



MISSION  
DRIVEN  
PARTNERSHIPS

# Air Force Technology Transfer Program





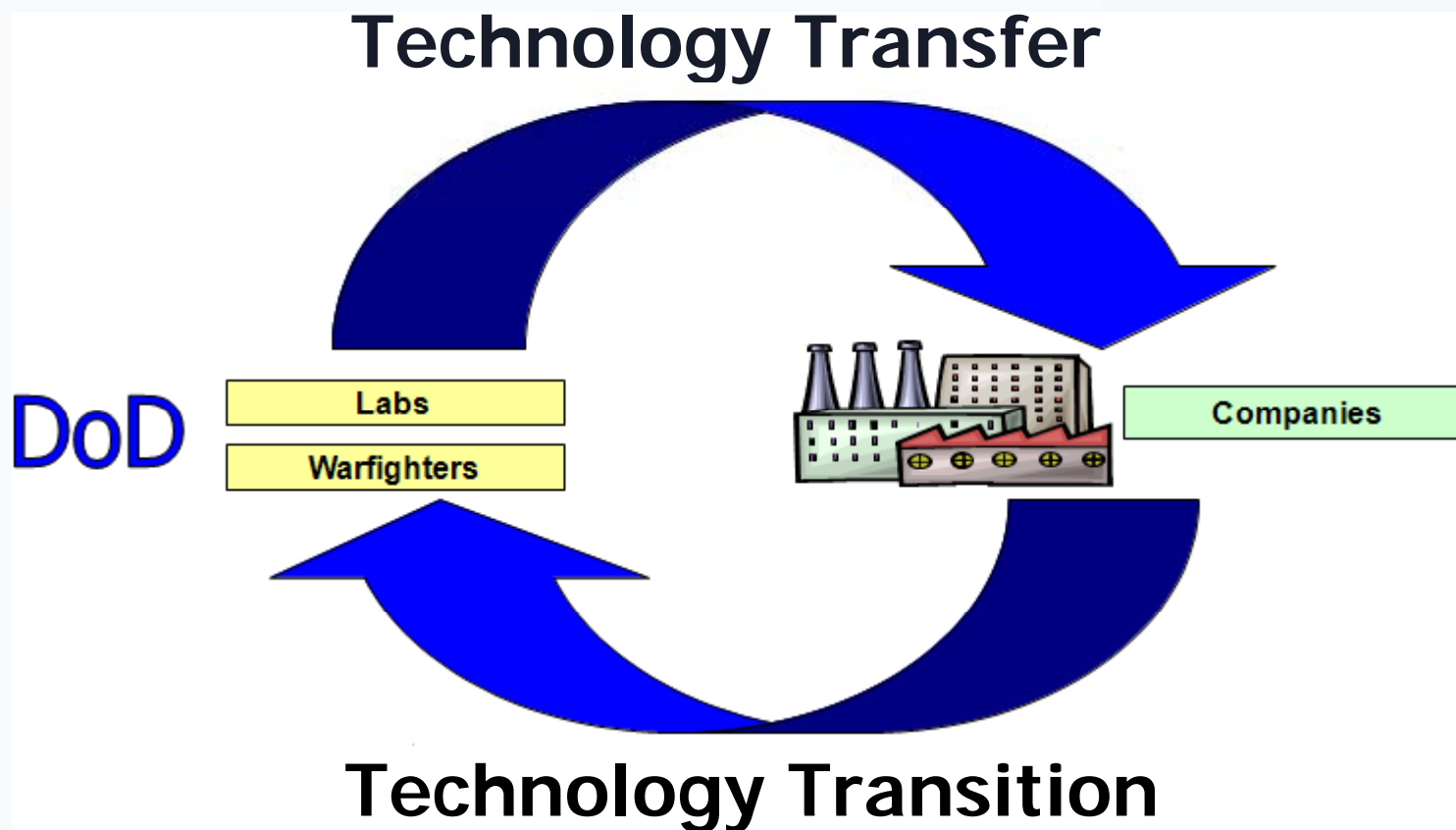
# Overview

- **Background and History**
- **Technology Transfer Concepts**
- **Technology Transfer Agreements and Mechanisms**
- **Contact Information**





# Technology Transfer Cycle





# Definitions

## **Technology Transfer**

The process by which knowledge, expertise, facilities, and equipment, or other resources developed in one place or for one purpose are intentionally transferred and utilized in another place for another purpose to fulfill actual or potential public or domestic needs. It includes spin on, spin off, and dual use.

