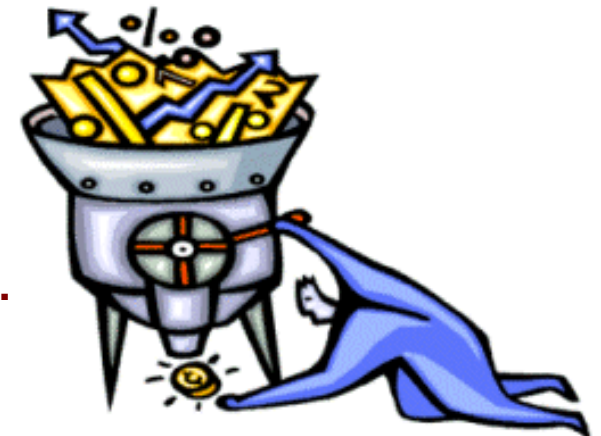




# **Technology Transfer: Small Business Experiences with Federal Laboratories**

**Presentation to the  
Northeast Regional Federal Laboratory Consortium  
September 16, 2008**

**Jay Fraser, President  
Tracer Detection Technology Corp.  
3463 Magic Drive, Suite T-19  
San Antonio, TX 78229**



# **MY OBJECTIVES**

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**Compress 18 yrs. of experience to 45 minutes**

**Talk about real case histories**

**Tell the truth without being (overly) critical**

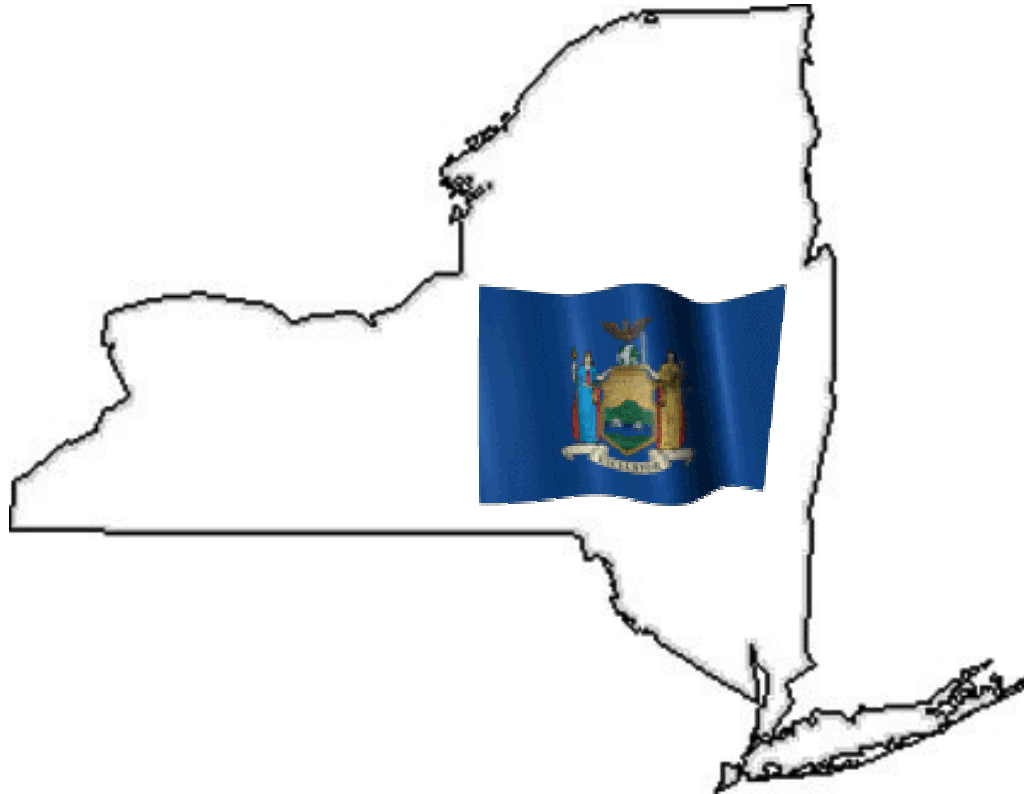
**Lessons Learned: highs/lows/frustrations**

**Highlight suggested changes in the system**

**Have a sense of humor**

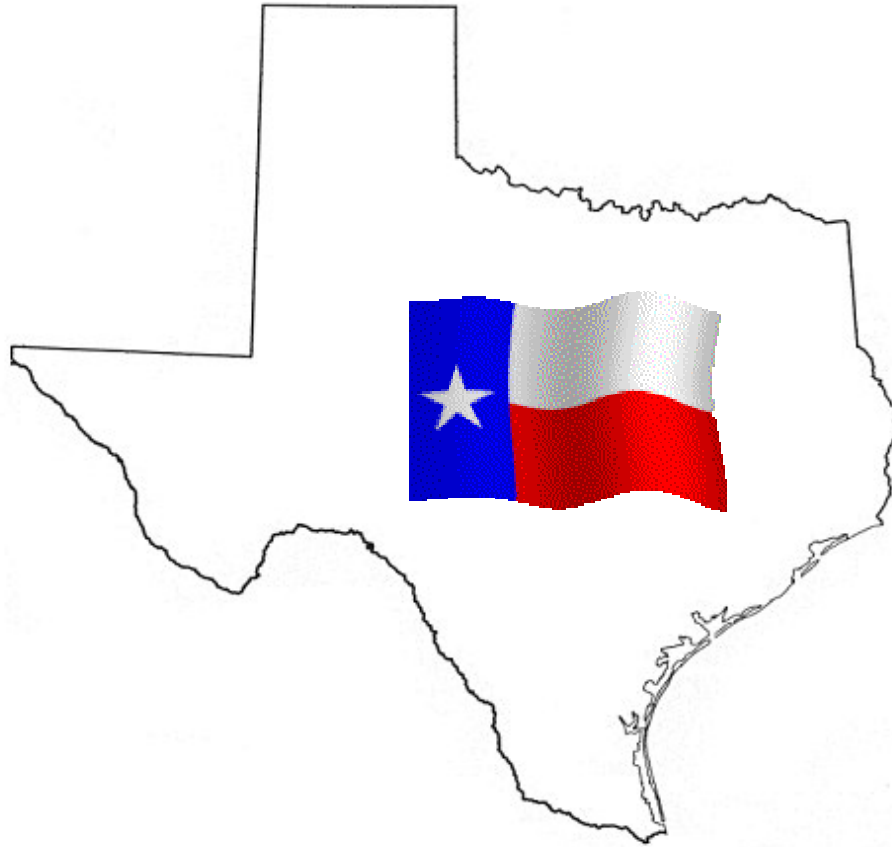
**EVERYONE WILL NOT AGREE**

**So, how does a boy from the Bronx...**



**...who grew up on Long Island...**

# Find himself in San Antonio Texas???



# WHY AM I IN SAN ANTONIO?

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**Innovative business environment**  
**Expanding technology sector**  
**Affordable cost of living/quality of life**  
**No corporate income tax**

