

Biyomedikal Mühendisliği Araştırmalarının Ürüne Dönüşümü



Mühendislik Dekanları Konseyi
28 Kasım 2008

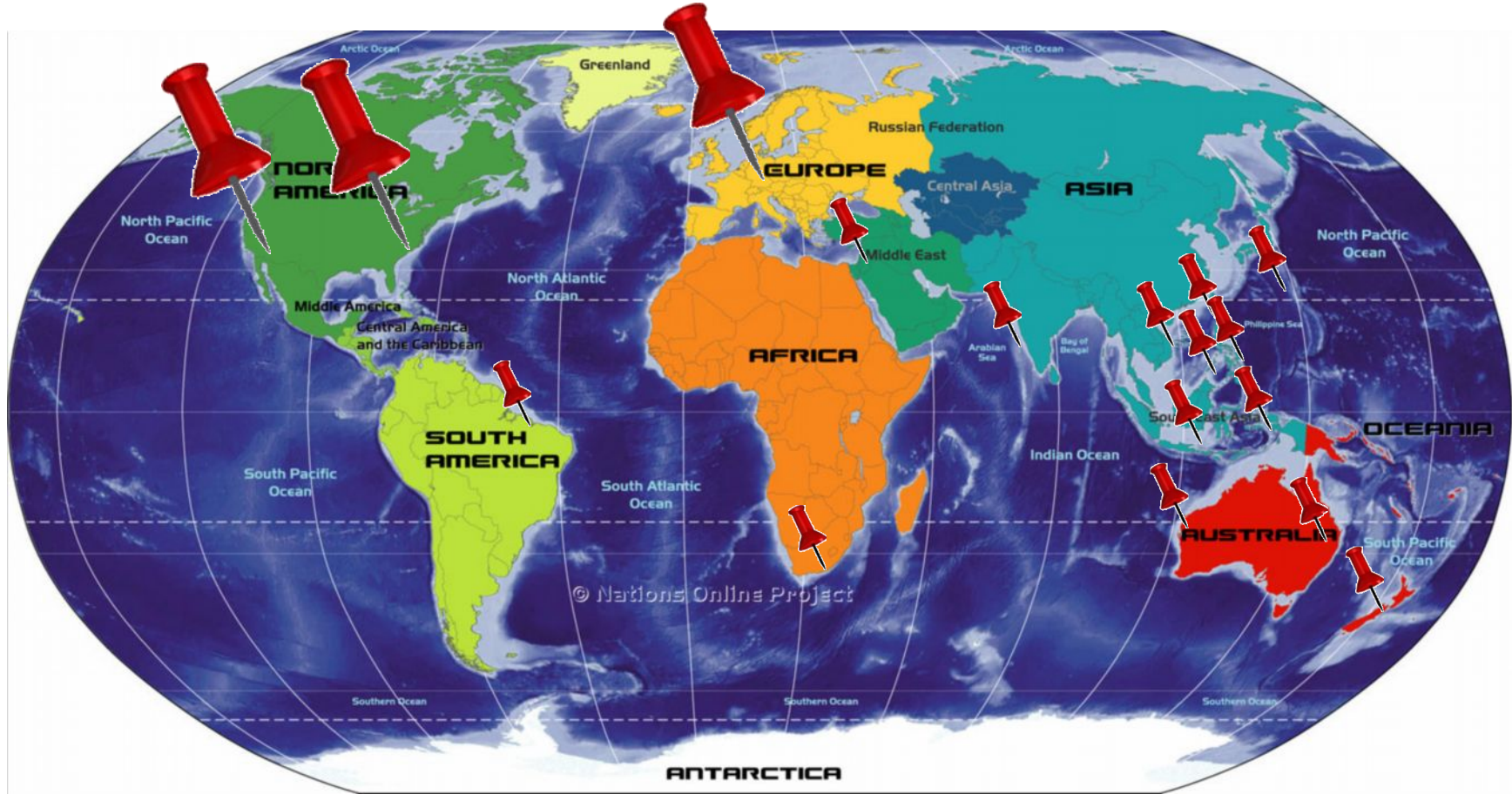
Banu Onaral, Ph.D.

Türk Bilim İnsanları ve
Akademisyenleri Derneği (TASSA)
Başkanı

&

H. H. Sun Profesörü ve Müdür
Biyomedikal Mühendislik,
Bilim ve Sağlık Sistemleri Fakültesi
Drexel Üniversitesi
Philadelphia, Pennsylvania USA
[TASSA; www.tassausa.org]

Bilgi, Bilim ve Teknoloji Ekosistemleri



- Stratejik Kaynak ve Altyapı Yatırımları
- Sürdürülebilir ve Yüksek Katma Değerli Ekonomik Düzen

Küresel Bilgi, Bilim ve Teknoloji Ekosistemleri Akımı

Bilgi, Bilim ve Teknoloji Ekosistemleri



Bilgi, Bilim ve Teknoloji Ekosistemleri

➤ Üniversiteler

- ARGE ile bütünleşmiş eğitim
- Ürüne dönüşüm araştırması
- Teknoloji transferi
 - Paydaş üniversiteler
 - Bağımsız araştırma merkezleri; ARGE kümeleri

➤ Kamu Sektörü

- Yerel, yöresel ve ulusal kalkınma kuruluşları
- Mevzuat dünyası: standartlar, ehliyet, tescil, onay, izin...

➤ Özel Sektör

- Şirketler ortakları
- İş Dünyası; girişimciler, yöneticiler, hukukçular, yatırımcılar, sanayiciler, teknik danışmanlar, iş kurma strateji danışmanları, prototipleme ve endüstri tasarım, kalite yönetimi, anlaşmalı imalat, test ve kalibrasyon laboratuvarları, teknoloji işleme ve değerlendirme kurumları... © Nations Online Project

➤ Sivil Toplum

- Bilimsel ve teknik dernekler, akademiler, enstitüler, meslek odaları, sanayi birlikleri, tüketici örgütleri...

