

EXECUTIVE SUMMARY

RECOMMENDATION:

The FY 2007 Technology Transfer Reports for Arizona State University, Northern Arizona University, and The University of Arizona are presented to the Board as an information item.

UNIVERSITY TECHNOLOGY TRANSFER GLOSSARY

Bailment Agreement: Provides for the physical transfer of ABOR-owned research materials to another party, and permits that party limited use of the materials. ABOR remains the owner of the materials even though they are located on the premises of the other party. This type of agreement is often used for biological materials or other tangible research materials.

Covenant Not to Sue: Provides freedom from risk of lawsuit for intellectual property infringement under defined circumstances in exchange for consideration paid by the counterparty (the party with whom the university is dealing).

Exclusive Copyright License: Permits another party, the licensee, permission to enjoy one or more of the five rights of a copyright owner (modify, reproduce, redistribute, publicly display, and publicly perform the copyrighted work of authorship), and represents that ABOR, as licensor, will not grant the same permissions to other parties.

Exclusive FOU License: Permits another party, the licensee, exclusive permission to practice in a specified field-of-use (FOU) one or more rights in intellectual property owned by ABOR, as licensor. Licensor agrees not to license technology within the field-of-use to any other parties but may license the technology outside the field of use. Licensee may not practice outside the field-of-use.

Exclusive License: Permits another party, the licensee, to practice one or more rights in intellectual property owned by ABOR, as licensor, and represents that similar permissions will not be granted to other parties. This general term is usually used when the licensed rights are neither patents nor copyrights (they might be technical information).

Exclusive Option: Provides the counterparty the exclusive right, but not the obligation, to obtain a license to a defined ABOR-owned intellectual property package within a set period of time. Depending upon the purpose, the option may be a simple letter agreement or a multi-page agreement with an unsigned fully-negotiated license attached. Consideration is paid by the counterparty for the option, and an offer to license may not be made to anyone else by ABOR.

Exclusive Patent License: Permits another party, the licensee, permission to enjoy one or more of the standard rights of a patent owner (make, use, sell, have made, or have imported the patent invention), and represents that the ABOR, as licensor, will not grant the same permissions to other parties.

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Inter-Institutional Agreement: An agreement between two or more nonprofit organizations governing the management of jointly-owned intellectual property, i.e., where more than one institution has ownership rights. Typically, the agreement will allow one institution the right to license the jointly-owned intellectual property on behalf of the owners.

Letter of Intent: Letter agreement to enter into good-faith negotiations for a commercialization agreement. It may or may not involve consideration.

License: Permits another party, the licensee, to enjoy one of the intellectual property rights owned by ABOR, as licensor. This general term is usually used when the licensed rights are neither patents nor copyrights (they might be technical information).

Memorandum of Understanding: An agreement setting forth the understanding between parties relative to certain rights to, or handling of, technology.

Nonexclusive Copyright License: Permits another party, the licensee, permission to enjoy one or more of the five rights of a copyright owner (modify, reproduce, redistribute, publicly display, and perform the copyrighted work of authorship), but makes no representation that similar permissions will not be granted to other parties.

Nonexclusive License: Permits another party, the licensee, to enjoy one of the intellectual property rights owned by ABOR, as licensor. The license makes no representation that similar permissions will not be granted to other parties. This general term is usually used when the licensed rights are neither patents nor copyrights (they might be technical information).

Non-Exclusive Option: An agreement to have non-exclusive rights to evaluate ABOR intellectual property for a defined period of time to determine whether or not to proceed with a licensing agreement. ABOR can enter into other non-exclusive option agreements with other counterparties.

Nonexclusive Patent License: Permits another party, the licensee, permission to enjoy one or more of the rights of a patent owner (e.g., make, use, or sell the patented invention), but makes no representation that ABOR, as licensor, will not grant the same permissions to other parties.

Option Agreement: Gives another party, as optionee, a right, but not a duty, to negotiate for a license to intellectual property, such as patents or copyrights owned by ABOR. A limited-term option agreement is often used preliminary to a patent or copyright license.

Research and Assignment Agreement: Provides for a specifically identified line of narrow and fully-funded research to be undertaken at the university for the other party,

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and gives the funding party assignment of any intellectual property that arises in the university while performing the research at the end of the contract. Aside from the requirement that such research be at full cost (unsubsidized), other special terms for such agreements are set by ABOR intellectual property policy and each university.

Research and Option Agreement: Provides for a specifically identified line of research to be undertaken at the university, usually with funding from the other party, and, in addition, gives the funding party, usually a company, an option to negotiate for a license of any intellectual property that arises in the university while performing the research.

Research Contract: Agreement under which consideration is paid by parties outside the university to have research work performed by the university.

Royalty: In broadest terms, a royalty is consideration paid by the counterparty to a licensing agreement for the use of ABOR-owned intellectual property, though often the term is used only to refer to a percentage of sales to be paid to the licensor. Distinction may be made among types of consideration made. A running royalty is a royalty on product sales. An annuity is a recurring fixed payment in lieu of a running royalty. Milestone payments or royalties are payments made to the licensor when pre-defined events representing an increase or proof of intellectual property value occurs. Minimum annual royalties or minimum annual fees are fixed sums representing the minimum consideration expected in a given year by the licensor for the licensee's use (rental) of the intellectual property.