**World Class Research**  
**Southwest Research Institute**  
**Southwest Foundation for Bio-Medical Research**  
**Univ. of Texas – San Antonio Health Science Center**

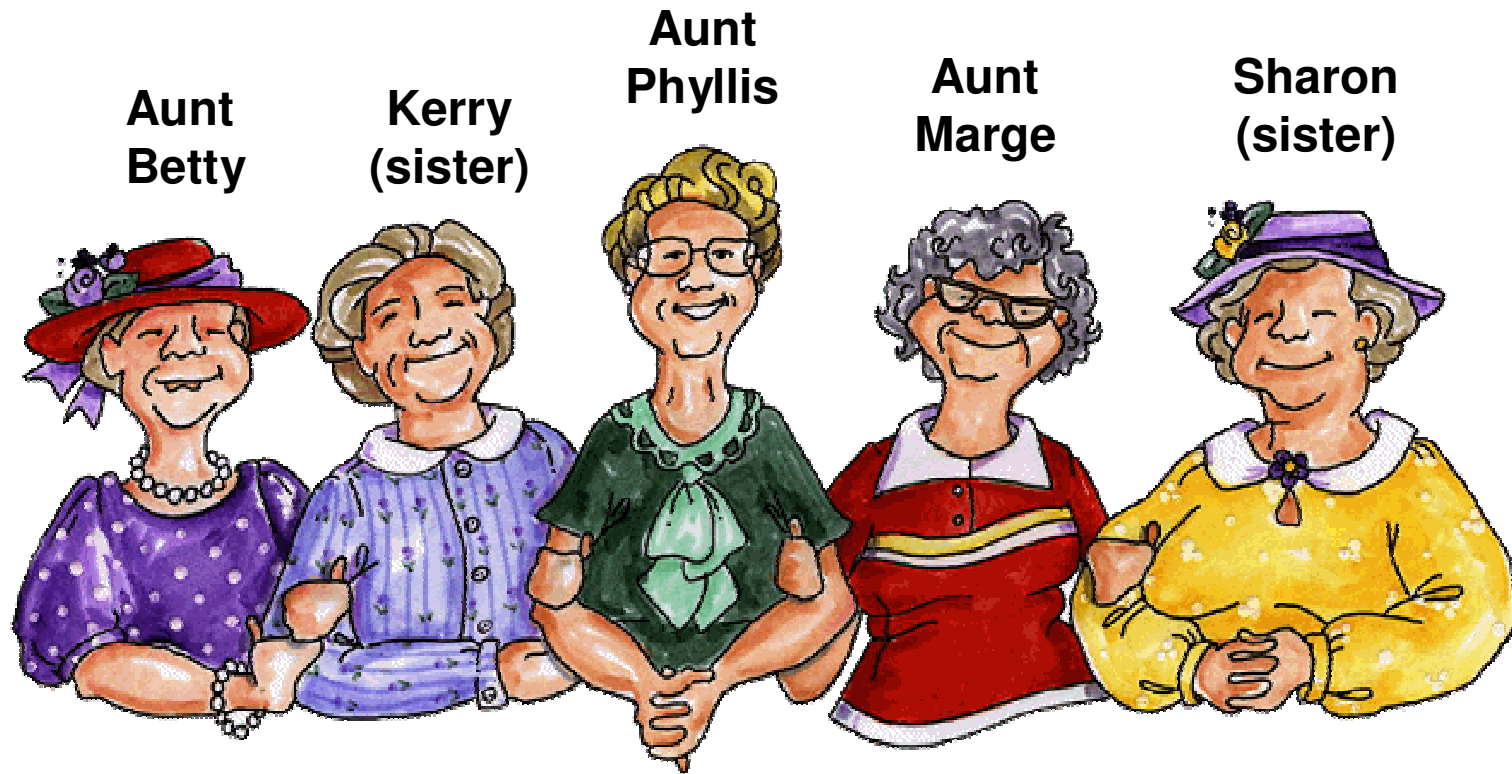
**Finalist: National Bio and Agro Defense Facility**

***NO SNOW***

# WHY AM I IN SAN ANTONIO?

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## Introducing my wife's sisters and aunts



**Plus children, cousins and friends**

# **Creating a Technology Entrepreneur**

# **MY TECH TRANSFER GUIDES**

## **CONTRIBUTORS**

**Frank Salzano/Bill Marcuse - BNL**

**Arthur Ezra – SUNY Farmingdale  
Dean, College of Engineering Technology**

**Michael Furey - BNL**

**Larry Dickens – ORNL/FLC**

**Mark Reeves - ORNL**

**Dr. Randy Goldsmith (SATAI)**

**Dr. Clyde Frank – Dept. of Energy**

# NEED TO ACHIEVE

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David McClelland  
“The Achieving Society” (1961)

The “achievement” itself is more important than material or financial reward

Accomplishing the goal gives greater personal satisfaction than getting praise or recognition.

Financial reward is a measurement of success, not an end in itself.

Security and status are not prime motivators

# ULTIMATE SELF-CONFIDENCE



# **SUCCESSFUL ENTREPRENEURS**

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**“The difference between a successful entrepreneur and one who is not is often that one gave up too soon.”**

***Donald Perrine, CEO - Sarcon Microsystems, 1997  
(Now Out of Business)***

## Lessons Learned

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**"Killing it is as hard as making it work."**

## Lessons Learned

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**“Persistence is a Double-edged Sword”**

**ATLEAST**

**Family, Time, Money, Opportunity**

# **TECHNOLOGY TRANSFER MODELS**

# Technology Transfer – Technology Delivery Systems

## Technology Utilization: Incentives and Solar Energy

Arthur A. Ezra, Ph.D.