## **Technology Transition**

The process of applying critical technology in military systems to provide an effective weapons and support system — in the quantity and quality needed by the warfighter to carry out assigned missions and at the “best value” as measured by the warfighter.



# Spin-Off: Visco-Elastic Memory Foam

## Objectives:

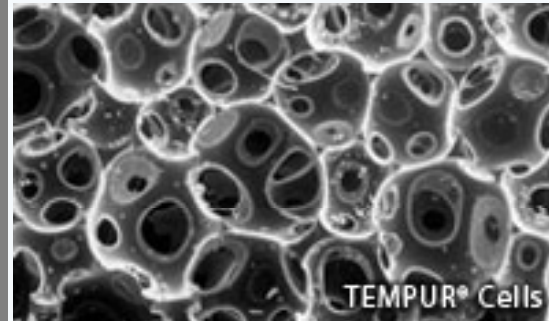
- To develop a material to relieve the g-forces experienced by astronauts.
- Originally developed as a way to improve the safety of aircraft cushions

## Technology:

- Memory foam was never used in the space program but was subsequently used medically
  - Manufacturing process remained difficult and unreliable
- NASA released memory foam to the public domain in the early 1980s
  - In 1991 Fagerdala produced the "Tempur-Pedic Swedish mattress"

## Participants:

- NASA (Ames Research Center)
- Fagerdala World Foams, Sweden
  - 1991 product, the "Tempur-Pedic Swedish Mattress"





# Spin-Off: NAVSTAR Global Positioning System

## Objectives:

- To provide accurate location information for Department of Defense applications (ex. ballistic missile submarines and general navigation).
- The first satellite navigation system, Transit, used by the Navy, was first successfully tested in 1960

## Technology:

- After Korean Air Lines Flight 007 was shot down in 1983 after straying into the USSR's prohibited airspace, President Ronald Reagan issued a directive making GPS freely available for civilian use as a common good.
- Full Operational Capability was declared by NAVSTAR in April 1995

## Participants:

- U.S. Navy
  - Naval Research Laboratory
- U.S. Air Force Space Command
  - 50<sup>th</sup> Space Wing (formerly 2d Space Wing)





# Spin-in Examples



Blackberry



MIOX Water Purifier



Oakley SI M 2.0 Frame



Surefire M6 Guardian



# History

Before 1980:

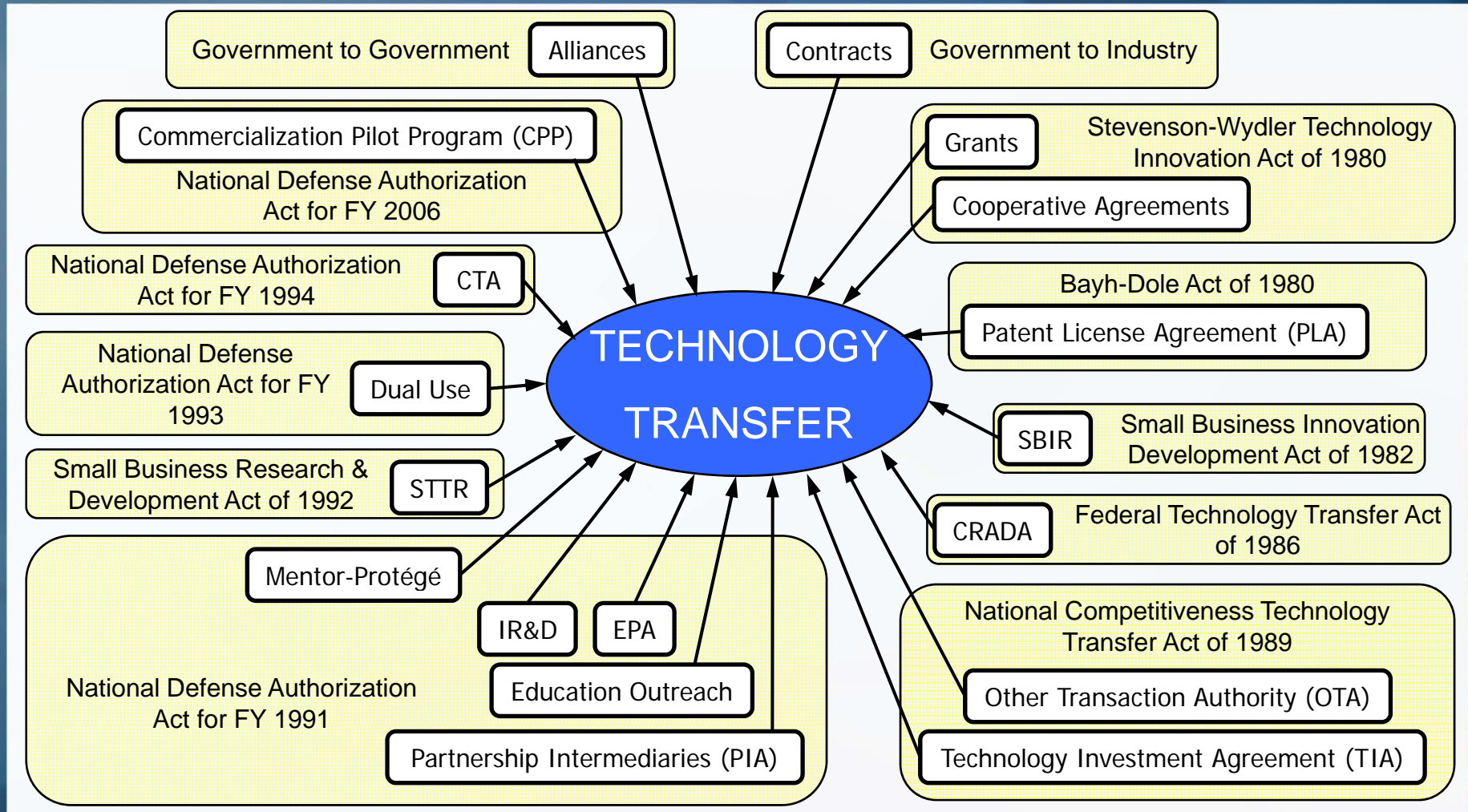
- Technology gaps between government and private sector were growing
- Government could not protect nor license developed technologies
- Contracts were the only legal vehicles for interaction
- No vehicles existed for collaboration





