



BOARD OF REGENTS

SUMMARY OF ITEM FOR ACTION
INFORMATION OR DISCUSSION

TOPIC: Maryland Proof of Concept Alliance (information item)

COMMITTEE: Economic Development and Technology Commercialization

DATE OF COMMITTEE MEETING: November 15, 2012

SUMMARY: The Honorable Jacques S. Gansler will brief the committee on the activities and successes of the Maryland Proof of Concept Alliance (MPCA). The MPCA at the University of Maryland entered into a cooperative research agreement with the Army Research Lab to foster the commercialization of technologies through research, development, prototyping, and testing, while working with the various technology transfer offices and venture development offices within the University System of Maryland.

ALTERNATIVE(S): This item is for information purposes.

FISCAL IMPACT: This item is for information purposes.

CHANCELLOR'S RECOMMENDATION: This item is for information purposes.

COMMITTEE RECOMMENDATION:

DATE:

BOARD ACTION:

DATE:

SUBMITTED BY: Joseph F. Vivona (301) 445-2783



Maryland Proof of Concept Alliance (MPCA)

The Honorable Jacques S. Gansler, PhD*

Professor and Roger C. Lipitz Chair

Director, Center for Public Policy and Private Enterprise

School of Public Policy | University of Maryland

University System of Maryland, Board of Regents

November 15, 2012

** Dr. Gansler served as Under Secretary of Defense (Acquisition, Technology and Logistics) from 1997-2001; his most recent book is "Democracy's Arsenal: Creating a 21st Century Defense Industry" [MIT Press, 2011]*



Background

- ➔ Large research universities have rapidly escalated their involvement in “technology transfer”-- the process of transforming university research into marketable products (i.e. “commercialization”).
- ➔ The national goal is stimulating economic development by spawning new businesses and creating new, high-value jobs
 - President Obama (Fall 2011) stressed University Research and National Laboratories (see below)
- ➔ There are other implicit benefits:
 - Advance continued national technology leadership (for economic and security reasons)
 - Increased contributions to the academic research enterprise
 - Practical educational benefits for students
 - Enhancing a university's ability to retain entrepreneurial faculty
 - Contribute to the institution’s reputation for innovation
 - Enhance its reputation for providing highly-trained students for the industrial work force
 - Increased employment through small-business growth (particularly in the vicinity of the University)



Background (cont.)

- ➔ Funding for the Maryland Proof of Concept **Alliance** was received in two DoD Research appropriations (FY 2009 and FY 2010) totaling \$5.1 million [thanks to Sen. Mikulski]
- ➔ University of Maryland, College Park, entered into a cooperative research agreement with the Army Research Laboratory. The purpose of the agreement is to foster the commercialization of technologies through research, development, prototyping, and testing, while working with the various technology transfer offices and venture development offices within the University System of Maryland.
- ➔ These projects, in addition to being good commercialization candidates, will simultaneously address the Army's current and future technology needs - - they are all “dual use” items.
- ➔ Thus, the Army is a potential “first buyer”; as an important step in commercialization (including the attraction of V.C. money)



The MPCA Model – Regional Innovation Cluster -- of University, Government Labs, and Industry

Congress

↓ \$ via local gov. lab [ARL]

University P.I.

↓ With gov. lab experts and relevant specialization experts from Univ. and industry (selected by MTEC)

Selected Projects

↓ Collaborative research

Univ. Professor/Researcher
Gov. Lab Researcher
Industry Researcher

↓ Prototype demonstration (“proof of concept”)

<ul style="list-style-type: none"> • Gov. 1st buyer • VC \$ • Other funding Sources* 	}	→	<ul style="list-style-type: none"> • Commercialization • Employment
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* Industry, other government agencies, foundations



It is Increasingly Being Recognized that Technology is the key to Economic Competitiveness and Growth – as well as National Security leadership