Science, New Series, Vol. 187,

No. 4178 (February 28, 1975), 707-713

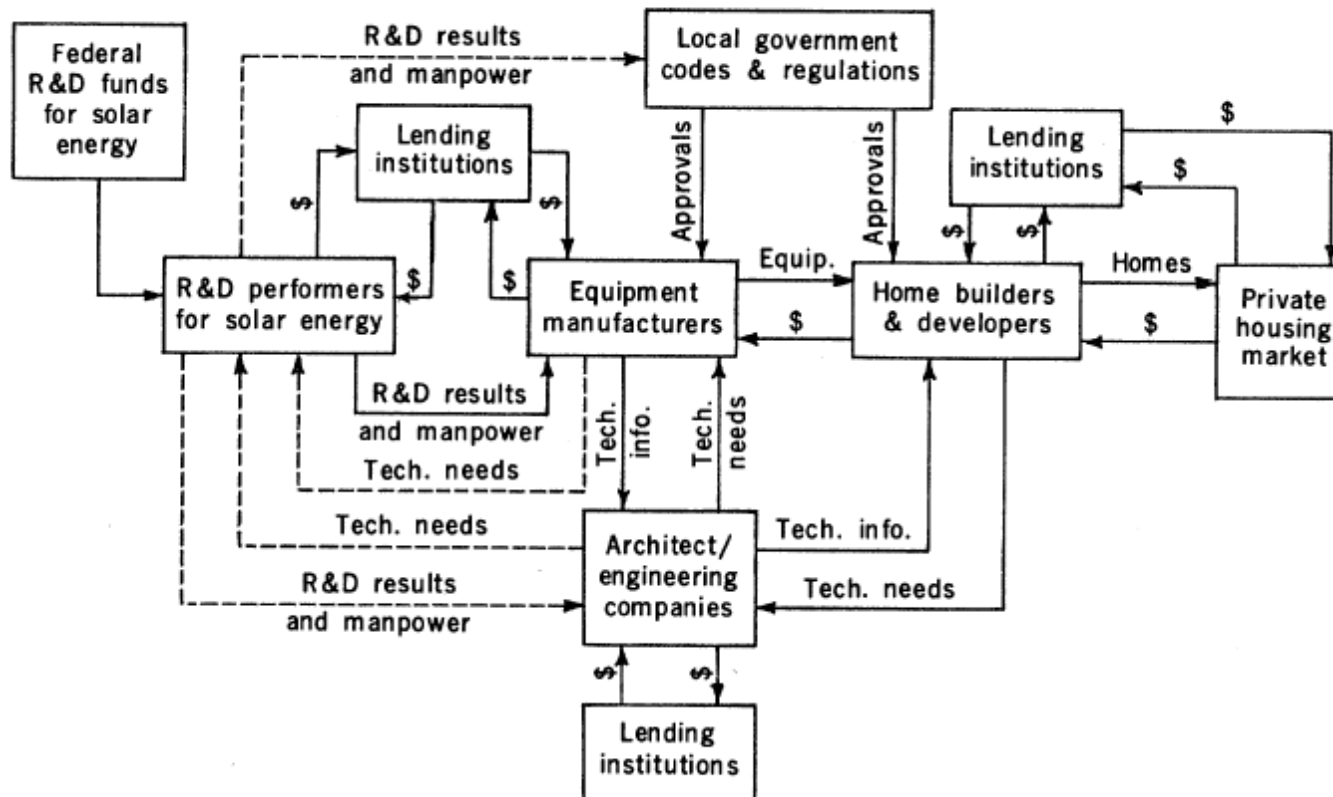
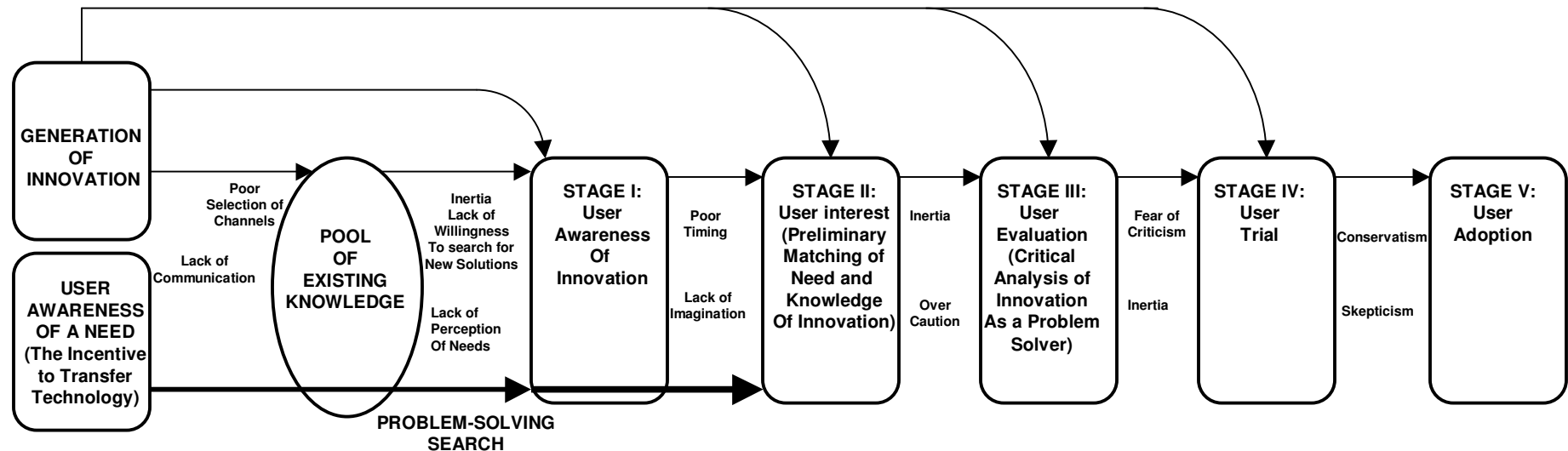


Fig. 3. The TDS for the private housing market showing the required interactions between the solar energy R&D performers and the other components. Broken lines indicate the linkages to be established or strengthened.

# Technology Commercialization Model

## Managing Through the Barriers of Technology Development

### Conventional Attempts to Link Inventor and User



### Venture Management Interventions

Create relationships with innovator	Recognize commercial opportunities	Pre-market technology to prospective end-users	Relate Corp. IP to market vision	Help corporate client to create strategic architecture	Help structure Company for funding; identify potential funding
Apply market vision to adjust R&D objectives	Conceptualize technology deployment team/plan	Take obvious applications to industry	Create & manage virtual corporations	Accelerate corporate Acquisition of new Technology/IP	
Understand R&D functionality	Identify & dimensionalize possible applications	Position early R&D results To prospective end-users	ID corporate "core competencies" & technological needs/ opportunities	Shorten time-to-market	
	Help clients to assess corporate IP value	Focus R&D on dual-use applications			

**James B. Poage, President  
San Antonio Technology Accelerator Initiative**

**“Models, Schmodels...”  
What Makes Tech Transfer Work?**

**“It’s the  
People!  
Silly”**

# EXPERIENCES

# BACKGROUND

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Background in marketing, strategic planning, product development and business development

Began technology transfer career in 1990 as Research Professor for Technology Transfer at the College of Engineering Technology, SUNY Farmingdale