Royalty Income Sharing Agreement: An agreement to share royalties that usually is associated with consolidating rights or permissions to license a technology that is not completely owned by one party.

Standstill Agreement: An agreement where the intellectual property owner agrees to suspend an activity, such as entering into license negotiations with any party, for a defined period of time while a counterparty evaluates an ABOR technology or takes some other action in support of their decision-making towards licensing.

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INFORMATION ITEM: FY 2007 REPORT ON TECHNOLOGY TRANSFER AT ARIZONA STATE UNIVERSITY

ISSUE: This University Technology Transfer Report is submitted in compliance with Article G of the ABOR Policy 6-909.10 "Technology Transfer Policy." The purpose of this report is to highlight the activities and performance of ASU and Arizona Technology Enterprises (AzTE), the technology commercialization and intellectual property management company for ASU, in the area of technology transfer for the fiscal year ending June 30, 2007.

BACKGROUND:

This report provides an overview of historical data as well as the highlights of ASU's patenting and licensing activities for FY 2007. Through AzTE, ASU has accelerated the growth of its technology transfer initiatives by emphasizing technology licensing, start-up company formation, and proof-of-concept investment in promising discoveries. In FY 2007, some of AzTE's primary objectives included (1) increasing the number of invention disclosures, (2) creating investable start-up companies based on ASU technology, and (3) increasing commercialization revenue. AzTE accomplished or exceeded each of these stated objectives in FY 2007.

DISCUSSION:

I. Technology Transfer Statistics for FY 2003-FY 2007

Table 1 provides a current and historic overview of ASU's technology transfer activities for the five years ending June 30, 2007. In summary, for FY 2007 AzTE reports 152 new invention disclosures, 135 new U.S. patent applications filed, and 17 U.S. patents issued. In addition, 23 transactions involving ASU technology were executed in FY 2007.

TABLE 1: Technology Transfer Statistics for FY 2003-FY 2007

	FY 2007		FY 2006		FY 2005		FY 2004		FY 2003	
	Actual	%*	Actual	%*	Actual	%*	Actual	%*	Actual	%*
Invention Disclosures	152	3	148	23	120	26	95	10	86	-11
U.S. Patent Applications	135	55	87	-12	99	-8	108	-18	132	22
U.S. Patents Issued	17	-15	20	5	19	6	18	6	17	55
Licenses/Options	23	-41	39	39	28	40	20	122	9	0
Other Major Agreements **	68	36	50	14	44	175	16	300	4	0

* Percentage change from prior year.

** Other Major Agreements are those requiring significant licensing staff time to negotiate, including Inter-Institutional Agreements, Master assignments, or other agreements.

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II. Revenue and Distributions for FY 2003-FY 2007

AzTE budgeted \$3,448,475 in operating expenses for FY 2007. Actual FY 2007 operating expenses were \$3,980,414 (net of legal reimbursements), approximately 15% over budget. The increased expenditures in FY 2007 are primarily attributed to additional patent prosecution costs and outside legal fees incurred. Table 2 summarizes financial data for ASU's technology transfer program for the five years ending June 30, 2007.

TABLE 2: Technology Transfer Financial Data for FY 2003-FY 2007

	FY 2007		FY 2006		FY 2005		FY 2004		FY 2003	
	Actual	%*	Actual	%*	Actual	%*	Actual	%*	Actual	%*
Licensing and Other Revenue:										
Licensing Revenue	\$3,600,489	7	\$3,377,805	57	\$2,154,045	69	\$1,275,961	17	\$1,092,785	-38
Licensee Legal Reimbursement	\$687,866	185	\$241,745	0	\$241,979	100	\$121,124		N/A	
Options & Other Revenue	\$76,000	-53	\$160,200	-5	\$169,375	584	\$24,750		N/A	
Total	\$4,364,355	16	\$3,779,750	47	\$2,565,399	80	\$1,421,835	30	\$1,092,785	-38
Sponsored Research Generated by AzTE	\$293,000	-49	\$570,289	60	\$356,733	-17	\$430,509	-63	\$1,166,298	0
Royalty Distribution:										
Inventors	(\$959,782)	239	(\$283,014)	-50	(\$561,298)	82	(\$308,515)	-11	(\$345,357)	-12
Laboratories & Units	(\$954,777)	175	(\$347,800)	-34	(\$529,779)	75	(\$302,860)	-11	(\$340,384)	-9
University	(\$826,762)	166	(\$310,688)	-36	(\$487,611)	68	(\$290,716)	-5	(\$307,405)	-2
Undistributed	\$64,227	-73	\$239,463	131	\$103,838	-58	\$246,196		N/A	

* Percentage change from prior year.

Note: The majority of undistributed royalties are a result of the cash received at year-end for which AzTE and ASU had not processed the distribution.

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III. Summary of FY 2007 Patent Activity

A. FY 2007 Invention Disclosure and Associated Patent Activity

Table 3 provides a breakdown of FY 2007 patent filing and issuance activity across ASU's academic departments to identify where technology patenting activity is concentrated.