➤ Altyapı ve Kaynaklar

- Öngörücü, yönlendirici, özendirici, ödüllendirici

➤ Medya, Basın ve Yayın kuruluşları

...Geniş Yelpazeli Katılım

Yeni Firma Kuluçkaları
Firma Filiz Çiftlikleri

Sosyal Girişimciler

ArGe ile bütünleşmiş “İleri Eğitim” Ortamı

**Rekabet Öncesi
Ortaklıklar, Paydaşlıklar...**

İleri Eğitim Yöntemleri

- Doktora Üstü
- Doktora
- Odaklanmış Yüksek Lisans
- Hızlandırılmış Lisans
- Odaklanmış Lisans
- Birleşik Diplomalar
BS/MS; BS/PhD; BS/MD
BS/Hukuk; BS/Yönetim, İşletme...
- Uzmanlık Programları

İleri Eğitim Ağı

ArGe Kümeleri

- Paydaş Üniversiteler
- Mükemmeliyet Merkezleri
- Ulusal Araştırma Merkezleri
- Küresel Araştırma Enstitüleri
- Strateji ve Politika Merkezleri
- Yasal ve Etik Araştırma Enstitüleri
- Düşünür ve Sanatçı Kolonileri
- Sanatpark, Bilimpark, Teknoparklar...

Dünyada yankı getiren özgün örnekler



TASSA

Türkiye ve Amerika arasında...

- Sürdürülebilir Bilim Köprüsü
- Bilgi Ağı... Bilgi Dolaşımı
- İşbirliği ve Güçbirliği
 - ABFT, İTS, TAİK, TCA , TÜBA, TÜBİTAK, UİG...
 - Sanat, Sosyal ve Beşeri Bilimler
 - Doğa Bilimleri
 - Sağlık ve Biyomedikal Bilimler
 - Mühendislik ve Uygulamalı Bilimler

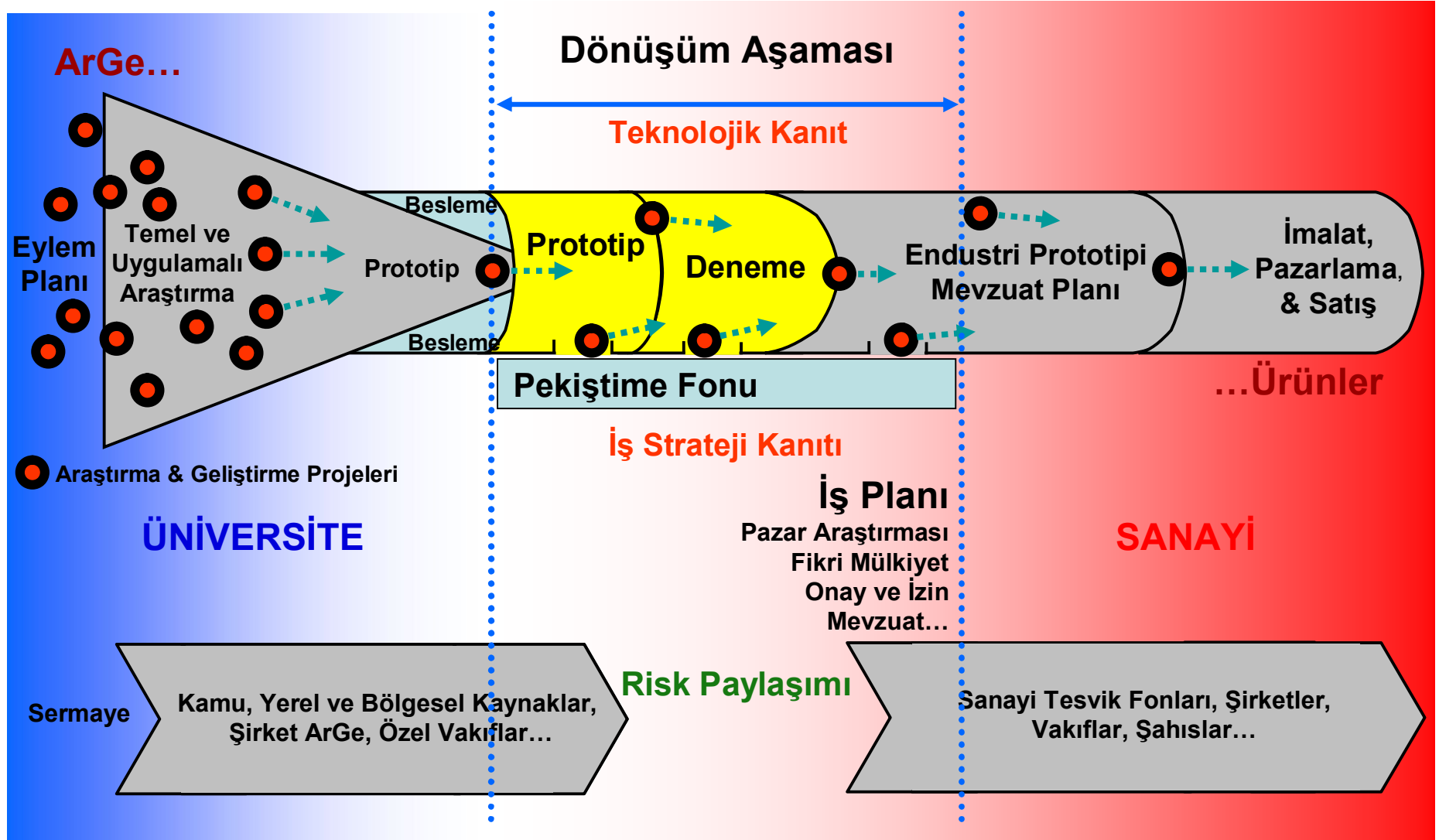
...Biyonoteknoloji Güçbirliği

- ODTÜ Teknopark → Filiz Firmalar
- Bilkent Üniversitesi → Ulusal Nanoteknoloji Araştırma Merkezi
- Vestel ArGe → Yakıt Pili
Ankara, Gazi ve Niğde Üniversiteleri
- Sabancı Üniversitesi → INOVENT
- Ulusal İnovasyon Girişimi