# BACKGROUND

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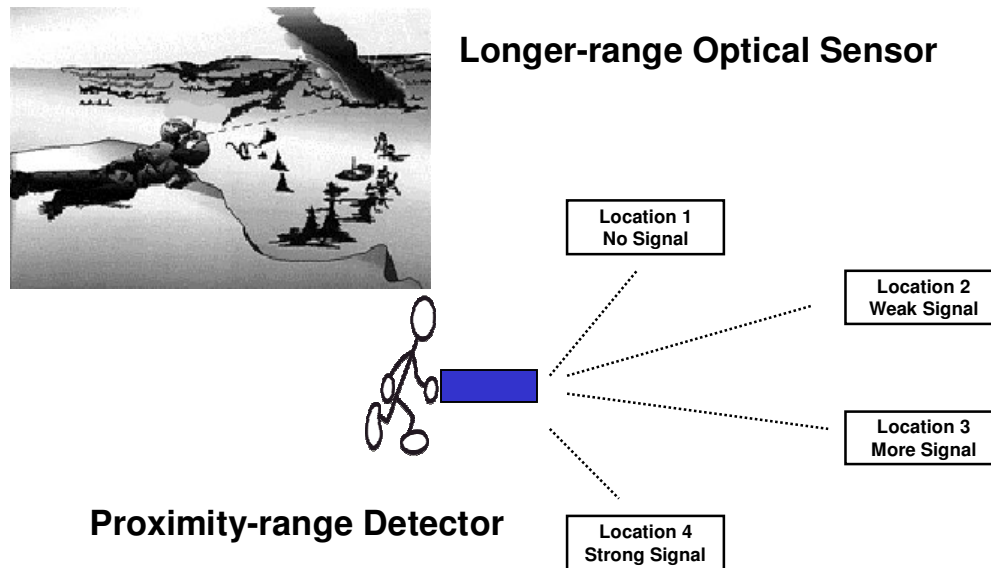
U.S. Dept. of Energy grant for a technology transfer personnel exchange program bridging SUNY/Brookhaven National Laboratory/industry.

President of Tracer Detection Technology Corp. (now holds 7 issued and 5 pending patents) and principal of PowerShift Management LLC

# WHAT IS TRACER DETECTION TECHNOLOGY?

## *Encapsulated Perfluorocarbon (PFT) Tag, Track and Locate*

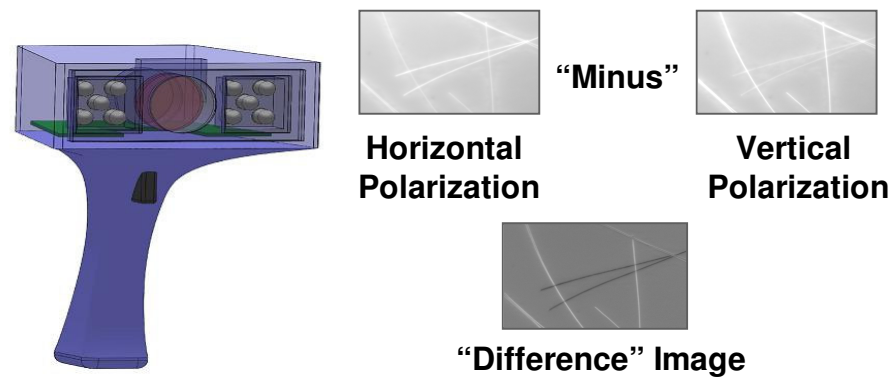
Conceptual Picture (search for tagged source)



- Tracer U.S. Pat #5,409,839 - “Method of tagging and detecting drugs, crops, chemical compounds and currency with Perfluorocarbon tracers (PFT'S)” - #6,025,200 - “Method for remote detection of volatile taggant” and pending patent covering “Methods to identify people or vehicles transporting people using encapsulated Perfluorocarbon tracers.”
- Multiple private security missions in Central America in which PFTs used to mark ransom money
- DoD contract to develop and test an enhanced duration PFT taggant/matrix combination and a proximity range detector

# WHAT IS TRACER DETECTION TECHNOLOGY?

Unique Anti-Counterfeiting Solution Based on the Use and Exploiting of  
Optically readable random patterns matched to symbology or codes



## Fluorescent Dichroic Fibers

Technology exclusively licensed from ORNL (U.S. Patents #6,035,914 and #6,246,061)

Tracer U.S. Pats #5,974,150/#7,089,420/#7,162,035 plus 5 pending patents; Int'l protection in Canada, Mexico, UK, Europe, China, Japan

Research & material supply agreement with Natick Army Lab; Tracer now ready for commercialization

# **BROOKHAVEN NATIONAL LAB**

# **SUNY Farmingdale/BNL: T<sup>2</sup> Personnel Exchange**

“*Strategic bridge*” between SUNY, BNL and L.I. cos.

Objective: accelerate the process of technology transfer through catalytic, management tactics.

“Extend the limits” of the more traditional models.

Matched “technology need with technology solution” with knowledge of regional industrial capabilities and the applications of selected federal technologies.

Strategic partnerships in which new technologies would be used by industry were then formed, based on the Technology Delivery System model

# BROOKHAVEN NATIONAL LABORATORY

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**1991-2:** Performed building ventilation/sick building study using PFTs under DoE program with plan to include technique in course work; Final Report received 18 mos. later after SUNY letter to Sec'y O'Leary

**1992:** Suitability to be involved in T<sup>2</sup> questioned because of my MBA (not an Engineer or Ph.D.)

**1993-5:** Spin-out company, Tracer Detection Technology Corp. to commercialize environmental applications of PFT technology.

**1993-4:** BNL awarded grant from LILCO with Tracer's help but was not included as T<sup>2</sup> component; Tracer writes White Paper for ONDCP and files patent; meets with DARPA and FBI requests demonstration; demo at FBI-Quantico postponed due to lack of CRADA/lab support

**1995:** Appearance at Galvin Commission; gained support of Under Sec'y of Energy; perform FBI demonstration in Sept. '95 – 1 year late

# OAK RIDGE NATIONAL LAB

# OAK RIDGE NATIONAL LABORATORY

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**1996:** Introduced to T<sup>2</sup> director in September; searching for micro-sensor for PFT program; introduced to scientific teams; through Jan. 2000 made 40+ trips (approx. 4 man-months)

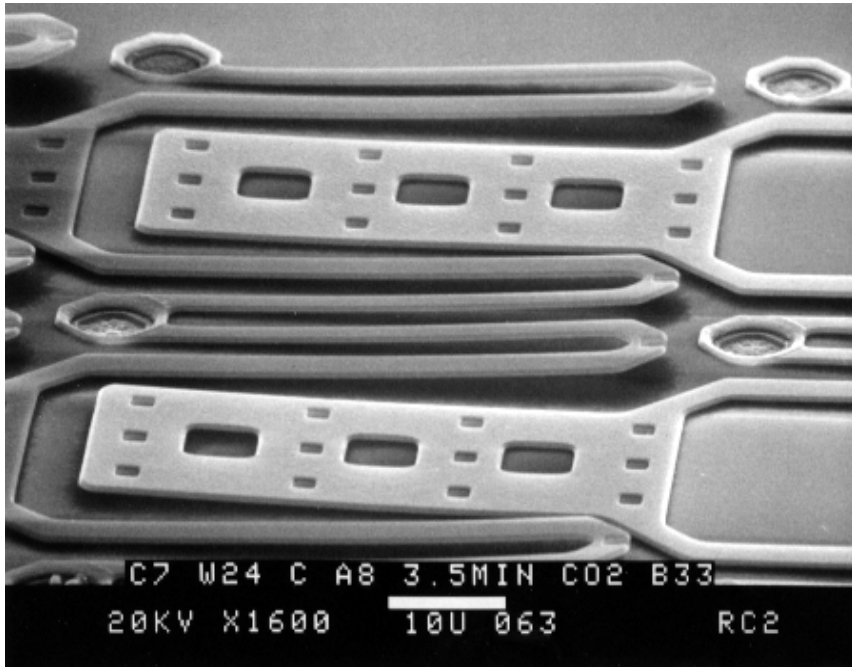
**1997:** Secured and signed first licensing agreement for the micro-sensor in February; also options for non-exclusive licenses for additional applications between March and Sept.