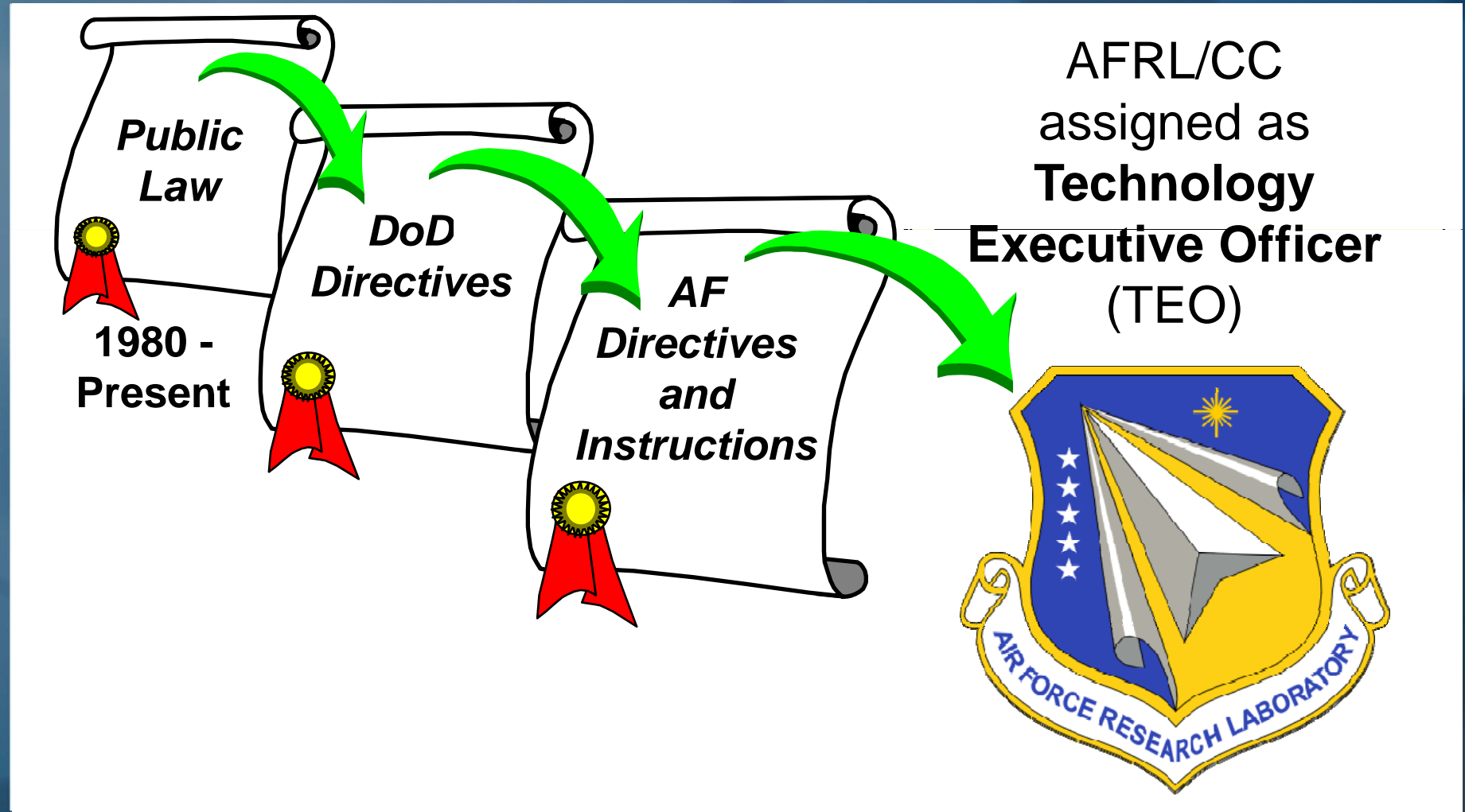


# Technology Transfer Authorizations



