer office at WFU began operations in 1983. At that time, Duke University provided services to WFU and Carl Wooten of Duke operated a satellite office at WFU. As a result, the technology transfer office adopted the practices of the Duke system, which was focused mainly on patenting and licensing. Gradually, over the period of 1983-1987, the increasing volume of intellectual property (IP) justified establishing WFU's own office. Paul Waugaman was the first director of the newly formed technology licensing and industry-sponsored research administration program, followed in the early 1990s by Julie Watson and then Beth Fordham Myer. During the early 1990s, the priority of the office was still obtaining licensing revenue to reimburse commercialization expenses, but there was also a slight shift toward considering start-ups, taking equity, and pursuing other relationships to commercialize technology.

The office was reorganized in 1999 and has been under the leadership of Spencer Lemons since. The 1999 reorganization included a name change—to OTAM—and a change in the reporting structure. OTAM now reports on the financial side of the medical school rather than the research side. Also as a result of the reorganization, OTAM's responsibilities were streamlined. Functions tangential to commercialization (e.g., material transfer agreements [MTAs], grants, contracts) for which the technology licensing and industry-sponsored research administration program previously had responsibility were reassigned; OTAM now has responsibility for commercialization only. Also, the number of commercialization agents increased from 1.5 to 3.0 FTE.

Over the past five years, OTAM has obtained 55 patents and formed five spin-out companies. **Table 1** and **Figures 1** through **3** below show OTAM's statistics over the last few years.

Table 1 – Comparison of Activity for Fiscal Years 1998 Through 2002

Activity	FY 98	FY 99	FY 00	FY 01	FY 02
Inventions disclosed	49	36	32	37	36
U.S. patents issued	13	4	12	15	9
New U.S. patent applications filed	19	12	13	14	11
Option/license agreements	9	6	9	12	11
Start-up companies created	0	1	3	1	0
Licensing revenues	\$1,741,880	\$2,788,987	\$2,953,600	\$9,388,500	\$17,886,000

Source: <http://www.wfubmc.edu/research/tech/stats.html>

The following three graphical representations of the above data (**Figures 1 through 3**) shows a downward trend in patenting activities and disclosures, while licensing revenues are up. One explanation for the decrease in disclosures and patent activity may be that as the commercialization process at WFU has matured, the focus has shifted from quantity to quality, resulting in better deals and increased revenue.

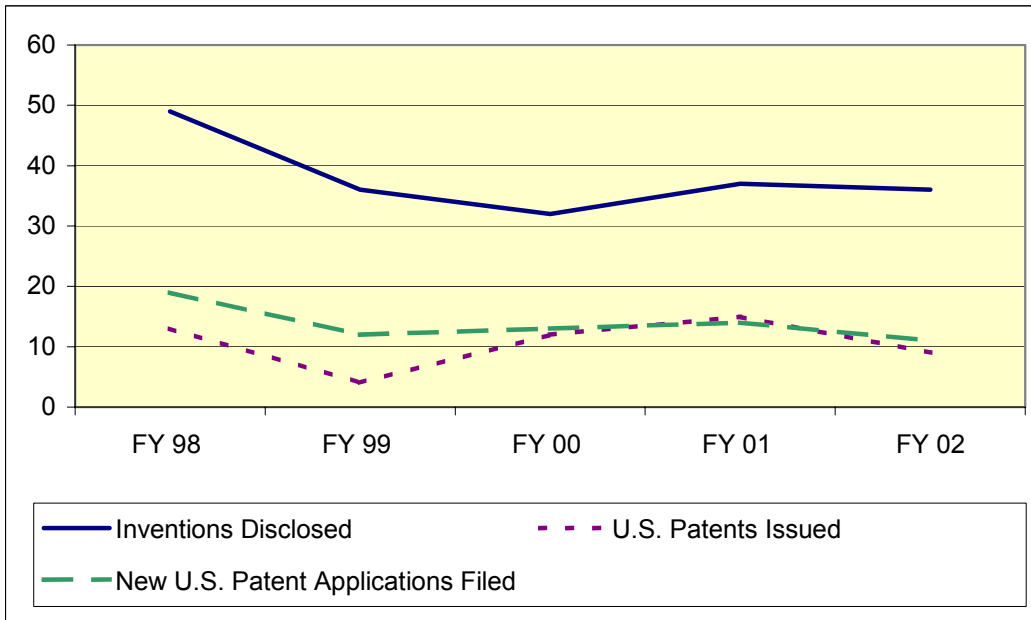


Figure 1 – Comparison of Activity for FY98 through FY02: Invention Disclosures, Patents Issued, Patent Applications Filed

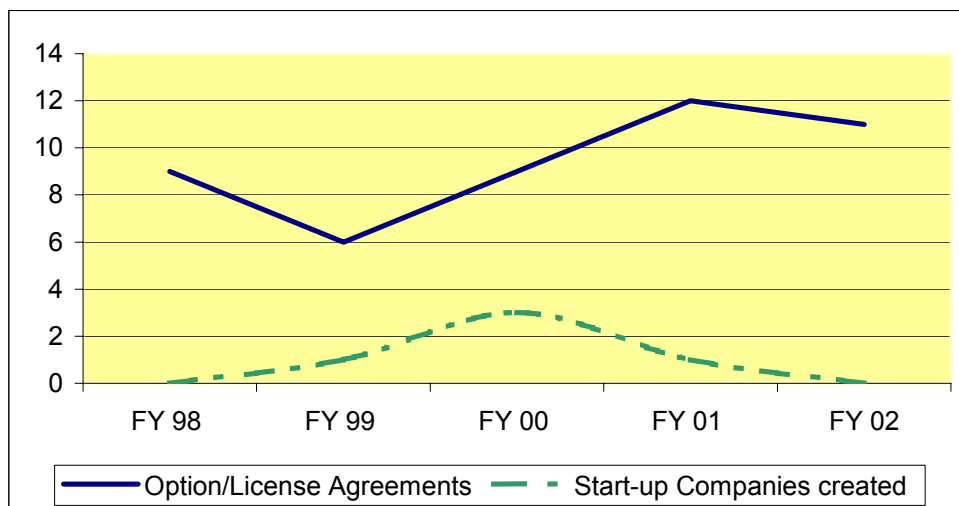


Figure 2 – Comparison of Activity for FY98 Through FY02: Agreements and Start-Ups