**1997:** Secure and sign exclusive licensing agreement covering Dichroic Fiber, anti-counterfeiting technology - U.S. Patents #6,246,061 and #6,035,914 (August 1997); begin product development and file for company patent (#5,974,150)

**1997:** Oak Ridge introduces Tracer to Natick Lab for supply of materials (Dichroic fluorescent fibers) for product development

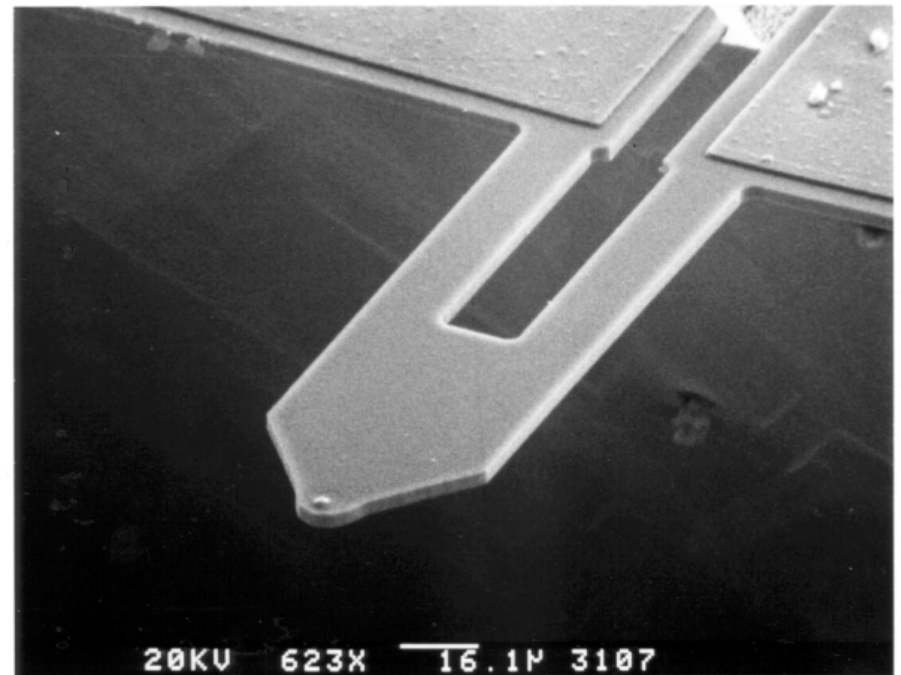
**1999-2000:** Negotiate and sign CRADA to perform demonstration under funded program from Nat'l Institute of Justice

# SNIFFER CHIP



## Real-Time Sensing

- chemical tagging
- law enforcement
- mercury/mercaptan
- environmental
- explosives
- CBW agents



Electron micrograph of a microcantilever.  
The device is about **200  $\mu\text{m}$**  long.

**“It’s the  
People!  
Silly”**

# OAK RIDGE NATIONAL LABORATORY

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**Dr. Thomas Thundat**

Thomas just turned 50. He and his wife Darilyn and they have 3 children (2 daughters/1 son).

A Corporate Fellow and the leader of the Nanoscale Science and Devices Group at the ORNL

Dr. Thundat is the recipient of many awards including:

U.S. Department of Energy's Young Scientist Award

R&D 100 Award

Inventors Hall of Fame Award

AMSE Emerging Technology Award

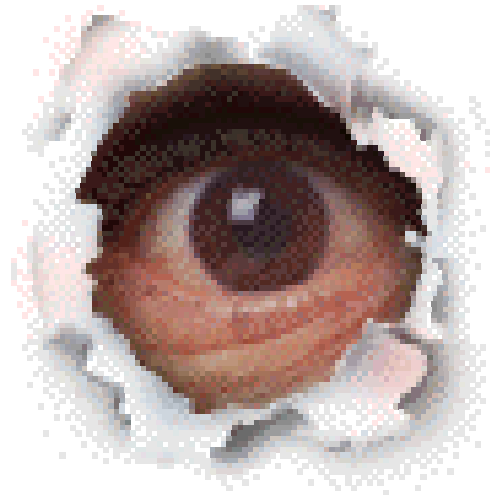
Discover Magazine Award for technological innovation

Numerous Lockheed Martin Awards for invention, publication, and Research and Development.

Over 125 publications in refereed journals, six book chapters, 7 patents and 9 pending patents, with a Ph.D in physics from the SUNY Albany.

# LESSON LEARNED

Beware Eyes Too Big...



For Your Budget and Infrastructure

# Beware Eyes Too Big...

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Relinquished licensing rights to the  
Microcantilever Sensor for detection of:

PFT's  
Explosives  
Chemical/Biological Agents

**May 1, 2001**

# OAK RIDGE NATIONAL LABORATORY

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## Successful T2 or Not?

Was the Exclusive License for Dichroic Fiber technology – U.S. Patents #6,246,061 and #6,035,914 (August 1997) a good deal? And for whom?

Tracer has paid ORNL ~\$70K over the years

Not yet commercialized – Pending VC funding, Tracer will complete development of its reader within 9 months

Tracer has invested over \$250,000 in product development and filing of company patents: #5,974,150, #7,089,420, #7,162,035 plus 5 pending patents; Int'l protection in Canada, Mexico, UK, Europe, China, Japan

# U.S. ARMY NATICK LABORATORY

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**November 1997:** Negotiate and sign CRADA for the supply and ultimate transfer of knowledge relating to fluorescent Dichroic fibers

**1997- 2003:** Multiple trips/meetings with Natick to meet with key engineers and technicians; begin to transfer manufacturing

**Sept. 2004:** CRADA extended (again in April 2005)

**2005-6:** Manufacturing knowledge transferred; commercial supplier of fibers identified and in negotiation

**2008:** Tracer reader for anti-counterfeit technology to start pre-production prototype immediately upon funding

**2008:** Relationship maintained – Natick attends Defense Demonstration on August 27, 2008

# IDAHO NATIONAL LABORATORY

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**January 2004/05:** First discussion with INL re: PFT application and introduced to lead chemist through National Security Office

**March 2005:** Tracer files provisional patent (full filing in 2006)

**August 2005:** First meeting with Office of Naval Research; request permission to use technical paper from Lead Scientist

**March 2006:** Discussions with scientist on PFT project lead to preliminary evaluation of different technology for novel bio-mechanical coatings; possible licensing deal and possible T<sup>2</sup>

**December 2006 – June 2007:** Collaboration with key scientist on PFT project leads to re-submission of a proposal to pursue Encapsulation of Perfluorocarbon to the Office of Naval Research for “track, trace and locate” applications

**November 2007:** Contract awarded and signed. Period of performance is through October 2008

**“It’s the  
People!  
Silly”**

# IDAHO NATIONAL LABORATORY

The Technical Lead for Synthetic Chemistry at the INL



**Dr. Mason Harrup**

He's "only" 40. He and his wife Patty have 2 daughters.