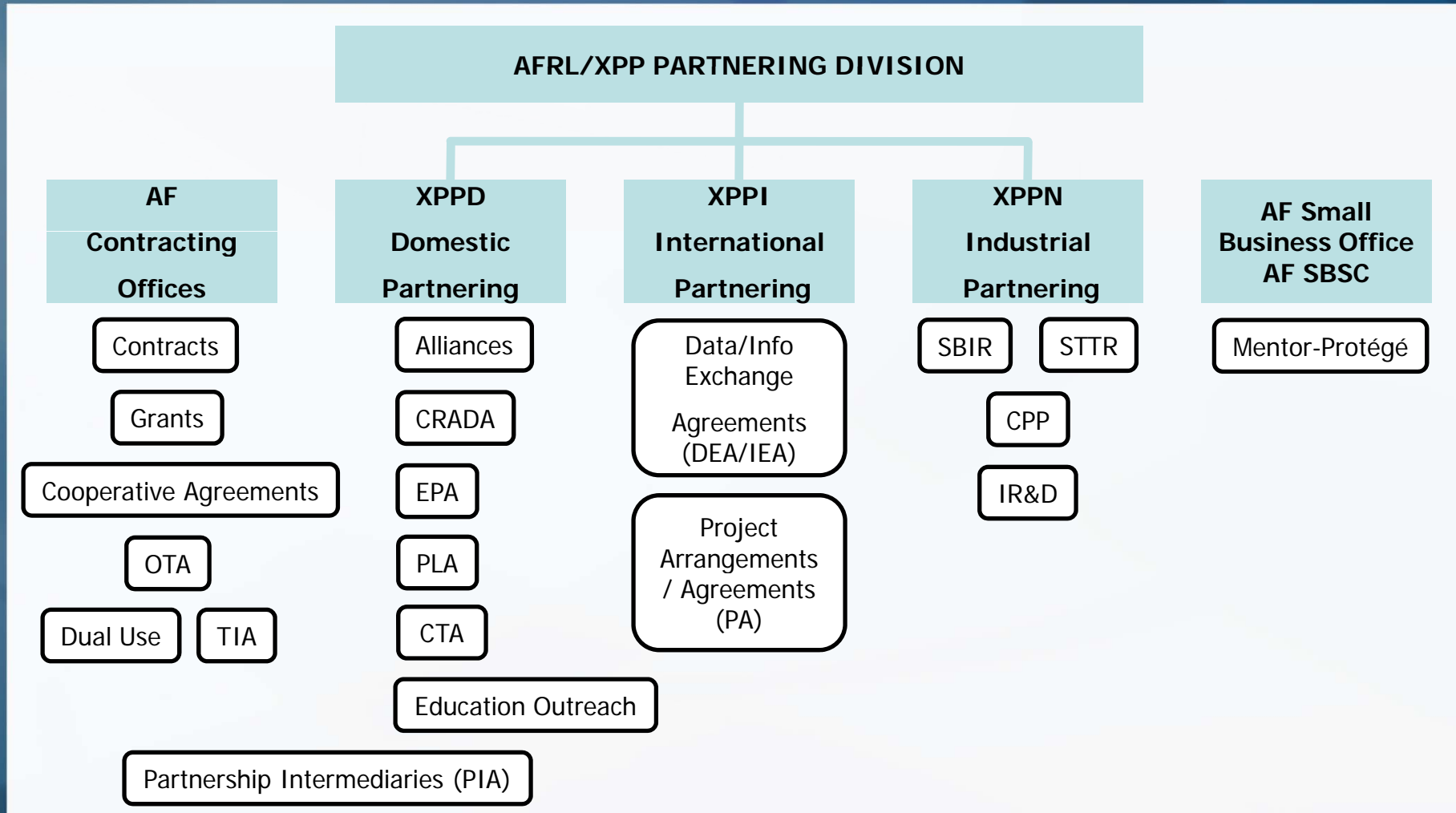


# Technology Transfer Authority