TABLE 3: FY 2007 Invention Disclosures by Major Academic and Research Units

Academic or Research Unit	Disclosures Received	U.S. Provisional Patents Filed	U.S. Non-Provisional Patents Filed	PCT ² Applications Filed	Patents Issued	
					U.S.	Other
Biodesign Institute	52	33	7	3	1	0
Chemistry & Biochemistry	18	14	9	3	4	0
College of Nursing	1	0	0	0	0	0
Flexible Display Center	3	2	0	0	0	0
Fulton School of Engineering	68	39	19	7	10	19
Hugh Downs School of Communication	0	0	0	0	1	0
Innovation Space - School of Design	5	0	0	0	0	0
Phoenix - Fletcher Library	1	0	0	0	0	0
Phoenix - Office of Youth Preparation	1	0	0	0	0	0
Physics	6	2	4	2	0	0
Polytechnic - Applied Biological Sciences	3	6	0	3	0	0
Polytechnic - Mechanical and Manufacturing Engineering Technology	2	0	0	0	0	0
Polytechnic - School of Educational Innovation	1	0	0	0	0	0
School of Business	1	0	0	0	1	0
School of Design (Non-Innovation Space)	2	0	0	0	0	0
School of Geographical Sciences	1	1	0	0	0	0
School of Kinesiology	1	0	1	0	0	0
School of Life Sciences	7	4	3	1	2	14
School of Mathematics	1	0	0	0	0	0
School of Psychology	2	0	0	0	0	0
West - College of Teacher Education and Leadership	1	0	0	0	0	0
Totals	177	101	43	19	19	33
Total Unique Disclosures or Patents ¹	152	97	38	20	17	33

¹ Disclosures and patents may involve more than one academic unit, especially in interdisciplinary areas.

² PCT = Patent Cooperation Treaty: Global Applications with an 18-month life.

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B. Issued Patents

The following are two examples of patents that have been issued to ASU during FY 2007:

Patent No. 7,071,431 Issued: 7/4/2006 Title: "Electronically Latching Micro-Magnetic Switches and Method of Operating Same"

Inventors: Meichun Ruan, Jun Shen, Charles Wheeler

This invention relates to latching micro-magnetic switches with low power consumption and to methods of formulating and operating micro-magnetic switches. Switches are typically electrically controlled two-state devices that open and close contacts to affect operation of devices in an electrical or optical circuit. Relays are commonly used in many applications including telecommunications, radio frequency (RF) communications, portable electronics, consumer and industrial electronics, aerospace, and other systems. A bi-stable, latching switch that does not require power to hold the states is, therefore, desired. Such a switch should also be reliable, simple in design, low-cost and easy to manufacture, and should be useful in optical and/or electrical environments.

Patent No. 7,132,837 Issued: 11/7/2006 Title: "System and Method for Measuring Conductivity on Molecular Level"

Inventor: Nongjian Tao

This invention relates in general to nanotechnology and, more particularly, to a system and method of measuring conductivity on the molecular level. Many practical devices used in industry and in various applications of technology continue to dramatically reduce in feature size. In the field of nanotechnology, device miniaturization has reached the boundary of the molecular level. Work is ongoing to achieve practical devices in areas such as microelectronics, chemical sensors, and bio-sensors, which are quantified in terms of numbers of molecules. A need exists to accurately and repeatably measure the electrical conductivity of a determinable number of one or more molecules. This invention is a conductivity measurement system for measuring conductivity of molecules comprising first and second electrodes.

IV. Summary of FY 2007 Highlighted Activities

A. Start-Up Company Activity

Four new ASU start-ups were created in FY 2007, each with funding and management. Start-ups are defined as companies that have completed a license agreement with AzTE for intellectual property owned by ABOR on behalf of ASU.

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Helicos, a new DNA sequencing company that was created in FY 2005 through ASU technology developed by Dr. Peter Williams, went public on the NASDAQ exchange in May 2007. A summary of each of the four FY 2007 start-ups is listed below:

- **USuggest, LLC:** USuggest, LLC is a social networking company whose mission is to create a virtual community where products are discovered and sold through trusted person-to-person recommendations at the company's website, www.usuggest.com. The USuggest concept is the result of several years of collaboration between Assistant Professor Dr. Hasan Davulcu of the Dept. of Computer Science and Engineering and Prabhdeep Singh at ASU. AzTE has filed for patent protection on the company's proprietary privacy-preserving, rewards-driven deal suggestion technology. The company has received several rounds of angel seed funding and formally launched its website in 2007.
- **4Blox, Inc.:** 4Blox, Inc. is an accelerator technology company for Storage Area Networks (SAN's) that are based on the ISCSI (Internet Small Computer System Interface) protocol. SAN storage is predominantly a block-storage architecture used in a wide variety of applications, including online transaction processing, database, email, IPTV, VOD and streaming environments. The core product from 4Blox is a family of software components used to expand CPU processing capacity in ISCSI Storage Area Networks. The company's technology was developed by Dr. Joseph Hui, Professor in the Dept. of Electrical Engineering at ASU, and Dr. Sai Narasimhamurthy. 4Blox successfully completed a Series A round of venture funding in 2007 and has concluded its first commercial product sale.
- **Fluidic Fuel Cell, Inc.:** Fluidic Fuel Cell, Inc. is an ASU spin-out created to develop nanoscale materials for hydrogen storage and fuel cell production. The company was created to commercialize technology developed by Dr. Cody Friesen, Professor in the Dept. of Chemical and Materials Engineering. The three main technological roadblocks that must be overcome for any potential hydrogen economy to come about are hydrogen production, hydrogen storage, and hydrogen use. Fluidic Fuel Cell is addressing each of these issues with government funding as well as private venture funding that was successfully raised in 2006.
- **PetroAlgae, LLC:** PetroAlgae, LLC is commercializing new technologies to grow and harvest oil from algae. This process creates a sustainable, renewable, cost-effective substitute for petroleum oil and a reliable, environmentally friendly feedstock source for biodiesel. The company is utilizing natural strains of microalgae developed by Drs. Milton Sommerfeld and Qiang Hu of the ASU School of Life Sciences and bred selectively over many generations to produce rapid growth and extremely high oil yield. PetroAlgae's modular algae cultivation bioreactor system can be built and operated on a large scale, thereby creating the opportunity to