Dr. Harrup is the recipient of many awards including:

U.S. Department of Energy's Bright Light Award, Energy @23 Award and Energy 100 Awards

Youngest Inductee ever in INL's Inventors Hall of Fame

Numerous Bechtel Awards for Outstanding Publication

Most Original Technical Work Award from Bechtel

Over 55 publications in refereed journals and peer-reviewed government reports, 17 U S patents and pending patents, as well as numerous international patents granted and pending

Received his Ph.D in chemistry from Emory University



**A Momentary Interruption**

# Technology Transfer – Universities vs. Labs

Process appears to be and can be very different

- will anything new be discovered (even if you own extensive background IP)?
- even when you bring the money they want to own the IP
- at January '08 meeting a local university presented this:

## University of Virginia Patent Foundation Model

- academic technology transfer is a business
- University of Virginia Patent Foundation- “deal-based” business model
- **Deal-Based:** Market first, only patent if deal is found. (analogous to “just-in-time” manufacturing)
- **Patent-Based :** Patent those that look promising, market and license later. (analogous to inventory-based manufacturing)

## Deal-Based Model

- The deal-based model can be equated with the “just-in-time” manufacturing model
- JIT approach requires that production (patenting) be closely linked to sales (licensing)
- key to this model is to negotiate a license or at least identify a willing licensee before spending money to convert a provisional application to a PCT or regular U.S. application, and let the licensee pick up the cost of patenting

## **Technology Transfer – Universities vs Labs**

And so I asked, *“You want industry to license a Technology before it is patented, or even filed?”*

What do I get for taking that risk?

Question was **not** answered...in fact it was ignored.

Tracer licensed from ORNL before the 1st patent was issued; 2<sup>nd</sup> patent later

# **Tracer Detection Technology Corp.**

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**Encapsulated Perfluorocarbon (PFT)  
Track, Trace and Locate System  
(#N00014-08-C-0155)**

# Project Organization

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## Tracer Detection Technology Corp.

Jay Fraser, Program Manager  
Stan Meyers, Chief Engineer

## CHEMICAL TAGGANTS

Idaho National Laboratory

## SENSOR PROGRAM

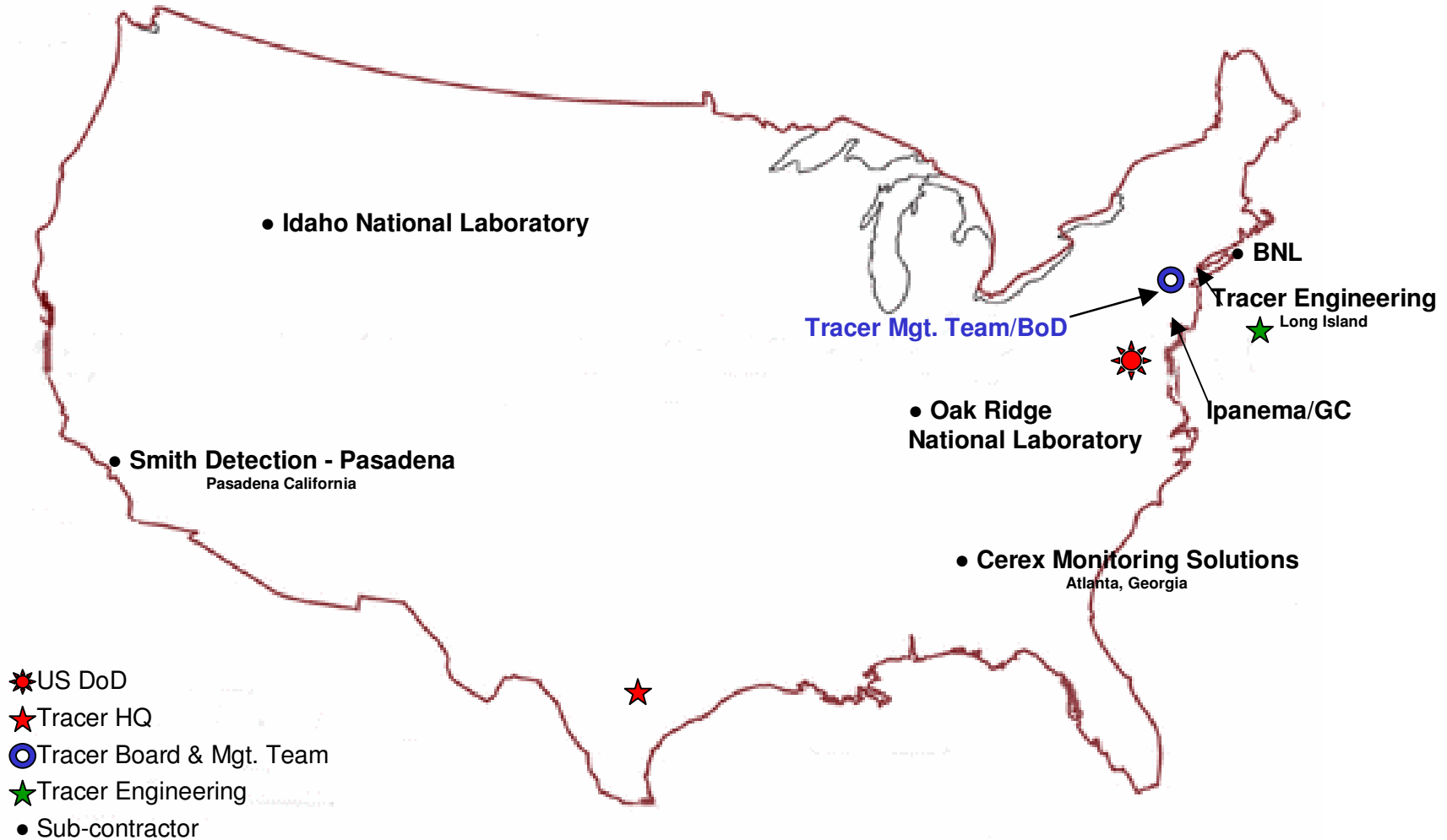
Stand-Off Detector  
Brookhaven National Laboratory