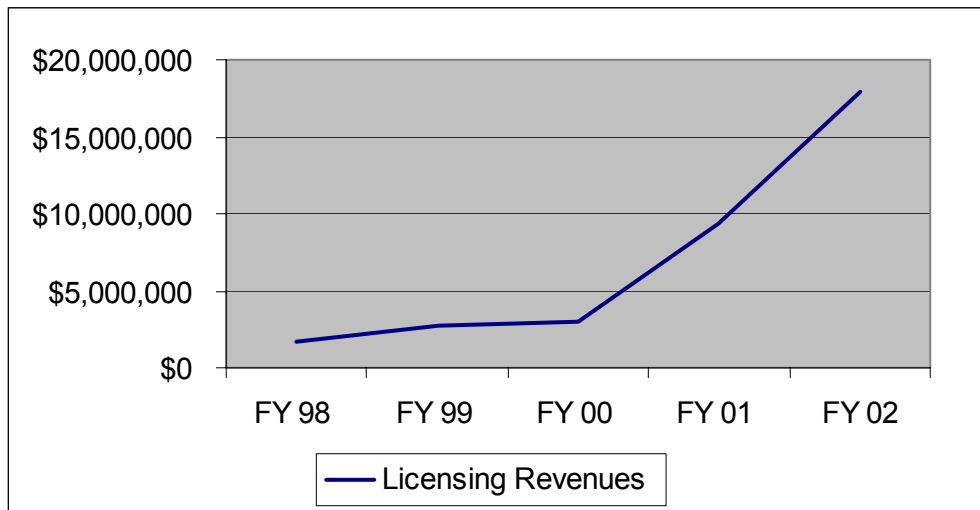


Figure 3 – Comparison of Activity for FY98 Through FY02: Licensing Revenue

In the early years of WFU's technology transfer office, an increased awareness of technology transfer among researchers followed the publication of information about researchers receiving royalties. There was an influx of disclosures as researchers submitted their inventory/backlog of technology. Subsequently, the rate of invention disclosures has converged to a steady level.

OTAM continues to steadily generate results. Although not indicated in the figures above, OTAM also is a contributor to regional economic development. Today, OTAM enjoys a close relationship with regional economic development groups and plays a pivotal role in cultivating innovation in the Winston-Salem area.

OTAM has a close affiliation with the development of the 180+ acre biotechnology research park called the Piedmont Triad Research Park. The research park will house privately operated and academic research centers, technology start-up companies and small businesses, laboratory operations, and retail businesses.

III. Results

RTI found seven overriding factors that have proven essential to the successful evolution of OTAM over the past 19 years. These success factors are listed and discussed below.

Success Factor #1: Strong Administrative Support

The WFU administration, at all levels, strongly supports the objectives of OTAM. The support is evident in the commitment of WFU to reorganize the technology transfer program in 1999. The administration put a priority on hiring top-rate talent for OTAM and in committing resources to establish and staff the new program. The support for technology transfer is also evident in speeches from top-level administrators and in the mission statement of the school of medicine. Specifically, the third line item supporting the mission of the Office of Research states that it "assists in the transfer of scientific discoveries of the faculty to the commercial sector for public and economic benefit."

There is general consensus within OTAM and its affiliates that administrative support has been the load-bearing wall upon which OTAM has built its success. Several interviewees noted that by definition, technology transfer is contrary to the traditional, "ivory tower" ideal of academic research. As such, university technology transfer can be controversial, and the program needs the backing of the administration to ensure that established objectives are upheld. Situations in which technology transfer can become controversial include the following:

- OTAM determines that an invention lacks commercial potential and does not pursue commercialization. In such cases, the inventor may challenge OTAM's decision and elevate the complaint to the highest level of the administration.
- OTAM enforces royalty sharing rules. Again, the inventor may bring a complaint to the highest level of the administration.
- A potential licensee is dissatisfied with the negotiation process and voices discontent in the press.

The above situations present potential public relations problems that would require administrative support. With the support of the administration, OTAM can make strategic decisions based on objective commercialization criteria, and efficiency of the process is maximized.

OTAM enjoys a reciprocal relationship with the WFU administration. In return for administrative support and backing, OTAM generates revenues for the university through technology licenses and spin-out companies. OTAM is also seen as a retention tool for innovative researchers and as an agent of regional economic development. Companies started by OTAM contribute to the well-being of the Winston-Salem area and help foster a healthy university/town relationship. WFU is actively involved in

local economic development and industry partnering and has adopted language in mission statements that reflects that emphasis. OTAM helps WFU achieve its goal of incentivizing the economic development of the community.

OTAM has played a significant role in gaining and maintaining the support of the WFU administration. When the office was revamped in 1999, OTAM worked with the administration to set mutually agreed-upon roles and guidelines for its operation. One key to maintaining the support of the administration has been managing expectations: OTAM made it clear that commercialization would require both time (5 years to success) and resources to hire staff and provide support services for start-ups. Also, OTAM representatives state that conservative success reporting—licenses are reported after they are signed and start-ups only after they are started—helps to align expectations.