- ➔ President Obama released “A Strategy for American Innovation,” emphasizing investing in the building blocks of American innovation
- ➔ “restoring the ability of enterprises to develop and manufacture high-technology products in America is the only way the country can hope to pay down its enormous deficits and maintain, let alone raise, its citizens’ standard of living” (Pisano & Shik, HBR, July/Aug 2009)
- ➔ China’s 5 year plan (2011-2015) recognizes this, and plans to invest \$1.5 trillion in “dual use” technologies for 7 critical, strategic industries
- ➔ U.S. National Security Strategy (in the post-WWII decades) has been “Technological Superiority”
- ➔ U.S. must take advantage of :
 - “Public/private partnerships” (Gov./Univ./Industry)
 - Regional clusters
 - Funding for research and commercialization
 - Emphasis on both product and process technology developments
 - Focus on development of high-tech workforce
 - Design for “dual-use” applications (commercial & government use)



Benefits of “Dual Use”

- U.S. economy benefits from military R&D and processes:
 - Aircraft; internet; jet engines; etc.
 - Program management; interchangeable parts; etc.
- Military benefit from civilian R&D and processes:
 - Information technology; biotechnology; nanotechnology; etc.
 - Low-cost designs and processes; high volume; etc.
- But, U.S. currently has legislative and regulatory barriers to integrated industrial operations - - and the barriers are increasing:
 - Excessive export controls; demands for data rights; specialized cost accounting; etc.
 - **These barriers must be removed!**
- Note that Russia, Japan, China, etc. have explicit national policies to encourage dual-use operations (in order to gain the benefits -- including rapid technology-transfer, overhead absorption, and low-cost focus).



Presidential Memorandum (signed by Pres. Obama), Oct 28, 2011

- ➔ “Accelerating Technology Transfer and Commercialization of Federal Research in Support of High-Growth Business”
 - Section 4: “Facilitating Commercialization through Local and Regional Partnerships”
 - “The heads of Agencies... shall implement administrative practices ... partner with external organizations such as ... University proof of concept centers, and regional innovation clusters”

- ➔ Center for American Progress
 - “Big Ideas for Small Business”, Dec. 15, 2011
 - “SBIR/STTR Programs ... do not fully address the need for earlier-stage proof-of-concept funding”
 - “...funding proof-of-concept projects is an appropriate role for the federal government to play”



More Recent Administration Report

“The Competitiveness and Innovative Capacity of the United States”
Dept. of Commerce – Jan. 2012

- ➔ “Speed the movement of Ideas from Basic Science Labs to Commercial Application”
- ➔ “Proof of Concept centers can help overcome the barriers, by supporting entrepreneurs at all stages of the development process – these centers need further encouragement”
- ➔ “The Administration is committed to helping develop these centers”



MPCA Management Approach

- ➔ Program is managed by the School of Public Policy's Center for Public Policy and Private Enterprise (CPPPE)
- ➔ Assisted by:
 - The Army Research Laboratory
 - Maryland Technology Enterprise Institute (MTECH) Program
 - USM's Special Assistant Vice Chancellor for Technology and Development
 - Smith School's Dingman Center
- ➔ Collaboration
 - ARL has identified an interested Army-wide technical POC for each of the projects
 - They have expressed interest in each project, and have worked with the Awardees. In some cases the Awardees have used ARL labs (e.g. their anechoic chamber).
 - We've also brought in Representatives from TEDCO, the Business School's Dingman Center, and the Engineering School's MTECH to meet with awardees and address business startup issues (including Business Plans).
 - We are currently working with the Dingman Center to use MPCA awardees for the experiential part of the business school's technology transfer class.



First Round Awardees

For the first round we received 42 well-developed proposals. Of these, seven projects were funded, and completed in June 2011

MPCA ID	P. I. Last Name	Campus or Company	Project Title
0105	Arnold	UMBC	Development of a Device for the Remote Detection of Vapor Phase Analytes
0108	Block (UMB)	Glicknik	Research and Development of Non-Inflammatory Surgical Sutures and Mesh
0110	Dagenais	UMCP	High power and quantum efficiency p-side down InGaN/GaN solar cell
0119	Hassel	UMB	Broad Spectrum antimicrobial activity by pharmacologic activators of RNase-L
0121	Hutcheson (UMCP)	Zymetis	Development of the Zymetis Integrated Process for biofuels production.
0132	Proctor (UMCP)	FlexEl	A Revolutionary New Thin-Film Battery To Power Military Microelectronics
0142	Yu	UMCP	Ultra-miniature fiber-optic microphone array system