## Proximity Detectors

Oak Ridge National Lab  
Smiths Detection-Pasadena  
Cerex Monitoring Solutions LLC  
Ipanema LLC

# TRACER DETECTION TECHNOLOGY CORP.

## Remotely Managed – Geographically Dispersed



**PFT OVERVIEW**

**UNIQUE:** Do not exist naturally in environment

**INVISIBLE:** Sensors tuned to detect;  
sensitive and precise @ low ppt/ppq levels

**RAPID LIQUID TO GAS PHASE TRANSITION:**  
Encapsulation permits vapors to be emitted  
over time in measured concentrations

**NON-TOXIC:** can be handled safely and  
ingested (empirical data – needs validation)

**RANGE OF FINGERPRINTS POSSIBLE**  
(current work does not include combinations)

**OPERATIONAL NICHE**

Covert Surveillance and Tracking

Detection in line of sight and/or vicinity  
(not limited to line of sight)

Look for something previously marked or mark  
something for future identification

Operationally flexible/mission customizable

Multiple product forms/form factors possible

Multiple delivery methods possible

**System Demonstration Test Results**

ORNL Aug 13 Check Point Scenario

- Tagged car identified at close range with closed windows by Gas Chromatographs (GCs) & Mass Spectrometer (MS)
- FTIR confirmed check point ID of the tagged vehicle
- All sensors showed positive detection
- GCs successfully detected the tagged vehicle in drive-by
- Residual PFT signal detected
- “Tagged” man was detected by the GC in meeting room

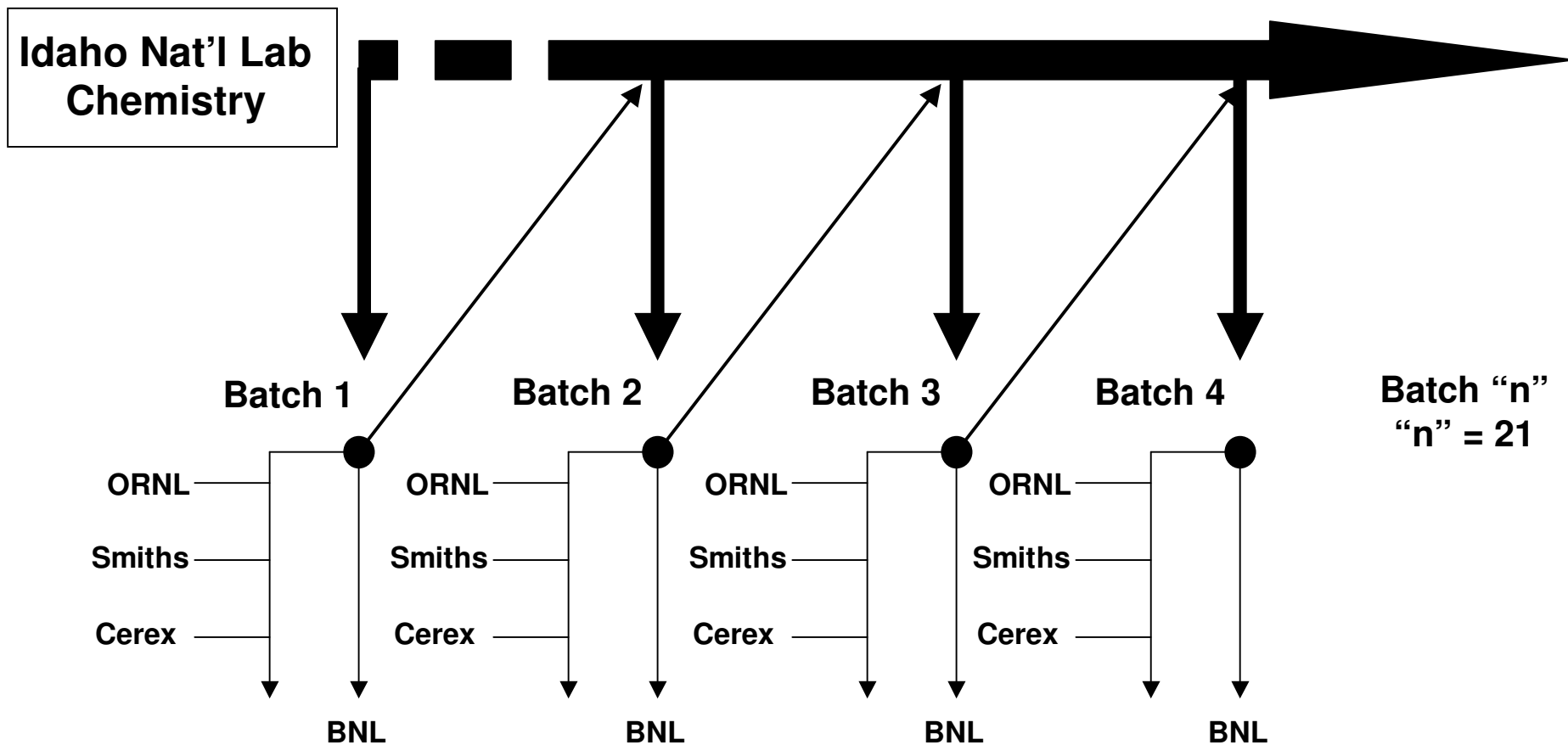
**System Demonstration Test Results**

BNL Aug 27 Stand-Off/Drive-by Scenario

- Stand off/line of sight detection w/LIDAR confirmed
- Successful drive-by detection/identification of tagged vehicle with windows closed
- Detection of human target wearing self-activating tag
- Detection of discarded source at approximately 75 yards

# Encapsulated PFT-TTL

## Program #N00014-08-C-0155



Feedback provided on each "batch" to INL/Tracer; iterative process of customizing sequential batches. Optimize sensor performance and maximize "library" of tags. INL produced 21 iterations with 3 PFTs

# Lessons Learned/Questions Asked

Will labs work together?

Cooperate and communicate?

Release/sharing of information?

Competing areas of expertise

Raging egos and jealousies?

Non-compete?

Labs do not operate the same, even when managed by divisions of the same company

BNL: Brookhaven Science Assoc.  
(Battelle and Stony Brook)

INL: Battelle Energy Alliance, LLC

ORNL: UT/Battelle

Interpretations of tech transfer rules

Publication questions/issues

Program is “sensitive” and ONR requires pre-approval of all pubs

# Question

Does the Department of Energy  
Really Want to Deal with Small Business?