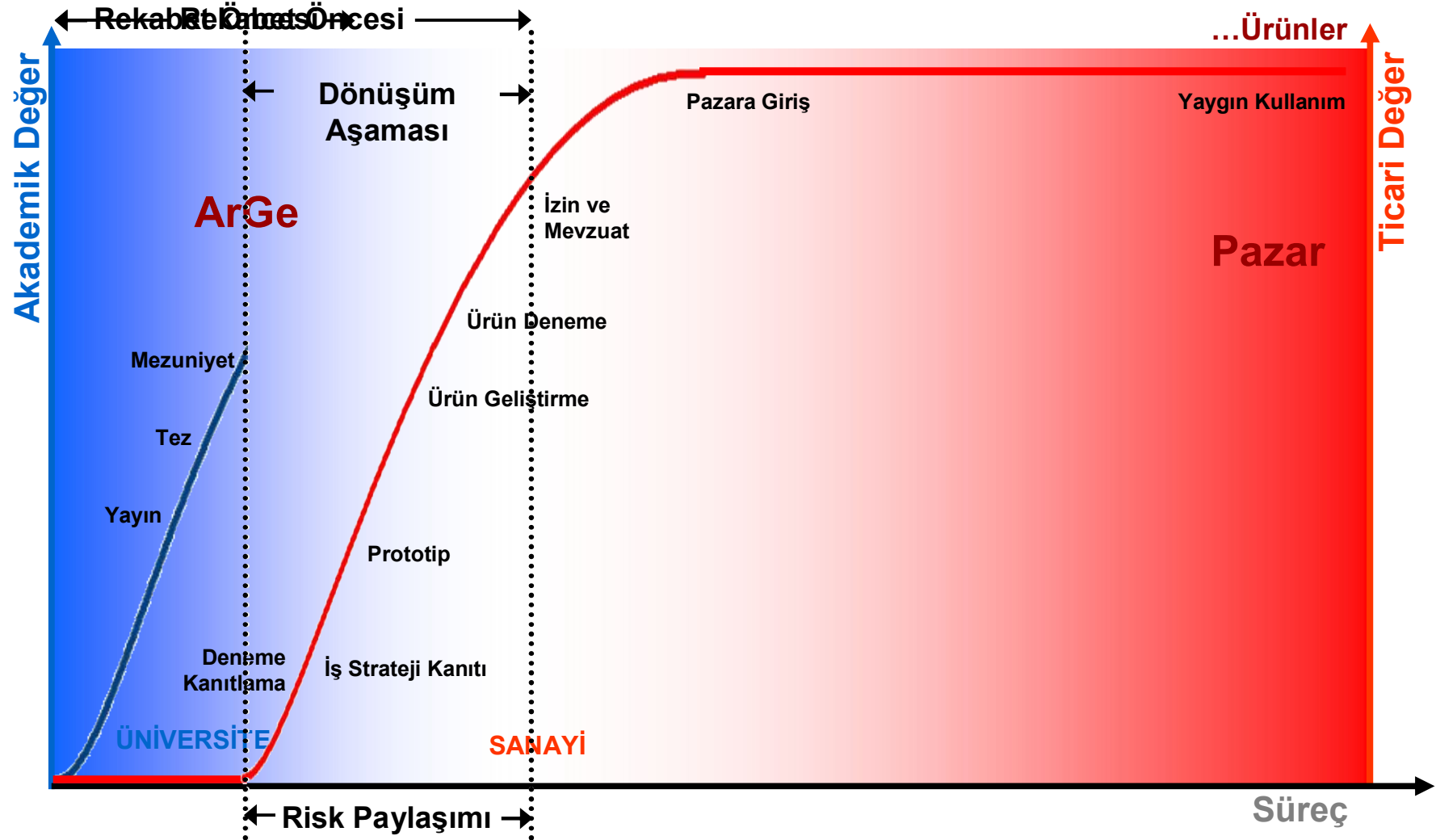
...Büyük Hedef Projeleri

**Duş Gücümüz Kadar
Sınırsız**

Ürün/Hizmete Dönüşüm Yol Haritası

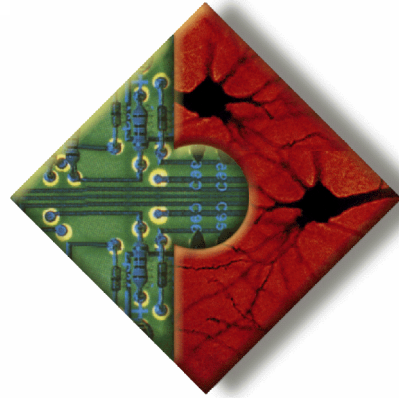


Ürün/Hizmete Dönüşüm





School of Biomedical Engineering, Science and Health Systems



Paralel Bir Örnek: Philadelphia, ABD School of Biomedical Engineering, Science and Health Systems Drexel University

*Bosson Research
Enterprise Center*



“Use Inspired Research”