Success Factor #2: Organizational Structure

Many attribute OTAM's successes to the evolution of its organization over the past five years. **Table 2** outlines the differences between the former and current organizational structures of OTAM.

Table 2 – Organization of OTAM and its Predecessor Office

	Former Office (pre-1999)	OTAM (1999 to present)
Reporting Relationship	Under Dean of Research	Under COO
Operations Management	Oversight from Dean of Research's Office	Higher degree of autonomy
Funding	Cost center	Self-supporting center
Responsibilities	Commercialization, MTAs, industry research contracts	Commercialization
FTE (Commercialization Agents)	1.5	3.0

Reporting directly to the executive level—in OTAM's case, directly to the COO—allows OTAM to operate as a business unit. OTAM's successful approach involves basing decisions to patent and commercialize solely on the commercial potential of an invention. Because the COO supports objective assessment as a key business practice, OTAM is able to focus resources on inventions that are most likely to succeed. OTAM officers stress that reporting high on the organizational chart has been extremely enabling. In fact, more than one put it simply: "Report high, or don't take the job."

In the past, when the office reported to the Dean of Research, key players found it limited its effectiveness. Although the two functions are related, the two offices have very different goals and should be administratively independent.

As a "break-even" center, OTAM must cover its costs through commercialization activities, making it necessary to view all potential innovations objectively as a business case. OTAM cannot afford to commit funds to technologies without commercial potential, and it takes a practical approach to cutting losses and abandoning projects with no future. OTAM's disposition as a self-supporting center protects it from criticism that it is "taking a part of employees' paychecks" and spares OTAM the scrutiny under which cost centers typically operate.

Because OTAM reports directly to the COO and has a clear mandate to "do what it takes" to get a return on commercialization activities, OTAM enjoys a certain degree of autonomy. The mandate frees OTAM from some of the politics of an academic setting, enables OTAM to administer its duties based on commercial criteria only, and gives it a powerful tool, the portfolio approach, discussed under *Success Factors #6: Risk Acceptance and Mitigation* and *#7: Commercialization Process and Strategy*.

As OTAM evolved, its duties have been streamlined. For example, responsibility for MTAs and contract research has been reassigned out of OTAM, and OTAM's leader handles all academic activities that are tangential to commercialization, allowing the other technology transfer agents to focus on working toward deals. At the same time, technology transfer agents have doubled from 1.5 to 3.0 FTEs. The combined effect is a streamlined focus on making deals—the core competency of the staff.

Success Factor #3: Adequate Resources

University technology transfer offices rely on three key resources: quality research, effective staff, and a healthy budget. OTAM is fortunate to have all three.

There is no commercialization without research. WFU's efforts to establish an atmosphere for research and an infrastructure for promoting research among the faculty is an important element in the success of OTAM (see *Success Factor #5: Cultivating an Atmosphere for Innovation*). Because of the medical school, OTAM has a portfolio of life sciences technology to work with, which is statistically more commercially promising than the physical sciences.²

The staff of OTAM is a cornerstone of its success. The university hired a seasoned professional to lead OTAM, and WFU dedicates the resources necessary to hire, and retain, professionals. Salaries are competitive and staffing levels are based on the case load. Each agent typically handles between five and ten active cases and many more less active cases.

In addition to resources for salaries, OTAM has a budget large enough to engage in speculative patent filings, an integral part of its commercialization strategy, discussed under *Success Factor #7: Commercialization Process and Strategy*.

² Pressman, L. (Ed). (2002). *AUTM Licensing Survey: FY 2000*. Northbrook, IL: AUTM. Although represented equally in the survey with other universities, universities with a medical school account for approximately 67% of active licenses and 75% of license income received for 2000.

Another resource OTAM draws upon is the Babcock School of Business at WFU, which provides two key resources: interns and a business incubator for start-up companies. Internships benefits all stakeholders: Babcock students work on real technologies and OTAM gets a focused assessment report to use as the basis for commercialization efforts. Interns are also a good source for performing market research. In the past, some Babcock interns have continued their involvement in commercialization by joining a WFU spin-out company or becoming permanent OTAM staff.

In November 2001, the Babcock Demon Incubator began operations under the Babcock School's Angell Center for Entrepreneurship, with a focus on growing the business skills needed to launch the company. While there are no laboratory facilities, companies may use office space for up to one year to

- Develop and refine business plans
- Create marketing campaigns
- Create presentation materials to pitch ideas to investors.

Once companies reach a viable level of independent funding (typically about \$500,000 annually), they are expected to graduate from the incubator. Dr. Mandel, Director of the Angell Center for Entrepreneurship, said the first six months of operation have been promising.

The model brings to bear the resources of the business school for outside entrepreneurs. The incubator uses students and faculty as business advisors, and is not limited to students of the Babcock Graduate School of Management. Monthly meetings provide a forum on aspects of launching a business (e.g., Jeffrey C. Howland of the law firm Womble Carlyle Sandridge & Rice recently spoke about licensing terms).

Success Factor #4: Staffing

Although staffing may be considered a sub-category of adequate resources (Success Factor #3), feedback from interviews so strongly correlated good staff with effective commercialization that it bears individual treatment. As mentioned above, WFU is fortunate to have the resources to hire top-rate talent to lead OTAM. OTAM staff have contributed to its success through their combined experience and skills, including

- Experience with university start-ups
- Familiarity with the innovation community in NC
- Aptitude to understand the science and willingness to build a business case around the science
- Capabilities as both mentor and teacher
- Ability to foster a cooperative mindset among researchers, OTAM, and the business school
- Ability to work well with the Office of the Dean of Research (although there is no reporting relationship).