Some First Round Highlights

FlexEL (flexible batteries)

- ➔ Results directly related to project:
 - Electrolyte formulation that led to high capacity primary cell, and alternative electrolyte formulation for secondary cell with lower capacity
 - Optimization of separator material for different applications
 - Understanding of underlying chemical mechanisms, with potential for future technical breakthroughs
 - Proof of low-cost manufacturability using proprietary cathode coating process
 - Recipient of V.C. funding



New power supply concept with broad market potential, such as in the lining of military/first responder jackets

“Perhaps the greatest indication of the success of our technology transfer is our relationship with a Fortune 100 commercialization partner. The company has grown from zero full-time staff at the time of grant application, to 7 full-time employees today. Our plans are to grow to 16 full-time employees by the end of this year.”

2011 Project Final Report

Some First Round Highlights

Zymetis

- ➔ Zymetis is a biotechnology company using intellectual property licensed from the University of Maryland to develop technologies for cost-effective production of biofuels and other bio-refined products.
- ➔ Work Completed Under this Grant
 1. Optimization of the protocol for cultivating of z-microbe
 2. Optimization of the high-density culture induction
 3. Feedstock pretreatment development and optimization
 4. Z-microbe strain development
 5. Design and optimization of the equipment for corn cob pretreatment and high-solids content saccharification

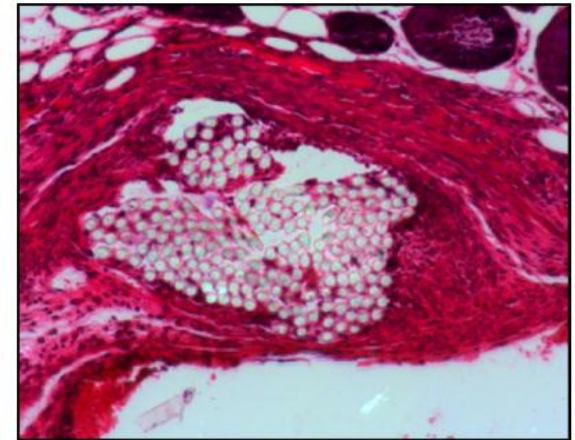
Zymetis was acquired by a renewable fuels company, AE Biofuels.

- UM had an equity position of 8.48% of Zymetis prior to the merger, which was all stock, plus debt assumption.
- UM also has a commitment to a royalty stream of 2.1% of net sales and 15% of licensing fees from sales of the technology.

Some First Round Highlights



- ➔ Gliknik has developed a series of novel, soluble therapeutic recombinant proteins which have demonstrated profound activity in animal models of autoimmune and inflammatory disease.
- ➔ This project aims to utilize the activity of these compounds when fixed on implanted devices to reduce inflammation and fibrosis associated with implantation.



Drug-coated suture :

- Minimal inflammation
- No cellular hypertrophy
- No collagen deposition

As a result of MPCA funding, GLIKNIK has raised \$2 M in additional equity capital.



Second Round Awardees

For the second round we received 40 excellent proposals. Of these seven projects were funded in March 2011, with a 12 month period of performance. (A detailed review was held in August, 2011)

MPCA ID	P. I. Last Name	Campus or Company	Project Title
203	Cross	UM Medical School	Development of anti-core endotoxin antibodies for the prevention and treatment of sepsis
207	Cullum	UMBC	Development of SERS Nanoimager for Robust Biological/Chemical Signature Identification
208	Menyuk	UMBC	Towards Commercialization of Opto-Electronic Oscillator (OEO) Design Software in Parallel with Commercialization of OEOs for Radar Applications
212	Yu*	UMCP	Fly-Ear Inspired Miniature Acoustic Localization System
226	Proctor* (UMCP)	FlexEI	Integrated Battery and Energy Harvesting System to Power Military Sensors
232	Fuhrer	UMCP	Graphene/Diamond-like-Carbon Thin Film Transistors
237	Dowling (UMCP)	Remedium Technologies	Sprayable Foam 'Reversible' Hemostat for Treatment of Non-Compressible Wounds