- **“Use Inspired” Research**

Life Saving, Life Enhancing Solutions

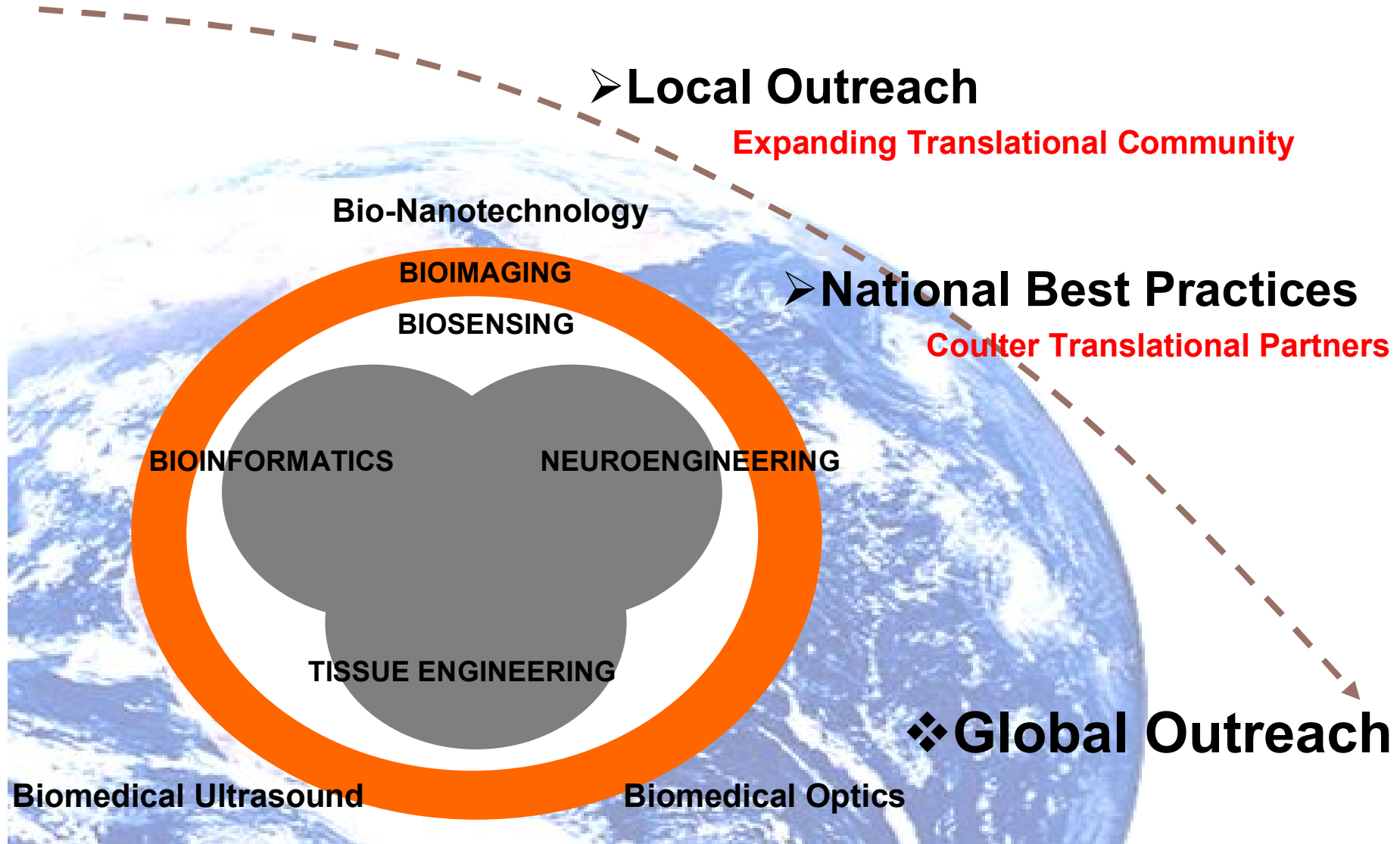
➤ **Local Outreach**

Expanding Translational Community

➤ **National Best Practices**

Coulter Translational Partners

❖ **Global Outreach**

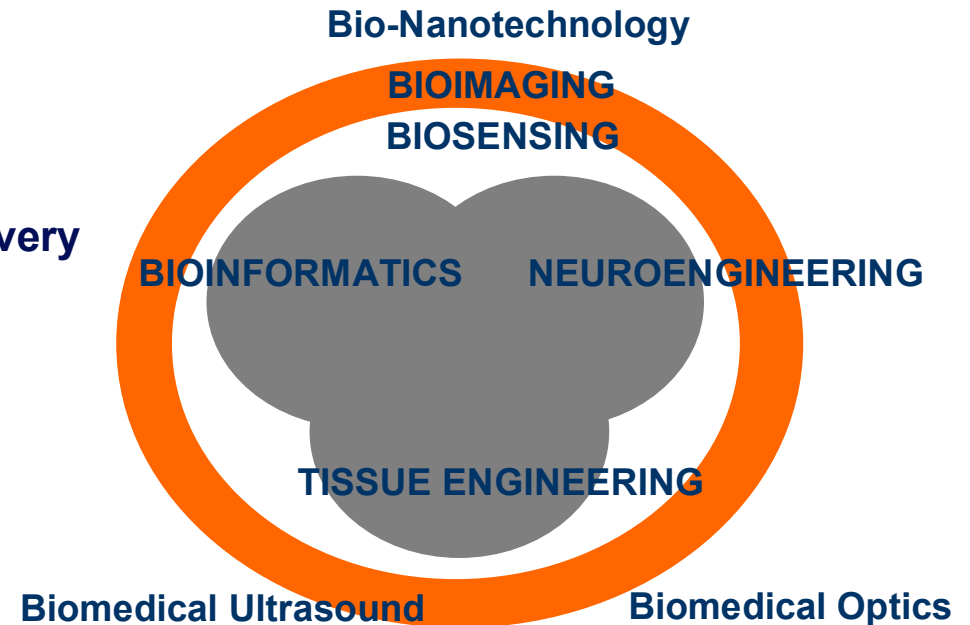


➤ **Strategic Academic Thrusts**

- Biosensing, Bioimaging, Drug Delivery
- Cellular Tissue Engineering
- Neuroengineering
- Integrated Bioinformatics
- Enabled by
 - Bionanotechnologies,
 - Biomedical Ultrasound & Optics,
 - and Information Engineering

➤ **Technology platforms**

- Translation of multiple clinical or personal health care applications



Biomedical Technology Pipeline...