The current leadership has been in place for three years and has been effective in establishing the solid relationship that OTAM enjoys with key deans and center directors. This relationship helps to quickly resolve issues and make sure that information about IP presented to the university is available and understandable. OTAM prioritizes retention of its technology transfer professionals, a worthy investment given that technology transfer programs with continuity of leadership hold an advantage over other programs.³ At WFU, continuity has helped build confidence in the program and maintain key relationships.

OTAM fosters professional development of the agents through formal training provided by the Association for University Technology Managers (AUTM) and informal mentoring.

Success Factor #5: Cultivating an Atmosphere of Innovation

A fifth key to the success of OTAM is its ability to recruit commercialization-minded researchers and to involve them in commercialization activities. A successful commercialization process requires inventors to

- *Innovate*: Be open to commercializing research and consider commercial potential while doing research.
- *Disclose*: Be aware of how to protect IP.
- *Market*: Work with companies to accomplish research and, when applicable, support negotiations by serving as a consultant. The majority of licensing leads, 56%, come directly from the inventors.⁴

Not all researchers have a technology transfer mindset. In fact, all interviewees affiliated with OTAM reported that there are two very distinct schools of thought among researchers: one views technology transfer as a worthy end, and the other believes technology transfer takes the focus away from basic scientific research. At WFU, the community of researchers who are very active in technology transfer is limited. At a minimum, researchers need to be aware of technology transfer so that WFU can protect and commercialize innovations.

To foster this awareness and develop an atmosphere of innovation, the university is taking conservative measures such as recruiting researchers who will add to the base of intellectual property. Support for commercialization at WFU is clearly stated; however, unlike the progressive stance adopted at Ohio State University⁵ and Pennsylvania State

³ Tornatzky, L.G. Waugaman, P.G., & Gray, D.O. (2002). *Innovation U.: New University Roles in a Knowledge Economy* (Ohio State University). Research Triangle Park, NC: Southern Growth Policies Board.

⁴ Jansen, C., & Harrison, F.D. (1999). Where do the leads for licenses come from? Source data from six institutions. *The Journal of the Association of University Technology Managers*, XI, 1.

⁵ Tornatzky, L.G. Waugaman, P.G., & Gray, D.O. (2002). *Innovation U.: New University Roles in a Knowledge Economy* (Ohio State University). Research Triangle Park, NC: Southern Growth Policies Board.

University⁶, the administration has not taken the step of redefining scholarship to include technology transfer or considering participation in commercialization as an element in tenure or promotion decisions.

OTAM has adopted a targeted approach to outreach that includes efforts to create an atmosphere for innovation and engage inventors in technology transfer. For example, OTAM provides opportunities for researchers to learn from their peers who have commercialized technology. OTAM also discusses technology transfer with research directors, who, in turn, promote technology transfer priorities among the faculty.

Additionally, OTAM has taken measures to ensure its visibility among the researchers. OTAM agents have tried various methods of outreach, including holding a workshop, speaking at research department staff meetings, and conducting school-wide seminars. The consensus among staffers is that trying to educate all researchers about technology transfer is not effective, because researchers become interested in technology transfer only when they have an innovation. In OTAM's experience, efforts are best directed at ensuring researchers know who to call when they have a need. For example, interested inventors can access OTAM's web site for information about technology transfer policy, procedures, and contact information (see *Attachment 1 - WFU Inventions and Patent Policy*).

Financial incentives are also important to creating an atmosphere of innovation. WFU's recently revised policy on royalty sharing grants inventors 35% of the royalties based on gross income, whereas the prior policy granted them 50% based on net. This policy—favorable for the majority of inventors, but less so for inventors of blockbuster technologies—was designed to address previous concerns that most inventors never received any royalties because very few royalty streams (~1 of 20, according to the Dean of Research) cover expenses. Revising the royalty sharing policy has had no noticeable effect on the number of disclosures received. However, OTAM agents did note an increase in the quality of the disclosures. As illustrated in **Figures 1** through **3**, the improved quality may explain the reduction in the total number of disclosures and patent activity.

Challenges for Maintaining an Atmosphere of Innovation

To continue its success in the long term, OTAM needs to keep innovators engaged in commercialization. Royalties are the obvious incentive for inventors, and OTAM is challenged to find a royalty scheme that satisfies all of its inventors. Inventors prefer a policy that allows them flexibility to select from several options at the outset of commercialization. For example, the inventor could elect to receive either 35% of gross or 50% of net.

⁶ Tornatzky, L.G. Waugaman, P.G., & Gray, D.O. (2002). *Innovation U.: New University Roles in a Knowledge Economy* (Pennsylvania State University). Research Triangle Park, NC: Southern Growth Policies Board.

Another incentive to innovate and participate in commercialization is simply to inform inventors on commercialization activities related to their technologies. Some researchers are inspired by and derive satisfaction from the knowledge that patients are benefiting because their technology has been commercialized.⁷

It was also noted that the environment for innovation is more favorable in other areas than in Winston-Salem. For example, the presence of high-tech companies such as GlaxoSmithKline in Research Triangle Park (RTP), NC, provides opportunities for intellectual synergy and networking among academic and industry researchers. More such opportunities for entrepreneurial researchers at WFU would be helpful.

There are sources of venture capital and angel networks in the Winston-Salem area, although accessing the funds has proven difficult. Potential investors in the area typically expect a quick return on investments, and efforts must be undertaken to encourage acceptance of the longer time frame and higher risk associated with new technologies.

Success Factor #6: Risk Acceptance and Mitigation

The path from disclosure to product is indirect and unpredictable. On average, it takes two to three years to sign a deal for a university-developed technology once it is disclosed. WFU's Dean of Research estimated that only one in nine agreements results in royalties and only one in 20 makes enough to cover costs.