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produce a cost-effective alternative to traditional oil supplies. The company is owned by XL Tech Group, a publicly traded company on London's AIM exchange.

B. Licenses and Options Signed

In addition to the licenses and options that have been granted to the ASU start-up companies described above, AzTE consummated licensing and other transactions during FY 2007. Examples include:

- **ST Microelectronics:** ST Microelectronics is one of the world's largest semiconductor companies with net revenues of \$10 billion in 2006. According to the latest industry data, the company is the world's fifth largest semiconductor company with market leadership in many fields. ST is also working on the research and development of hydrogen-based fuel cells that will out-perform other fuel cell technologies in terms of power density and compactness. The company has licensed fuel cell technology developed by Drs. Frederic Zenhausern and Dominic Gervasio of the ASU Center for Applied Bioscience. The technology relates to a low-temperature micro-fluidic fuel cell system for portable communication applications. The non-exclusive license terms include an upfront fee and milestone payments.
- **Abcam:** Abcam Plc is a producer and distributor of research-grade antibodies and associated products headquartered in Cambridge, UK, with U.S. offices located in Cambridge, MA. The company has built one of the largest on-line catalogs for antibodies in the world. Research-grade antibodies are used as fundamental detection tools by bio-scientists to develop theories of how a diseased cell malfunctions, which is the first step in targeted development of treatment or cures for diseases. Abcam has paid an upfront fee and will pay future royalties on the sale of antibodies developed by Dr. Stephen Johnston, Director of the Center for Innovations in Medicine at ASU Biodesign Institute.
- **Schering-Plough Corporation:** Schering-Plough is a global science-based health care company with leading prescription, consumer, and animal health products. Through internal research and collaborations with partners, Schering-Plough discovers, develops, manufactures, and markets advanced drug therapies to meet important medical needs. The company has licensed technology developed by Dr. Dean Kashiwagi of the ASU Del E. Webb School of Construction. Dr. Kashiwagi's PIPS (Performance Information Procurement System) software program is designed to increase the operational efficiency of large multi-national corporations through performance algorithms. The non-exclusive license agreement with Schering-Plough includes a one-time upfront fee.

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- **Herman Miller, Inc.- ASU Innovation Space:** Herman Miller is a leading global provider of office furniture systems and services. InnovationSpace is an entrepreneurial joint venture among the College of Design, Ira A. Fulton School of Engineering, and W.P. Carey School of Business at Arizona State University. The goal of the transdisciplinary education and research lab is to teach students how to develop products that create market value while serving real societal needs and minimizing impacts on the environment. Herman Miller has paid an option fee to work with students within Innovation Space to develop future products for its company.

C. Other Activities

The following is an overview of other AzTE activities for FY 2007:

- **Operational Achievements:** AzTE continued to achieve significant milestones during FY 2007. These included: (1) 16% year-over-year revenue growth from FY 2006 to FY 2007; (2) 3% increase in new invention disclosures through targeted faculty outreach; (3) four new spin-out companies launched; and (4) 55% increase in patent applications as a result of enhanced scrutiny of new invention disclosures through AzTE's Intellectual Property Review Process.
- **AzTE Catalyst Fund:** During FY 2007, AzTE catalyzed promising ASU technologies that were in need of additional funding to advance commercial opportunities. In FY 2007, AzTE invested a total of \$385,560 in 8 distinct technology areas including bacteria detection in water, solar energy, sensors, therapeutic drug compounds, DNA sequencing, and semiconductor processing.

RECOMMENDATION:

This FY 2007 Technology Transfer Report for Arizona State University is provided as information to the Board.

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INFORMATION ITEM: FY 2007 ANNUAL REPORT ON TECHNOLOGY TRANSFER AT NORTHERN ARIZONA UNIVERSITY

ISSUE: This University Technology Transfer Report is submitted in compliance with Article G of ABOR Policy 6-909.10 "Technology Transfer Policy" by the Office of the Vice President for Research at Northern Arizona University. The purpose of this report is to highlight the activities and performance in the area of technology transfer for the fiscal year ending June 30, 2007.

BACKGROUND:

NAU's technology transfer program continued to develop during FY 2007. A major goal of NAU's technology transfer program continues to be to seek opportunities to collaborate with the corporate sector, as well as more fully develop the technology transfer enterprise. To meet this goal, campus activities continue to increase awareness of faculty, staff, and students regarding ABOR intellectual property policies and potential prospects for technology transfer. Many of these activities involve the participation of Arizona Technology Enterprises (AzTE), which handles much of NAU's technology transfer activity.