* FlexEI and Yu were selected for a second award, with different technologies



Third Round Awardees

➔ **R&D funds can be spread over two years; so we were able to have a third round.**

For the third round we received 28 proposals. Of these, seven projects were funded in August 2011

MPC A ID	P. I. Last Name	Campus or Company	Project Title
303	Kofinas	UMCP	Shape-Conforming Solid Polymer Electrolytes for Safer Lithium Batteries
305	Zhu	UMBC	Variable Speed Transmissions for Military Vehicles: Ground, Water, and Airborne
321	Yu*	UMCP	Surface Plasmonic Lens for Extreme Light Concentration and Manipulation
318	Milner	UMCP	Hybrid Wireless Network Control Software for Intelligence, Surveillance and Reconnaissance
320	Gupta	UMCP	Development of High Performance and Fuel Flexible Distributed Combustion for Gas Turbine Engines and
322	Vispute (UMCP)	Blue Wave Communications	Energy efficient high power diodes for solar panels and power electronics.
324	Choa	UMBC	Development of High-Power, Low-Threshold Quantum Cascade Lasers for Chemical and Explosive Detection

* Yu was selected for a third award, all with different technologies



Collaborative effort with the Robert H. Smith School of Business and the Dingman Center of Entrepreneurship

- ➔ Awardees that agree to participate will be assigned a team of three MBA students
- ➔ Students will build commercialization plans
- ➔ Students will work to:
 - Validate the technology opportunity
 - Identify the need and the compelling product/service offer
 - Validate the market need and size
 - Identify and analyze valid potential partners, licensors or business models
 - Propose a commercialization strategy to skeptical investors and partners.

We believe this program will move these technologies closer to market, as well as be an important learning experience for the students and awardees



Summary of Program

- ➔ Received 110 outstanding university proposals, and were able to fund 21 - - which, subsequently, had an unusually high success rate.
- ➔ Some examples of added support:
 - Proctor, “FlexEl” [Flexible, low-cost batteries] - Received \$6 Million (\$4 Million + \$2 Million incentives) in additional investments from RJ Reynolds, in addition to \$3 Million in funding from third party investments (including DHS and US Navy). Flexell now has 12 full-time and 18 part-time employees.
 - Dowling; “Remedium Technologies” [Foam 'Reversible' Hemostat] - \$650K SBIR
 - Fuhrer; [Graphene/Diamond-like-Carbon Thin Film Transistors] - \$150k NASA, \$30K Alex Foundation
 - Zhu; [Variable Speed Transmissions] – signed agreement with General Motors for continued development
 - Hutcheson; “Zymetis”[biofuels production] – support from MIPS
 - Yu; [ultra-miniature microphone array] - \$314K NSF grant; licensed to UM Start-up “MedSense Technologies LLC”
- ➔ Beginning to receive widespread recognition as an innovative and successful “model” [see below]



Conclusion and Recommendation

The Maryland Proof of Concept Alliance is the first federally-funded program, and has a successful three year track record.

- ➔ This program has successfully demonstrated the capability to identify, and help commercialize university-developed technology.
- ➔ Has proven valuable to the University, the State, and the Army.
- ➔ Was selected as a winner of the 2011 Federal Laboratory Consortium for Technology Transfer, Mid-Atlantic Regional Educational Institution and Federal Laboratory Partnership Award.
- ➔ Both Sen. Mikulski and Chancellor Kirwan have received a Maryland General Assembly “Official Citation” for the MPCA program (Sept 12, 2012)
- ➔ We are advocating continued funding of the MPCA program, to enable funding of 7 awards per year (i.e. \$1.7 million for one year, \$3.5 million for two years)

Its award winning structure, and results, as a partnership between a federal lab and a university, are important to the nation’s economic development and its security.