"Use Inspired Research"

Life Saving...Solutions

"Educational...Experiences"

Life Saving...

Cellular Tissue Engineering Platform

Tissue Engineering & Regenerative Medicine

>> Immature Lungs at Birth
Tissue Engineered Lungs



Peter Lelkes
BIOMED



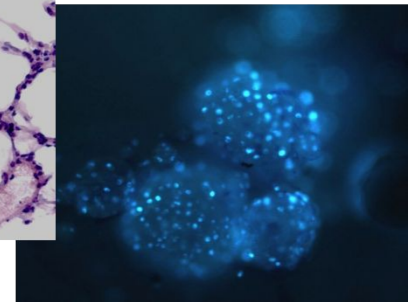
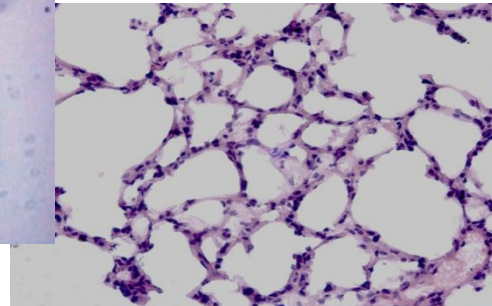
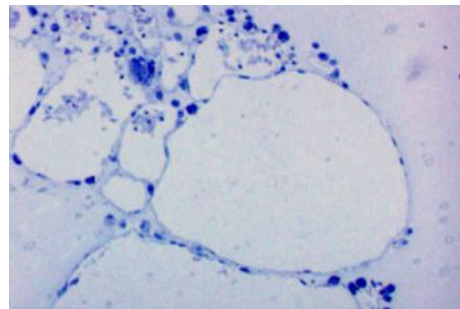
Christine Finck
Pediatric Surgery, COM



Mark Mondrinos
BIOMED



Christopher Koharski
BIOMED



...Solutions

Life Saving...

Drug Delivery

Breast & Prostate Cancer

>> Targeted and drug loaded imaging agents
Before... **After...**



Margaret Wheatley
BIOMED



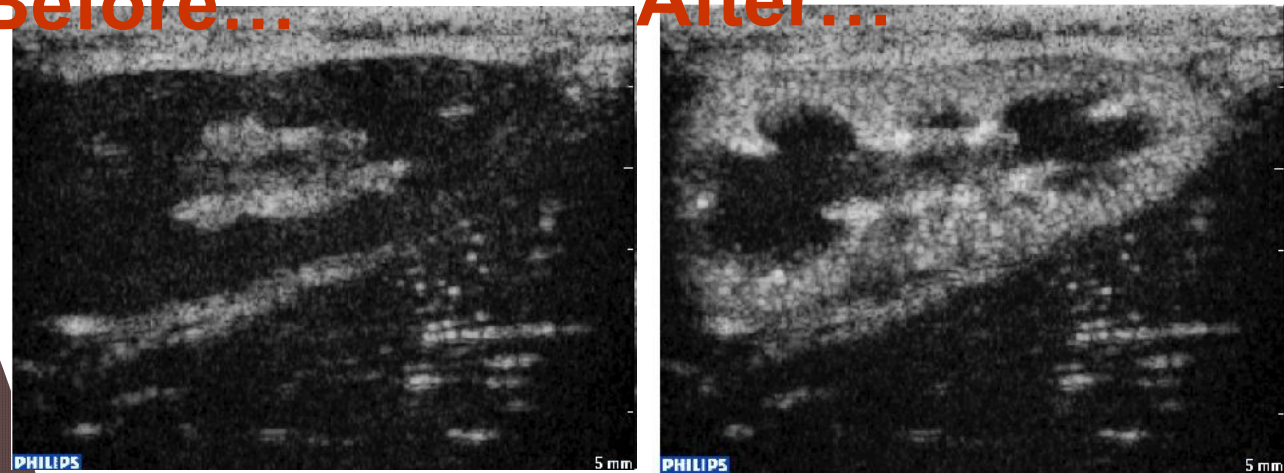
Kelleny Oum
BIOMED



Flemming Forsberg
Thomas Jefferson University



Berry Goldberg
Thomas Jefferson University



...for ultrasonic imaging and therapeutics.

...Solutions

Life Saving...

Neurorobotic Platform

Spinal Cord Injury & Neurological Disorders

>> Brain-Machine Interfaces

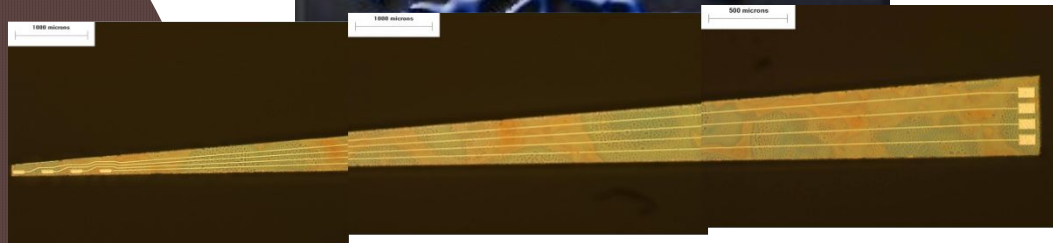
**Neuroengineering
Research Group**
Karen Moxon, Ph.D.
Guglielmo Foffani, Ph.D



Graduate Students
Robert Flint
Tina Koa

Corporate Partners
Spire Corporation
NeuroInc

Global Partners
Italy
Spain



Ceramic-Based Multi-site Electrode (CBMSE) Patent No.: 6,834,200



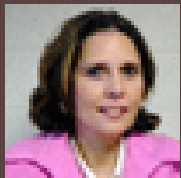
...Solutions

Life Saving...