DISCUSSION:

I. Technology Transfer Statistics for FY 2003-FY 2007

Table 1 summarizes Northern Arizona University's technology transfer statistics for the five years ending June 30, 2007.

TABLE 1: Technology Transfer Statistics for FY 2003-FY 2007

	FY 2007		FY 2006		FY 2005		FY 2004		FY 2003	
	Actual	%*	Actual	%*	Actual	%*	Actual	%*	Actual	%*
Invention Disclosures	6	0	6	-45	11	450	2	-50	4	-50
U.S. Patent Applications	3	-50	6	100	3	200	1	-75	4	0
U.S. Patents Issued	2	100	1	-50	2	100	1	0	1	0
Licenses/Options	0	-100	1	--	0	--	0	-100	1	0
Other Major Agreements **		**	**	**	**	**	**	**	**	**

* Percentage change from prior year.

** Other Major Agreements are those requiring significant licensing staff time to negotiate, including Inter-Institutional Agreements, Master assignments, or other agreements. It is a new category that NAU has just begun to track; therefore, we do not have prior data to report.

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In FY 2007, NAU faculty and researchers filed 6 discovery disclosures, which is the same number of discovery disclosures filed in FY 2006. The number of U.S. patent applications decreased by 50%, from 6 in FY 2006 to 3 in FY 2007. The number of patents issued doubled from 1 in FY 2006 to 2 in FY 2007. NAU had no license or option activity in FY 2007.

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II. Revenue and Distributions for FY 2003-FY 2007

Table 2 summarizes the financial summary for Northern Arizona University's technology transfer program for the five years ending June 30, 2006.

TABLE 2: Technology Transfer Financial Data for FY 2003-FY 2007

	FY 2007		FY 2006		FY 2005		FY 2004		FY 2003	
	Actual	%*	Actual	%*	Actual	%*	Actual	%*	Actual	%*
Licensing and Other Revenue:										
Licensing Revenue	\$0		\$170,000		\$0		\$0		\$0	
Licensee Legal Reimbursement	\$0		\$0		\$0		\$0		\$0	
Options & Other Revenue	\$0		\$0		\$0		\$0		\$0	
Total	\$0		\$170,000		\$0		\$0		\$0	
Sponsored Research Generated by NAU Tech Transfer	\$0		\$0		\$0		\$0		\$0	
Royalty Distribution:										
Inventors	\$0		\$18,469		\$0		\$0		\$0	
Laboratories & Units	\$0		\$0		\$0		\$0		\$0	
University	\$0		\$18,469		\$0		\$0		\$0	
Undistributed	\$0		\$0		\$0		\$0		\$0	

* Percentage change from prior year.

Note: Undistributed royalties arise predominantly from research assignment agreements requiring the completion of the term of research sponsorship prior to distribution.

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III. Summary of FY 2007 Patent Activity

A. FY 2007 Invention Disclosure and Associated Patent Activity

Table 3 provides a summary of disclosure and patenting activity by major academic and research units to identify where technology patenting activity is concentrated.

TABLE 3: FY 2007 Invention Disclosures by Major Academic and Research Units

Academic or Research Unit	Disclosures Received	U.S. Provisional Patents Filed	U.S. Non-Provisional Patents Filed	PCT ¹ Applications Filed	Patents Issued	
					U.S.	Other
College of Arts and Letters	1	0	0	0	0	0
College of Engineering and Natural Science	3	2	0	1	2 ²	0
School of Forestry	2	0	0	0	0	0
Total	6	2	0	1	2	0
Total Unique Disclosures or Patents	6	2	0	1	2	0

¹PCT = Patent Cooperation Treaty: Global Applications with an 18-month life.

²Both of these patents were continuation patents of inventions that received previous patents. These continuations patents are granted to additional components related to a previous patent, but are not an exact replicant of the previous patent.

B. Issued Patents

The two patents issued to NAU during FY 2007 were continuation applications. They were for the following inventions:

U.S. Patent No. 7,083,547 Issued: 8/01/2006 Title: “Method and Apparatus for Speed Controlled Eccentric Exercise Training”

Inventors: LaStayo, Paul; Linstedt, Stan; and Hoppler, Hans.

This recumbent stationary bicycle utilizes a motor to drive pedals in reverse direction, which is different from most exercise bikes. Cardiac patients, the elderly, and athletes find this device useful for strengthening the leg muscles without the strain of aerobic exercise or weightlifting. This product resulted in a start-up company called Eccentron LLC in 2004.

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U.S. Patent No. 7,168,294 Issued: 1/30/2007 Title: Embedded Piezoresistive Microcantilever Sensors

Inventors: Eastman, Michael; Porter, Timothy; and Macumber, Clay.

Originally issued a patent in 2004, this basic sensor platform can be used in the detection of numerous chemical and biological species with applications to environmental sensing, homeland security, and defense. It was licensed to the Cantimer Company in 2006.

IV. Summary of FY 2007 Highlighted Activities

A. Start-Up Company Activity

NAU does not have any start-up company activity to report for FY 2007.

B. Licenses and Options Signed

NAU does not have any licenses and options activity to report for FY 2007.

C. Other Activities

NAU does not have any activity to report in this area for FY 2007.

RECOMMENDATION:

This FY 2007 Technology Transfer Report for Northern Arizona University is provided as information to the Board.