# **Issue #1: Lab Burden on Work for Others**

Total Program Budget \$ 926.8

Total Budget for National Labs  
(Including 3.1x burden rate) \$ 622.9

National Laboratory % Program Budget 67.2

Actual cost (excluding “3.1x” burden) \$ 200.9

**Adjusted cost at “1.9x” burden \$ 381.7**

**Savings to total budget \$ 281.3**

**Net Program Impact????? Add'l Subcontractor**

## **Issue #2: 90 Day Upfront Requirement**

Contract was Fully-funded and Fully-Obligated (LoC from USG)

Idaho National Laboratory	233.1
Brookhaven National Laboratory	234.8
Oak Ridge National Laboratory	<u>155.0</u>
National Laboratory Sub-total	622.9
Total Contract Amount	926.8

Given 9-mo. Period of Performance, “requirement” = 207.6

Given delays in billing and reimbursement, this would cost Tracer ~ \$46,700 in interest during the contract period

INL and BNL came up with “pre-contract” funds. Oak Ridge could not do so. Tracer paid \$25,000 to ORNL during the contract, insufficient to complete the Statement of Work.

# PowerShift Management LLC

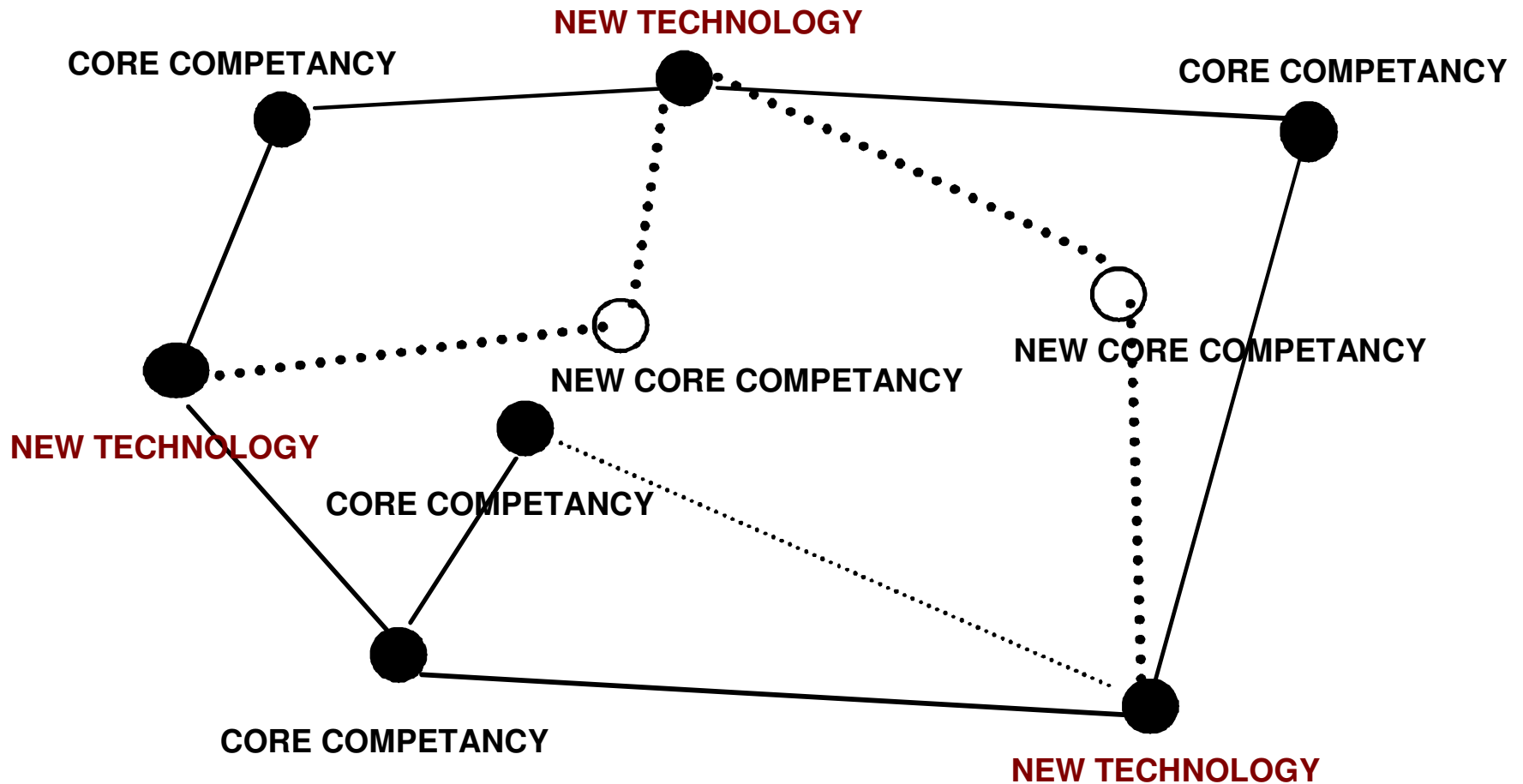
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## “Strategies for Innovation, Technology & Entrepreneurship”

- Apply entrepreneurial management skills to T<sup>2</sup>
- Leverage my 35 years of strategic marketing experience and my 18 years of technology transfer background.
- Objective is to help companies develop growth strategies through the development or acquisition of new technologies and intellectual property, and to help entrepreneurs in general.
- Include my work in transitioning law enforcement and homeland security technologies and my interests in counterterrorism policy & technology.

# Powershifting – Connecting the Dots

## Creating a Strategic Architecture



# TECH. POWERSHIFTING – THE PROCESS

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Access to innovative inventors and/or technologies in strategic areas of interest

Discovery of relevant technologies from universities, public and private research labs, start-ups, or small-to-medium enterprises

Initial qualification of technology fit and relevance to your specific needs

# TECHNOLOGY POWERSHIFTING – THE PROCESS

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## On-going Tech Transfer Opportunities - In/Out License

- Aging Aircraft corrosion issue
- coatings for biomechanical devices
- polymer applications
- **“federal lab pipeline”**
- **law enforcement/homeland security transition efforts**
- Multiple universities; UTSA; UTHSCSA; military
- Open Innovation

# **TECHNOLOGY POWERSHIFTING...ISSUES**

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Find the technology to fit your requirements

Evaluate/confirm technology appropriateness

Negotiate the deal

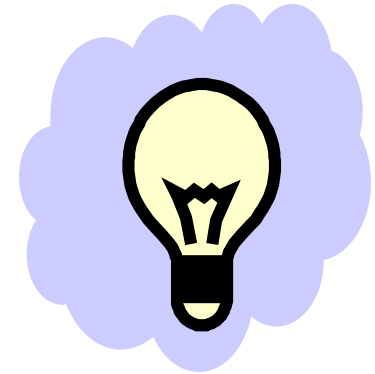
Pay for the licensing fee and continuing royalties

Fund your venture and keep it going

Develop the technology...

**...IP doesn't count, products do**

# Questions and Discussion



**Contact:**

**Jay Fraser, President  
Tracer Detection Technology Corp.  
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San Antonio, TX 78229  
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Cell: 210-542-0014  
tdtcorp@earthlink.net**

**Principal  
Powershift Management LLC  
powershift-mgt@earthlink.net**