Near Infrared Based Optical Imaging Platform

Diabetic Wounds

>> Functional Optical Wound Monitor



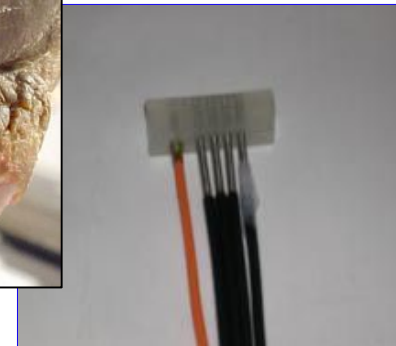
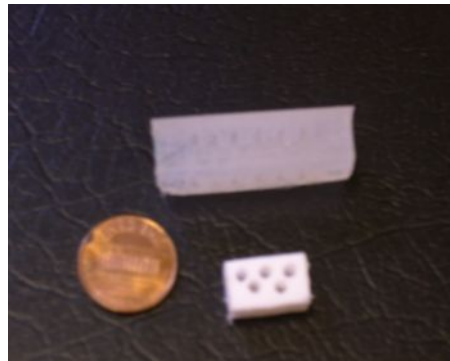
Elisabeth
Papazoglou
BIOMED



Kambiz
Pourrezaei
BIOMED



Michael S.
Weingarten
Surgery, COM



...Solutions

Life Saving...

Near Infrared Based Optical Imaging Platform

Traumatic Brain Injury



Portable Near-Infrared Technology for
Detection of Traumatic Brain Injuries



Drexel Optical Brain Imaging Team



Baruch Ben Dor
Entrepreneur in Residence



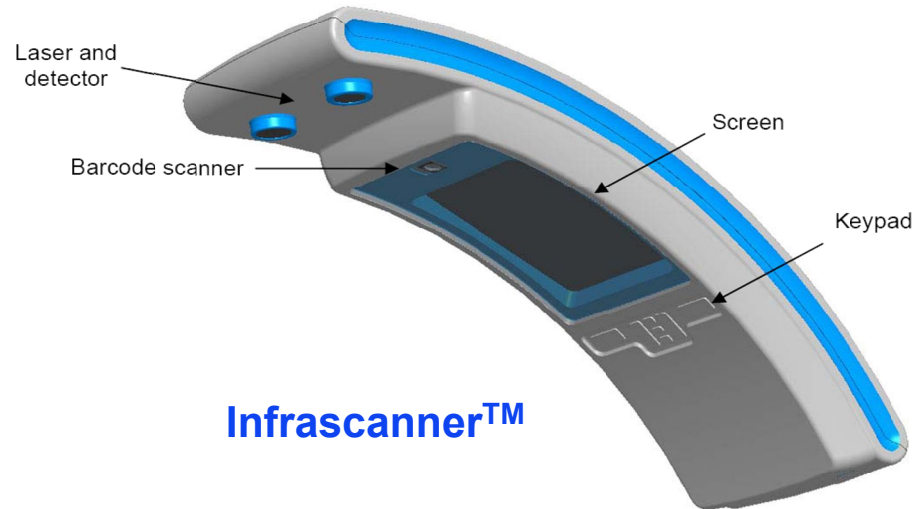
Banu Onaral
BIOMED



Kambiz
Pourrezaei
BIOMED



Hasan Ayaz
BIOMED



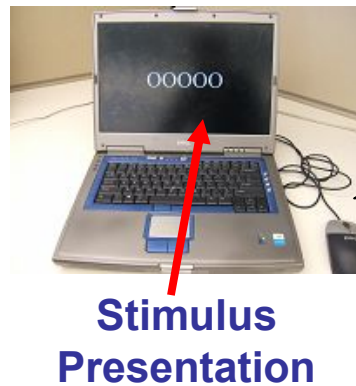
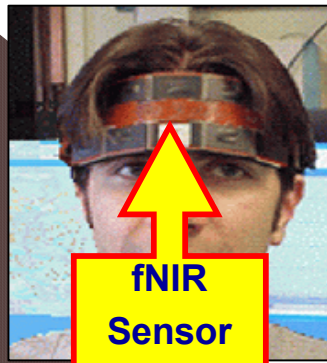
...Solutions

Life Saving...

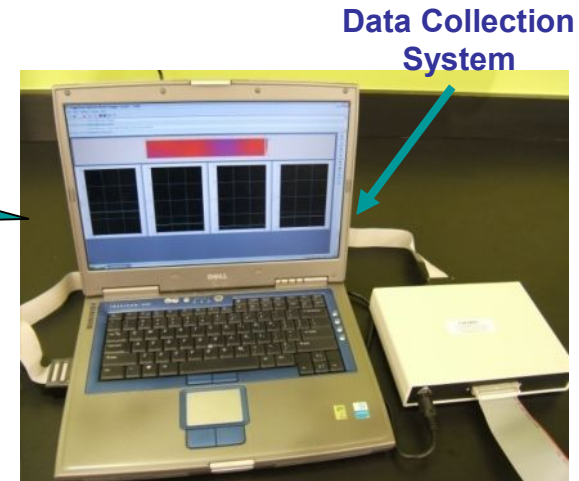
Near Infrared Based Optical Imaging Platform

Autism, Schizophrenia, Dementia...

>> Functional Optical Brain Imaging Sensor



Time
Synch.
Signal



Scott Bunce
Psychiatry, COM



Douglas L. Chute
Neuropsychology



Meltem Izzetoglu
BIOMED



Kurtulus Izzetoglu
BIOMED



Kambiz Pourrezaei
BIOMED



Banu Onaral
BIOMED

Personality and psychiatric disorders...

...Solutions

Life Saving...