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INFORMATION ITEM: FY 2007 ANNUAL REPORT ON TECHNOLOGY TRANSFER AT THE UNIVERSITY OF ARIZONA

ISSUE: This University Technology Transfer Report is submitted in compliance with Article G of ABOR Policy 6-909.10 "Technology Transfer Policy" by the Office of Technology Transfer (OTT) of The University of Arizona (UA). The purpose of this report is to highlight the activities and performance in the area of technology transfer for the fiscal year ending June 30, 2007.

BACKGROUND:

The OTT continues to focus on technology transfer activities that enhance infrastructure, operations, and execution. Efforts in FY 2007 included expanding approaches to marketing, solidifying partnerships with internal and external organizations to leverage our resources, and increasing the number of license-based relationships contributing to the success of UA and Arizona. The OTT continues its portfolio-based approach to licensing, emphasizing long-term returns to the University.

DISCUSSION:

I. Technology Transfer Statistics for FY 2003-FY 2007

Table 1 summarizes the technology transfer statistics for the five years ending June 30, 2007. The OTT works closely with the faculty on disclosures to improve quality and outcomes within a philosophy of intellectual property by design.

TABLE 1: Technology Transfer Statistics for FY 2003-FY 2007

	FY 2007		FY 2006		FY 2005		FY 2004		FY 2003	
	Actual	% ¹	Actual	% ¹	Actual	% ¹	Actual	% ¹	Actual	% ¹
Invention Disclosures ²	104	18	88	-14	102	7	95	-14	111	0
U.S. Patent Applications	125	23	102	1	101	11	91	23	74	32
U.S. Patents Issued	10	-33	15	50	10	-44	18	50	12	50
Licenses/Options	30	15	26	-19	32	3	31	29	24	4
Other Major Agreements ³	10	-60	16	-6	17	70	10	150	4	-55

¹ Percentage change from prior year.

² Records show 104 technically complete disclosures from the 117 received in FY 2007. (OTT tightened standards for technical completeness of disclosures in 2006.)

³ Other Major Agreements are those agreements other than licenses and options which also require significant licensing staff time to negotiate, such as Inter-Institutional Agreements, Master Agreements, or Research and Assignment Agreements.

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In FY 2007, the OTT licensing staff, represented by slightly fewer than 4 licensing full-time equivalents (LFTE), executed 40 significant transactions, which included 30 licenses and options with companies across the technology spectrum of size and interests, and 10 other major agreements. Of the licenses executed, 3 were to start-ups that conform to the Association of University Technology Managers (AUTM) definition where the license to the company is signed and technology involved is foundational to the creation of the company. Licenses, options, and other major agreements involve considerable effort by licensing professionals to execute, and represent one major output of the OTT.

The changes implemented in FY 2006 to improve disclosure quality were well communicated in FY 2007, bringing the disclosure metric back up to former levels while maintaining the improvement in quality sought in FY 2006. In the current fiscal year, the rate of disclosure is exceeding that of all previous years. The OTT's concentration on working early with the faculty in the innovation process has resulted in more patent filings and successful transactions for disclosures received.

A corresponding increase in the number of issued patents has yet to follow the increase in patent applications filed. We believe this is due to delays caused by the volume of patent applications to be examined by the U.S. Patent Office. FY 2007 patent issuances still do not reflect the positive effects of an increased filing rate over the last several years.

With an eye on future licensing potential, the OTT negotiated over 59 Confidential Disclosure Agreements to share UA information with interested companies; 52 outbound transfers of ABOR-owned biological materials; and 4 Letters of Understanding. These contracts enable UA to disclose proprietary technology or make proprietary materials available to companies as a possible first step in the formal adoption and commercial licensing of ABOR-owned intellectual property. The OTT continues to facilitate sponsored research in several ways, including assisting the UA Office of Research and Contract Analysis (ORCA) in complex or difficult intellectual property negotiations. For inventions made with federal grants, the OTT is responsible for reporting the invention to the granting agency and keeping the government informed on the status of any patent filings and commercialization efforts.

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II. Revenue and Distributions for FY 2003-FY 2007

Table 2 presents the five-year financial summary for technology transfer. FY 2007 revenues from licenses and options (income excluding cost recovery) decreased to about \$1.2 million as the external patent management firm handling UA's drug to treat sexual dysfunction initiated a lawsuit to receive payment they believed was due to them (and UA) from their licensee; they recently initiated termination of the license as well. Under the terms of the assignment to the firm, legal costs may be recovered from any revenue under the license prior to distribution among the parties.

Legal cost recoveries in FY 2007 for UA patent expenditures in past years as part of transactions decreased, but remained above 60% of the OTT's current legal expenditures of roughly \$500,000; the average cost recovery ratio for universities reporting to AUTM is about 45%. The OTT increased the number of discretionary filings for patents while increasing efforts in supporting start-up and other at-risk opportunities. Total expenses as a combination of operational and legal expenditures remained at approximately \$1.5 million.