By accepting the risks inherent in the commercialization business and building processes that account for that risk, OTAM has been able to successfully navigate this landscape and cover its operating costs. To mitigate risk, OTAM uses two primary tools:

- As part of its 1999 reorganization, OTAM obtained buy-in from the administration on a plan that outlined the time and investment required for success. The plan allowed 3-5 years to achieve OTAM's first success and outlined a budget for providing support services to start-up businesses. OTAM also fostered acceptance of the option to take equity in a start-up.
- OTAM operates under a portfolio approach, assessing the commercial potential of all disclosures received. These assessments help reduce overall risk by channeling resources to those technologies most likely to result in a success.

⁷ Deaver, D. (2002, June 24). Technology transfers creating more than just profits. *Winston-Salem Journal*. Available: http://www.journalnow.com/permanent/kucera_transfers.html.

Success Factor #7: Commercialization Process and Strategy

OTAM, like most university technology transfer offices, uses a variation of the simplified commercialization process presented in **Figure 4**.

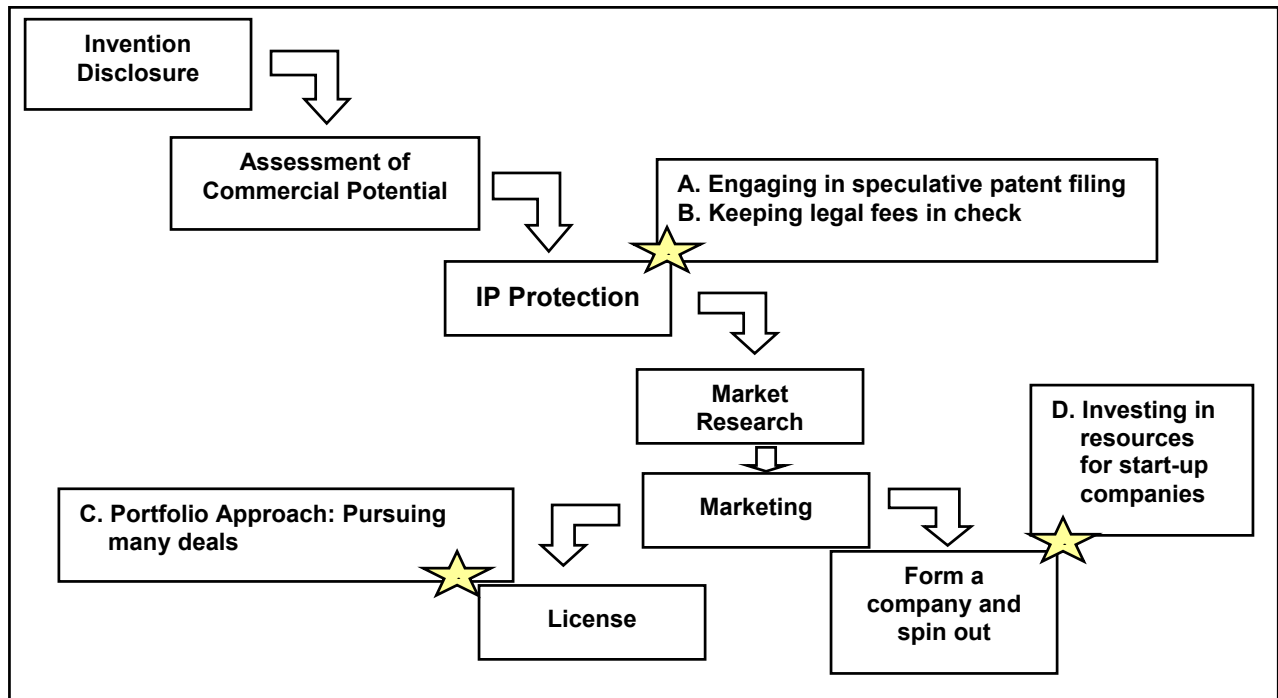


Figure 4 – OTAM's Commercialization Process

What distinguishes OTAM is its commitment to specific strategies and philosophies at key junctures on the process (indicated by a star above). Four tools are distinct to OTAM's success:

- Engaging in speculative patent filing
- Keeping legal fees in check
- Portfolio Approach: Pursuing many deals
- Investing in resources for start-up companies.

Engaging in Speculative Patent Filing

OTAM is fortunate to have funds to file for patent protection on technologies that appear to be commercially promising but have not been proven. OTAM uses high-quality, provisional patent applications as a less expensive means to protect a technology while further assessing its commercial potential. The provisional patent applications provide protection for one year, during which OTAM agents further assess the commercial potential of the technology by trying to market it to potential licensees.

After one year, a decision is made to either abandon the technology or pursue full patent protection and commercialization.

Typically, OTAM hires an attorney to draft a high-quality patent application at an approximate cost of \$2,000. It should be noted that provisional patent applications can be filed for \$160. However, a subsequent application for full patent protection must be based strictly on information submitted in the provisional application. It has been OTAM's experience that the cost of a quality provisional application is justified by its ability to strengthen WFU's IP case and reduce risk.

Keeping Legal Fees in Check

In order to succeed, OTAM needs to keep its budget under control in the face of mounting legal fees. In 1999, OTAM adopted a software database (FileMaker Pro) to track all commercialization activity for a technology, including information pertaining to ownership, assessment, marketing, licensing, royalty income, and legal fees. Legal fees are checked regularly and are contested if OTAM finds them unreasonable.

Another tool OTAM has used for managing the legal fees is a practice called rebilling. Licensees are billed for all legal work associated with the technology licensed, including patent execution costs. While not all licensees pay 100% of the costs, willingness to do so is a factor in license negotiations.