Near Infrared Based Optical Imaging Platform

Neurorehabilitation

Assessment of cognitive impairment following traumatic brain injury (TBI)

Healthy Subject



Maria Schultheis
Psychology



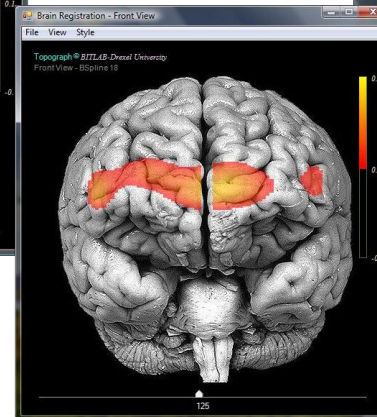
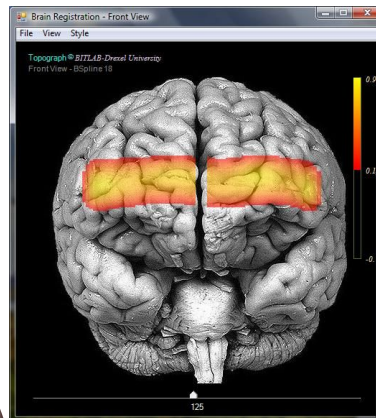
Anna C. Merzagora
BIOMED



Kambiz Pourrezaei
BIOMED



Banu Onaral
BIOMED



TBI Patient

...Solutions

Life Enhancing...

Near Infrared Based Optical Imaging Platform

Human Performance Training & Learning

Target Population:

- Military Personnel
- E-learners
- Attention Deficit Hyperactivity Disorder (ADHD)
- Neurorehabilitation
- Autism



Scott Bunce
Psychiatry



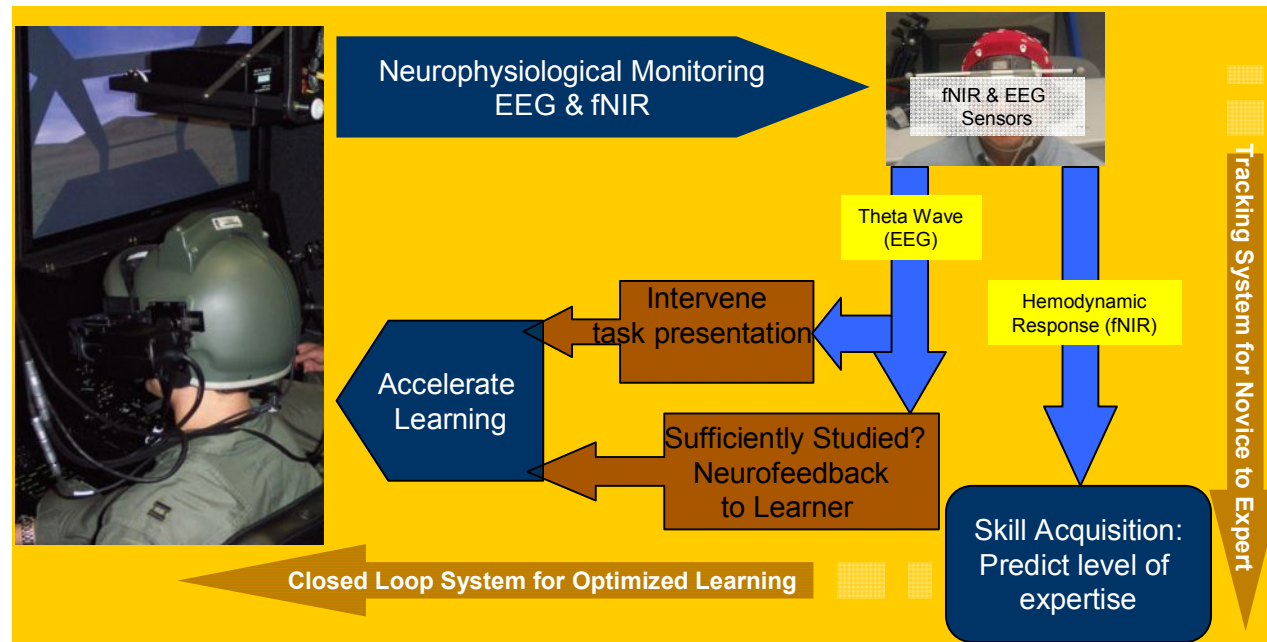
Kurtulus Izzetoglu
BIOMED



Kambiz
Pourrezaei
BIOMED



Banu
Onaral
BIOMED



...Solutions



“Our Expanding Translational Community”

Local Outreach

BIOMED
BIOMEDICAL TECHNOLOGY SHOWCASE
FRIDAY, NOVEMBER 3, 2006
BOSSONE RESEARCH CENTER
DREXEL UNIVERSITY, PHILADELPHIA, PENNSYLVANIA

RETHINKING PHILADELPHIA ✓
REINVENTING PHILADELPHIA ✓
ACTION PHILADELPHIA - NOW!