TABLE 2: Technology Transfer Financial Data for FY 2003-FY 2007

	FY 2007		FY 2006		FY 2005		FY 2004		FY 2003	
	Actual	%*	Actual	%*	Actual	%*	Actual	%*	Actual	%*
Licensing and Other Revenue:										
Licensing Revenue	\$1,076,989	-33	\$1,616,914	63	\$993,842	34	\$742,210	-5	\$782,232	N/A
Licensee Legal Reimbursement	\$310,358	-27	\$423,302	.01	\$425,351	28	\$332,075	20	\$277,401	N/A
Options & Other Revenue	\$114,141	59	\$71,943	-60	\$182,073	-32	\$266,411	-9	\$294,638	N/A
Total	\$1,501,488	-29	\$2,112,159	32	\$1,601,266	19	\$1,340,696	-1	\$1,354,271	N/A
Sponsored Research Generated by UA OTT	\$459,929	-40	\$768,900	26	\$610,000	-28	\$847,175	38	\$615,527	N/A
Royalty Distribution:										
Inventors	(\$414,724)	-32	(\$608,540)	70	(\$358,706)	21	(\$296,265)	-13	(\$340,416)	37
Laboratories & Units	(\$338,497)	-32	(\$496,125)	157	(\$193,150)	-2	(\$197,510)	-13	(\$226,943)	37
University	(\$323,424)	-32	(\$472,914)	22	(\$388,876)	46	(\$265,880)	33	(\$200,635)	-26
Undistributed	\$114,485	3	\$111,278	-53	\$235,183	-6	\$248,996	-19	\$308,876	981

* Percentage change from prior year.

Note: Undistributed royalties arise predominantly from research assignment agreements requiring the completion of the term of research sponsorship prior to distribution.

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III. Summary of FY 2007 Patent Activity

A. FY 2007 Invention Disclosure and Associated Patent Activity

Table 3 provides a summary of disclosure and patenting activity by major academic and research units.

TABLE 3: FY 2007 Invention Disclosures by Major Academic and Research Units

Academic or Research Unit	Disclosures Received	U.S. Provisional Patents Filed	U.S. Non-Provisional Patents Filed	PCT ¹ Applications Filed	Patents Issued	
					U.S.	Other
College of Ag & Life Sciences	12	8	4	4	4	2
College of Education	1	0	0	0	0	0
College of Engineering & Mines	25	19	4	2	3	0
College of Medicine	31	34	11	5	9	5
College of Nursing	2	1	0	0	0	0
College of Optical Sciences	26	25	3	5	1	0
College of Pharmacy	13	15	5	2	2	0
College of Science	17	25	11	3	0	1
Eller College of Management	1	0	0	0	0	0
Research Division (BIO5 Institute)	37	30	19	4	7	2
Totals²	165	157	57	25	26	10
Total Unique Disclosures or Patents ³	99	91	33	21	10	6

¹PCT = Patent Cooperation Treaty: Global Applications with an 18-month life.

²Disclosures and patents may involve more than one academic unit, especially in interdisciplinary areas.

³Total Unique Disclosures may be less than actual total for the fiscal year if nonacademic units disclose (e.g., Purchasing). See Table 1 for definitive fiscal year total.

B. Issued Patents

Two examples of the 10 U.S. patents that were granted to The University of Arizona in FY 2007 are:

U.S. Patent No. 7,079,730 Issued: 7/18/2006 Titled: "Integrated Hybrid Optoelectronic Devices"

Inventors: Fallahi, Mahmoud; Fardad, Amir

This invention covers a hybrid optoelectronic device and method of producing the hybrid device based to provide a sol-gel application process which overcomes shortcomings of traditional sol gel materials and has the requisite low-loss, polarization insensitivity, and large bandwidth needed for integration of active and passive optical components into complex optoelectronic devices. Such active optoelectronic devices provide a platform for hybrid optoelectronic

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integration, wherein silicon substrates can be used as heat sinks and optical benches for optoelectronic chips such as laser diodes, coupling output from the optoelectronic devices into passive glass waveguides (filters, splitters, etc.) These devices address issues in existing devices such as inherent losses in the sol gel glasses at the desired operating frequency, unintentional losses due to light scatter at sol-gel glass/air interfaces, and limitation on the design of passive optical components.

U.S. Patent No. 7,158,862 Issued: 1/2/2007 Title: “Method and System for Mining Mass Spectral Data”

Inventors: Liebler, Daniel C.; Hansen, Beau T.; Mason, Daniel E.; Davey, Sean W.; Jones, Juliet A.; McClure, Thomas

This patent covers a method, system, and computer program product for mining mass spectral data to detect chemical-specific characteristic features in large databases and/or files. The approach includes specifying spectral characteristics of mass spectra to mine, specifying a relationship between the spectral characteristics, searching the mass spectra for portions of the mass spectra which match the spectral characteristics based on the relationship, and assigning scores to the portions of mass spectra to indicate a degree of correlation between the portions of mass spectra and the spectral characteristics. The patented method and system speeds the mining of data and enhances the results. It is well suited to large databases including those resulting from protein studies and associated bioinformatics.

IV. Summary of FY 2007 Highlighted Activities

A. Start-Up Company Activity

Three start-up companies were formed in FY 2007, with several other transactions carrying across into FY 2008. Start-ups in this context refer to companies who have completed a license transaction with the OTT for intellectual property owned by ABOR on behalf of UA and that the technology transferred is foundational to formation of the company.

- Behavior Support Specialists, LLC is a professional services and educational training company providing advanced training for special education and other support personnel dealing with challenging behaviors in their client populations. The company has licensed program and other materials created at the University and offers its services to a market unserved by the University. The company is self-funded through the services it offers and is located in Tucson, Arizona. The University researchers involved are Drs. John Umbreit, Jolenea B. Ferro, and Carl J. Liaupsin from UA's College of Social and Behavioral Sciences.