Portfolio Approach: Pursuing Many Deals

AUTM statistics establish a positive correlation between royalty income and the number of active licenses at an academic institution.⁸ Accordingly, OTAM has adopted a portfolio approach in which it pursues many opportunities simultaneously, aiming for success collectively. The portfolio approach requires that OTAM pursue many agreements for its technologies. OTAM agents are encouraged to prioritize daily activities to make progress on signing deals. Given that one in nine deals pays out royalties, OTAM's success depends heavily on the number of deals made.

Investing in Resources for Start-Up Companies

When it makes sense to form a company around a technology, OTAM helps facilitate it. To date, OTAM boasts five start-up companies on its list of successes. Start-up companies bring many benefits to WFU and the Winston-Salem area, including equity-based earnings, a tool for attracting and retaining entrepreneurial researchers, an enhanced tax base, and new job creation. The five start-up companies have created 50 high-tech jobs in Winston-Salem.⁹

⁸ Pressman, L. (Ed). (2002). *AUTM Licensing Survey: FY 2000*. Northbrook, IL: AUTM. According to *AUTM Licensing Survey: FY 2000*, 88% of programs with more than \$20M in license income have 50 or more active licenses.

⁹ Deaver, D. (2002, June 24). Technology transfers creating more than just profits. *Winston-Salem Journal*. Available: http://www.journalnow.com/permanent/kucera_transfers.html.

Many locations, such as RTP, offer resources for start-up businesses though North Carolina Technological Development Authority, Inc. (TDA)¹⁰, The Council for Entrepreneurial Development (CED)¹¹ and a strong network of angel and venture capital resources. However, the Winston-Salem area does not provide those support services at a comparable level. OTAM recognizes that, to pursue start-ups, it needs to provide support services.

When the conditions for a start-up are right, OTAM invests in the company by providing the following services in exchange for equity:

- Hiring a chief executive officer
- Assisting with the business plan
- Hiring legal assistance
- Providing incubator space (through the Piedmont Triad Research Park)
- Accessing student business talent (through the Babcock School) to
 - Develop and refining business plans
 - Create marketing materials
 - Create presentation materials to pitch ideas to investors, etc.
- Accessing venture capital and angel funds
- Mentoring.

In addition, OTAM dedicates time to working with the new companies, even on a daily basis, in the inaugural stages.

¹⁰ The North Carolina Technological Development Authority, Inc. (TDA) is a public benefit corporation whose mission is to create jobs and wealth throughout North Carolina using business incubation, venture capital, technology transfer and rural initiatives to commercialize promising business opportunities

¹¹ The Council for Entrepreneurial Development was founded in 1984 to stimulate the creation and growth of high-impact companies in the greater Research Triangle area. CED achieves its mission by providing programs and services in four major areas: education, capital formation, outreach and communications.

IV. Recommendations

The above seven factors tell the story of a success born of the combined experiences of OTAM affiliates. All those interviewed noted several lessons learned along the way. These lessons learned are provided below as guiding recommendations— mapped to the seven success factors—for those charged with setting up a technology transfer office at a university.

Strong Administrative Support

- Get buy-in on key parameters up front: establish an understanding that technology transfer takes money and time.
- Keep expectations in check. Talk about start-ups after they are started and deals after they are signed.

Organizational Structure

- Report high, no more than one level down from the president. Researchers may oppose certain strategy decisions; ensure that the office has administrative support.
- Report on the business side.
- Ensure that the same person does not lead both the research office and the technology transfer office. Agendas of each function may differ.
- Set up the office to be self-supporting. This helps isolate the office from criticism.
- Grant the office some level of autonomy. Set a budget and adopt a hands-off approach (unless budgets are not met). Give the office the freedom to make the decisions required to succeed.
- Be wary of being perceived as a “service organization.” You cannot give all technologies equal attention and foster successes at the same time.
- Develop a plan for the first five years and follow it.
- Focus on your core competency—making deals. When possible, minimize academic obligations and shed responsibilities for everything except technology transfer (MTAs, contracts, etc.).

Adequate Resources

- Before starting an office, secure enough money to pay good people competitively and to invest in your technologies.
- A small office may want to share resources rather than hire second-tier talent. The Triangle Universities Licensing Consortium (TULCO)¹² approach, in which one centralized office addresses technology transfer for several universities, may be apt.
- Provide a business incubator to help inventors
 - Develop and refine business plans
 - Create marketing strategies and materials
 - Create presentation materials to pitch ideas to investors, etc.
- Recruit interns from a nearby business school. They are a good resource for conducting assessments, performing market research, marketing, and writing business plans.
- Use members of the local innovation community as advisors.

Staffing

- Hire a director with solid experience in licensing and developing start-ups specifically in a university setting. If not, contract all of the work out. There is too much at stake to risk a false start.
- Expect to pay top-rate professionals top-rate salaries.
- Hire someone familiar with innovation in your local area, and specifically with connections to venture capital and industry talent.
- Do not try to grow someone into the technology transfer position. Use seasoned professionals only.
- Make sure the leader is both mentor and teacher.
- Hire those with an aptitude to understand science and the eagerness to put a business case around the science. Having a PhD on board buys some cooperation from the inventors.
- Hire someone comfortable with making cold calls. Cold calling is a key part of the job.

¹² In operation until 1994, TULCO addressed the technology transfer needs of Duke University, North Carolina State University, and the University of North Carolina–Chapel Hill.