...WHERE IT ALL BEGAN

*School of Biomedical Engineering,
Science and Health Systems*

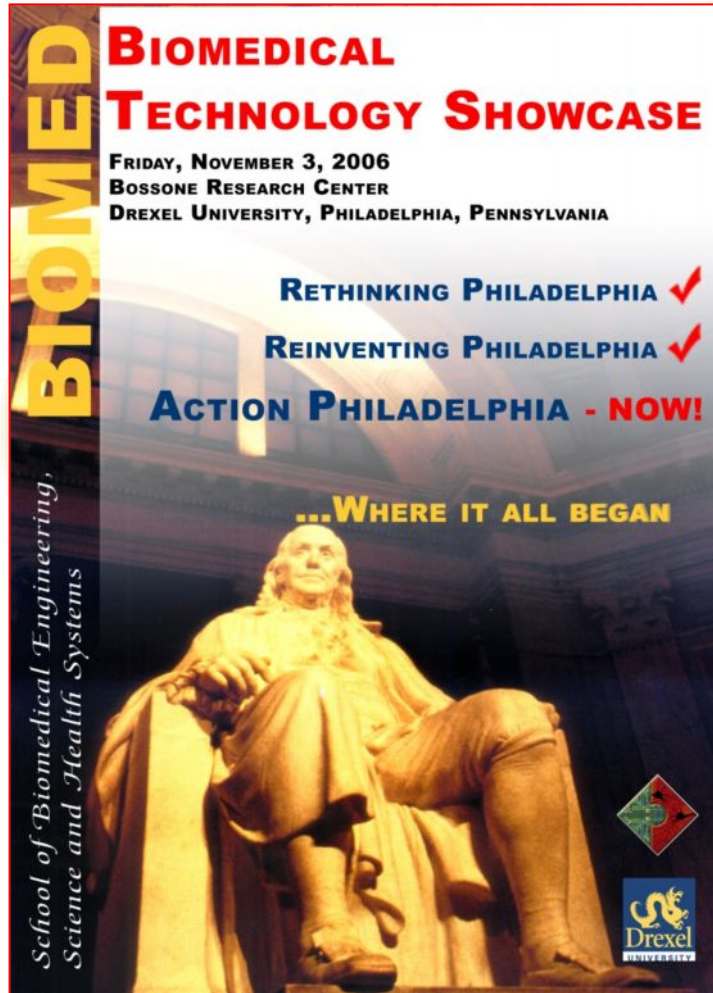
- **Drexel Partners**
 - Medicine; Public Health; Nursing and Health Professions
 - Arts and Science; Engineering; Information Science
 - Media Arts and Design
 - Business and Law
- **Regional Partners**
 - University of Pennsylvania
 - Fox Chase Cancer Research Institute
 - Thomas Jefferson University
 - Wistar Institute
 - Coriell Institute for Medical Research
 - Shriners Childrens Hospital...
- **Economic Development Agencies**
 - BioAdvance
 - Ben Franklin Technology Partners
 - University City Science Center
 - Keystone Innovation Zone...
- **Corporate Partners**
- **Business Development, Legal and Investment Partners**
- **Alumni and Friends**

...State of PA



“Our Expanding Translational Community”

Local Outreach



- B** BIOSENSORS & BIOMARKERS & BIOIMAGING & BIOINFORMATICS 18
- D** DIAGNOSTICS & TESTING & THERAPEUTICS
ULTRASOUND, OPTICS, BIONANOTECH., DELIVERY of BIOACTIVE COMPOUNDS 18
- T** TISSUE ENGINEERING & REGENERATIVE MEDICINE 7
- N** NEUROENGINEERING 9



About Drexel BIOMED

Regional Leadership

- **Nanotechnology Institute (NTI) – founded 2002**
Co-Director: Kambiz Pourrezaei, BIOMED
- **Greater Philadelphia Bioinformatics Alliance (GPBA) – founded 2003**
Co-Director: Aydin Tozeren, BIOMED
- **Biomedical Technology Development Initiative - 2005**
– **Translational Research in Biomedical Technologies**
Program Director: Banu Onaral, BIOMED



"National Best Practice Participation"



"Science serving humanity"

Boston University
Case Western Reserve University
Drexel University
Duke University
Georgia Technology Institute
University of Michigan
Stanford University
University of Virginia
University of Washington
University of Wisconsin

Engineer

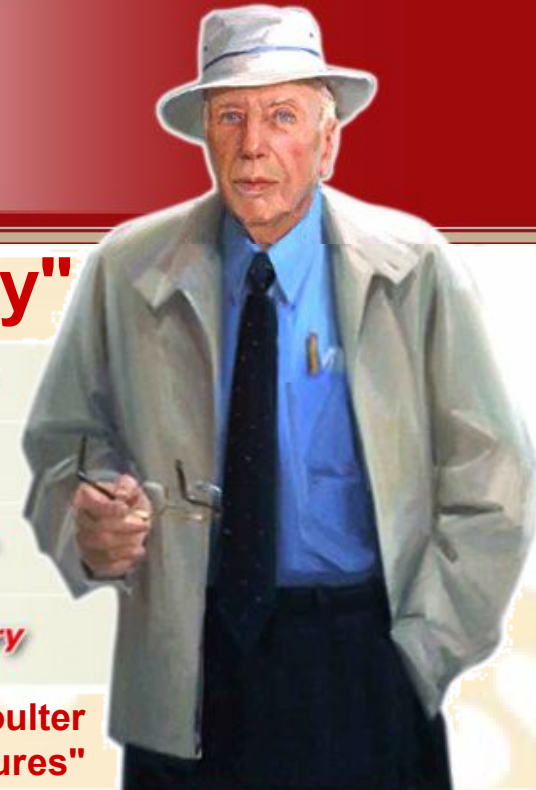
Inventor

Entrepreneur

Visionary

Wallace H. Coulter

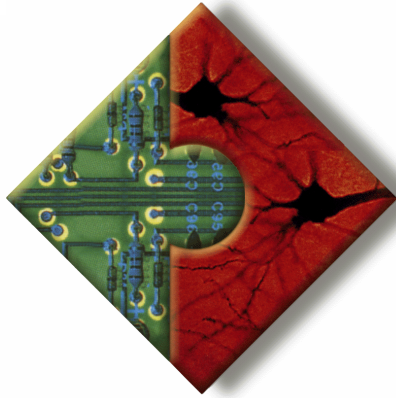
"Passion for diversity of world cultures"



- The Coulter Foundation's mission is compatible with our dedication to safe, affordable, broadly deployable biomedical technologies aimed to benefit the quality of life in our global society.
- \$1M/Year; 23 Submitted Projects; 8 Full, 3 Seed Projects Awarded.
- Conversion to Endowment in four years...



School of Biomedical Engineering, Science and Health Systems



Drexel BIOMED

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