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- RediRipe, LLC is an agricultural product company providing a simple ripeness indicator sticker which can be placed on fruit and vegetables to help growers choose the optimum time for harvesting their crops. The patented detection technology was developed at UA in conjunction with the Washington State Apple Growers. The privately financed company is located in Albuquerque, New Mexico, and involves researcher Dr. Mark R. Riley of UA's College of Agriculture and Life Sciences.
- Climate Appraisal Services LLC is a consumer information services company offering consumers Web-accessible customized reports on geological and meteorological factors which may affect their property values. Utilizing expertise and models developed by researchers at UA's Institute for the Study of the Planet Earth (ISPE), Climate Appraisal Services provides consumers and others access to the latest information arising from state-of-the-art climate and geological research including expected sea-level rise in coastal areas. The company is privately financed and is located in Easton, Connecticut. The researchers from UA's College of Science and ISPE are Drs. Jonathan T. Overpeck, Susan L. Beck, Andrew C. Comrie, Julia E. Cole, and George Zandt.

B. Licenses and Options Signed

In addition to the start-ups outlined above, companies involved in technology adoption in FY 2007 included large corporations, such as Merck, 3M, and BOC; mid-stage companies, such as RTI Healthcare and Healthcare Technology Systems; and a variety of small companies and organizations, including such local Tucson companies as MediPacs, Inc. Examples of innovations transferred under licenses or options include:

- **Pioneer Hybrid:** Pioneer Hybrid is one of the world's leaders in plant breeding and agricultural biotechnology. Pioneer has non-exclusively licensed technology, developed by Drs. Bryan Gibbon and Brian Larkin of UA's Department of Plant Sciences, which allows for improved seed characteristics.
- **GleeCo:** GleeCo is a Tucson small company focused on developing and commercializing innovative and efficacious speech/physical/occupational therapy treatments for people with Parkinson's disease and other neurological disorders. GleeCo has licensed the UA's ThinkBIG/LearnBIG program intellectual property developed by Dr. Rebecca Farley of UA's Department of Physiology. The novel therapy program combines therapeutic regimes for motor and cognition systems demonstrating that behavioral intervention may have distributed effects across seemingly varied systems. For example, voice treatments can be applied to not only

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improve speech and voice but also motor skills associated with neurologically impaired patients such as those with Parkinson's disease. The exclusive license agreement includes upfront and annual fees as well as cost recoveries and royalties.

- **EcoSnow:** EcoSnow is a subsidiary of BOC focused on creating next generation environment-friendly tools for semiconductor manufacturing. EcoSnow has exclusively licensed technology for cleaning photoresist from silicon wafers developed by Drs. Srin Raghavan and Peggy Sue Cross of the Department of Materials Science and Engineering. The exclusive license agreement includes an upfront fee, cost recoveries, annual fees, and royalties on product sales.
- **Healthcare Technology Systems:** Healthcare Technology Systems (HTS) is a leading provider of integrated voice recognition technology for supporting patient data collection in clinical trials conducted by pharmaceutical companies throughout the world. HTS has licensed the Arizona Sexual Experience Scale developed by the University of Arizona's Department of Psychiatry for the field of integrated voice recognition supported clinical trials exclusively for a five-year period; HTS will have non-exclusive rights thereafter. The agreement provides for a royalty to be paid to UA on revenues received by HTS, including a minimum royalty per use of the scale.

C. Other Activities

- The OTT continued its highly successful interactions with the Eller School of Business to commercialize select inventions and leverage internal relationships to extend the reach and relevance of technology transfer. To enhance the opportunities for collaboration, the OTT and the top-ranked McGuire Entrepreneurship Program have jointly hired Dr. Matt Mars to coordinate educational programs involving the two groups. The OTT staff also continues to aid the McGuire Entrepreneurship Program and the MBA program in expanded experiential exercises in high tech entrepreneurship.
- The OTT continued outreach and other activities through collaboration with various units in the University and organizations in Arizona. Among them are:
 - The Arizona Center for Innovation (AzCI), a subsidiary of the UA Campus Research Corporation, which provides incubation and business acceleration services associated with the UA Science & Technology Park through joint marketing education and communication activities.

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- The College of Science through support of graduate masters student appointments in OTT for the professional science masters program.
- The Arizona Enterprise Program with Desert Tech LLC., an organization affiliated with Southern Arizona's Desert Angels, to support proof-of-concept or proof-of-application work on UA technologies under OTT management as well as concurrent business planning by local angel investors leading to more start-ups in Arizona.
- The OTT staff continues to provide service both to the state of Arizona and nationwide through volunteer professional service activities. In FY 2007, OTT staff members were frequent volunteer speakers at local events and participated in organizing external activities, such as Southern Arizona's IdeaFunding seminar. Senior licensing associates contributed their time in professional development activities for AUTM and in mentoring student entrepreneurs within the University and its McGuire Entrepreneurship Program. In March 2007, Dr. Patrick Jones, Director, OTT, became the President of AUTM, the 3,500-member international professional society for academic technology transfer.

RECOMMENDATION:

This FY 2007 Technology Transfer Report for The University of Arizona is provided as information to the Board.