Cultivating an Atmosphere for Innovation

- Establish an atmosphere that promotes research among faculty.
- Recruit researchers who can contribute to the IP portfolio.
- Foster [develop? encourage?] a cooperative mindset among researchers, the technology transfer office, and the local business school.
- Encourage research directors to promote awareness of technology transfer among researchers.
- Make the office visible to researchers.
- Develop technology transfer policies via a participatory process (i.e., use faculty input to draft policies).
- Develop policies and procedures that are easy to understand.
- Interact with researchers on a one-on-one basis.
- Develop a royalty structure that allows the inventor some flexibility.
- Keep the inventor informed and in the loop during commercialization activities.
- If the local environment for innovation is not thriving, be prepared to provide more support services and take on more risk with start-up ventures.
- Cultivate university/industry peer relationships with networking opportunities.
- Guide the inventor: be willing to discuss whether it is worth carrying research further for commercialization purposes.
- Share successful cases with researchers.

Risk Acceptance

- Start with a base of licensing technology and build from there.
- Be patient and willing to accept a certain level of risk.
- Plan for 3-5 years before the first success.
- Be open to taking equity in a start-up.
- Adopt a portfolio approach (pursuit of 10 technologies yields 1-2 deals).

Commercialization Process and Strategy

- Allocate money for speculative patent filing.
- Be willing to cut losses and stop a commercialization project midstream to save money in the long term.
- Allocate money to provide support services for start-ups (e.g., CEO salary, business plan assistance). If support services for start-ups are not locally available, be prepared to assume these responsibilities.
- Pursue lots of deals. One of ten will produce significant royalties¹³; if the office pursues only one or two annually, success will be illusive.
- Commit to start-ups.
- Secure pre-seed and venture funding for new technologies.
- Adopt a database for sound record keeping.
- Monitor legal expenses to keep them in check.

¹³ Tornatzky, L.G. Waugaman, P.G., & Gray, D.O. (2002). *Innovation U.: New University Roles in a Knowledge Economy* (Ohio State University). Research Triangle Park, NC: Southern Growth Policies Board.

V. Conclusion

RTI has investigated the evolution of technology transfer methodologies at Wake Forest University (WFU) to pinpoint the factors that most significantly contributed to the successful evolution of the technology transfer function from its inception, through the recent reorganization, to the present.

Information gathered during this investigation depicts a distinct contrast between the previous atmospheres for innovation at WFU and the future outlook. Looking backward in time, one sees a local economy driven by manufacturing, few resources for start-ups, and a technology transfer function limited to licensing. Looking forward, one sees a community committed to building an economy led by technology and resources for start-ups that include a business park, venture capital, and a commercialization office engaged with researchers and active in economic development in the community at large.

Though WFU is a private institution focused primarily on medical research, many of the success factors that have contributed to the growth of its technology transfer function can be applied to other institutions, especially those within the University of North Carolina system.

Attachment 1

WFU Inventions and Patent Policy

Inventions and Patent Policy

1. Purpose.

The Inventions and Patent Policy of Wake Forest University is intended to:

- a. Encourage research and the development of ideas and inventions by rewarding the developers of inventions, assisting them in implementing their ideas, and by providing a system for the encouragement of research;
- b. Serve the public interest by providing means through which inventions and discoveries which arise in the course of the University's research may be made available to the public through established channels of commerce; and
- c. Protect the interests of the University and its employees and students with regard to inventions developed at the University.

2. Definition of Inventions

"Inventions" are tangible or intangible inventions, discoveries or other innovations, whether or not patentable or reduced to practice. Inventions include "device-like" software or other "device-like" copyrightable material, that like a device, is intended and likely to result in the accomplishment of a task or in allowing the user to produce, manage, analyze, or manipulate a product, such as data text, a physical object, or more software. Device-like software or material acts as a tool or building block in the accomplishment of such a task or in the creation or management of such a product or result. Inventions do not include "informational" software or other "informational" copyrightable material, which may be interactive, to the extent it is intended to inform or educate the user. In the case of software or other copyrightable material that is both device-like and informational, appropriate distinctions will be made in accordance with the principles of this policy.

3. Administrative Responsibilities.

a. Authority of the President.

The President of the University is responsible for administrative matters relating to inventions and patents. The President may delegate authority to another individual or individuals to carry out these responsibilities in whole or in part.

b. The Patent Advisory Committee.

1. The President or his designee will establish a University Patent Advisory Committee (the "Committee"). The Committee will:
 - a. Provide advice on the appointment of the Patent Administrator;
 - b. Meet at least once each semester, receive current summaries of the activities of the Patent Administrator, oversee the implementation of the program, and report its findings to the President or his designee(s) from time to time;
 - c. Advise the Patent Administrator on issues of program implementation and specific cases where guidance is sought; and

- d. Review situations where problems arise in the implementation of this policy or the execution of the invention and patent program.
2. The Committee will consist of six faculty members, at least four of whom are engaged in scientific research, including one member from the management disciplines, appointed by the President for staggered three year terms. In addition, the University Counsel, the University Controller, the Medical School Controller, the Dean of the Graduate School, the Director of Research and Sponsored Programs, the Senior Associate Dean (Science and Technology), and the Patent Administrator will be *ex officio* members. The President will appoint a chairman from among the membership. All members of the Committee will be voting members. The *ex officio* members, with the exception of the Patent Administrator, may designate an alternate with the approval of the chairman of the Committee.
- c. **The Patent Administrator.**

The President will appoint the Patent Administrator with the advice of the Committee.
- d. **Program.**

The Patent Administrator, in consultation with the Committee, will develop and implement a patent and licensing program ("the Program"), revised from time to time as necessary, to carry out the following functions:

 1. **Evaluation.**

Inventions within the scope of this policy will be evaluated in order to determine whether they have sufficient promise to justify marketing and/or patenting.
 2. **Patenting.**

Patent protection will be sought for inventions determined to be sufficiently promising to justify the effort and expense.
 3. **Marketing.**

The Program for the sale or licensing of inventions and/or discoveries will be implemented so as to provide maximum return for the University and the inventors.
 4. **Sponsored Research.**

The Patent Administrator will assist the appropriate University office(s) in the identification of industrial sponsors for research and in the negotiation of research agreements related to inventions.
 5. **Dissemination of Policy.**

This policy and the implementing Program (and succeeding changes) will be brought to the attention of University employees and students. Contracts of employment and attendance as a student will be made subject to its provisions (including revision of existing contracts to the extent that

is possible). Appropriate procedures will be adopted to fully protect the interests of the University and its employees and students in all sponsored research agreements. The provisions of this policy may be modified from time to time, and no employee or student of the University has a right to their continuation unmodified (but this does not affect rights to inventions or payments already established).

6. Accountability.

The Patent Administrator will from time to time inform the Committee on patent disclosures, developing markets, and other activities. The Committee will evaluate the effectiveness of the Program in achieving the stated purpose of the policy and recommend such changes, as they believe appropriate.

e. Implementation of the Program.

In implementing the Program, the Patent Administrator may utilize full- or part-time University employees, independent contractors, or companies or organizations providing such services; or a combination of them, as the Patent Administrator determines to be appropriate with regard to a particular invention and within approved budgetary limits.

4. Ownership of Inventions.

a. Inventions Developed by an Employee or a Student.

Inventions developed:

1. in the course of an individual's employment or, in case of a student, in the course of his/her academic program;
2. within or useful within the individual's normal field of employment; or
3. with the use of University funds or University facilities, are the property of the University.

b. Individual Work.

1. Inventions resulting from research or other work conducted by University employees;
 - a. wholly on their own time;
 - b. outside their normal field of employment; and
 - c. without the use of University funds or facilities (or with insignificant use of University funds or facilities) are the property of the individual employee and not subject to this policy unless assigned by the inventor to the University under an agreement satisfactory to the Patent Advisory Committee. The Committee will develop policies with regard to what constitutes "insignificant" use of University funds or facilities. (The term "facilities" in this document include all types of real and personal property.)

2. To make clear what is individual work, the employee must request approval in advance for specific consulting or contractual arrangements, which may result in an invention. The appropriate Dean will review and approve these requests in a manner consistent with the policies of each campus of the University.

c. Research Sponsored by Third Parties.

The ownership of Inventions arising out of research or work undertaken under sponsorship by a third party (including government or private grants, sponsorship of targeted research, consulting arrangements, or otherwise) will be presumed to be the property of the University unless the terms of the contract, grant or other agreement with the sponsor modify those provisions. Each employee proposing to begin such an agreement must submit the proposed agreement to the Patent Administrator. The Patent Administrator, in consultation with appropriate academic officials, will determine if the proposed agreement will foster the research and educational purposes of the University and protect its interests as well as the interests of its employees. The Patent Administrator will seek the advice of the Committee in situations of an unusual or precedent-setting nature.

5. Resolution of Disputes.

In cases where there is a difference of opinion on ownership of inventions, division of proceeds, or other provisions of this policy, the Committee will recommend to the President a final disposition. The President's decision is binding on all parties.

6. Division of Proceeds.

a. Division Schedule and Recovery of Expenses.

When an invention is patented (or patent protection is sought) and/or marketed by the University (whether owned by it, assigned, or subject to the provisions of an agreement for sponsored research), the gross proceeds arising from the invention will be distributed as follows:

Before Recovery of Specific Expenses:	35%	Inventor
	65%	Wake Forest University until Specific Expenses associated with the invention are fully recovered
After Recovery of Specific Expenses:	35%	Inventor
	10%	Inventor's Department until \$1,000,000 is received by the Department
	55%	Wake Forest University Research

After \$1,000,000 Received 35% Inventor
by Dept.: 65% Wake Forest University Research

Gross proceeds include equity, the acquisition and disposition of which will be governed by a University policy approved by the President. Any consideration received for the performance of research is not to be defined as part of gross proceeds.

b. Provisions Relating to Allocation of the University's Share.

1. The University's share of proceeds from an invention made by an employee or student of the University will be allocated to the Reynolda Campus budget or to the School of Medicine budget, according to the inventor's place of employment or academic program. In the case of joint appointments or academic programs, proceeds shall be distributed according to the portion of the inventor's time designated to research at each campus. This will be determined by the Patent Administrator after careful consultation with the appropriate Controller(s) when a disclosure is filed.
2. The February 5, 1993 policy is applicable to all disclosures made prior to the date of adoption of the policy. For inventions not yet generating proceeds, inventors may request that their inventions fall under the policy. This will be determined by the Patent Administrator after careful consideration with the appropriate Controller(s) upon receipt of the request.
3. The University's portion (whether to the Reynolda Campus or the School of Medicine) will be utilized for the support of research as determined by the Reynolda Campus or the School of Medicine. Research will be defined broadly and may include support for peer-reviewed basic and clinical research programs, invention commercialization, and Technology Transfer Service operations.
4. The allocation of the University's share to the inventor's department may be modified by the Board of Trustees if the Board judges that existing circumstances warrant such action.

c. Transferability of the Inventor's Share.

The Inventor's allocated share of the proceeds under this policy is transferable by assignment, will, or intestate succession. The University will incur no liability for payment in accordance with the inventor's last assignment sent to the University. Notice of assignment should be sent to the Controller's Office, Wake Forest University School of Medicine, or the Reynolda Campus Controller's Office, whichever is appropriate, with a copy to the Patent Administrator.

(Approved by the Board of Trustees of Wake Forest University, February 5, 1999.)