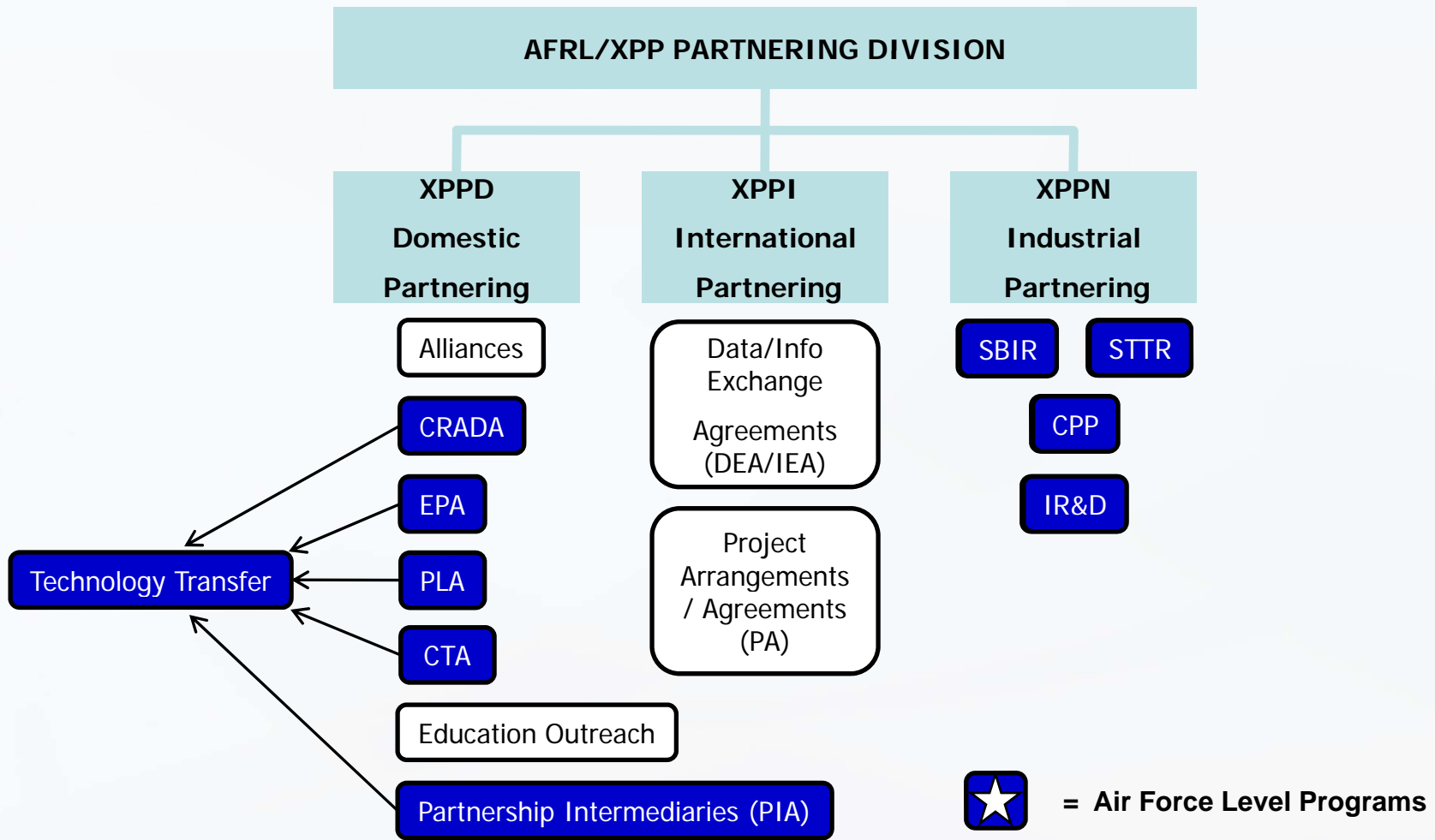


# Authorities Organized within Air Force



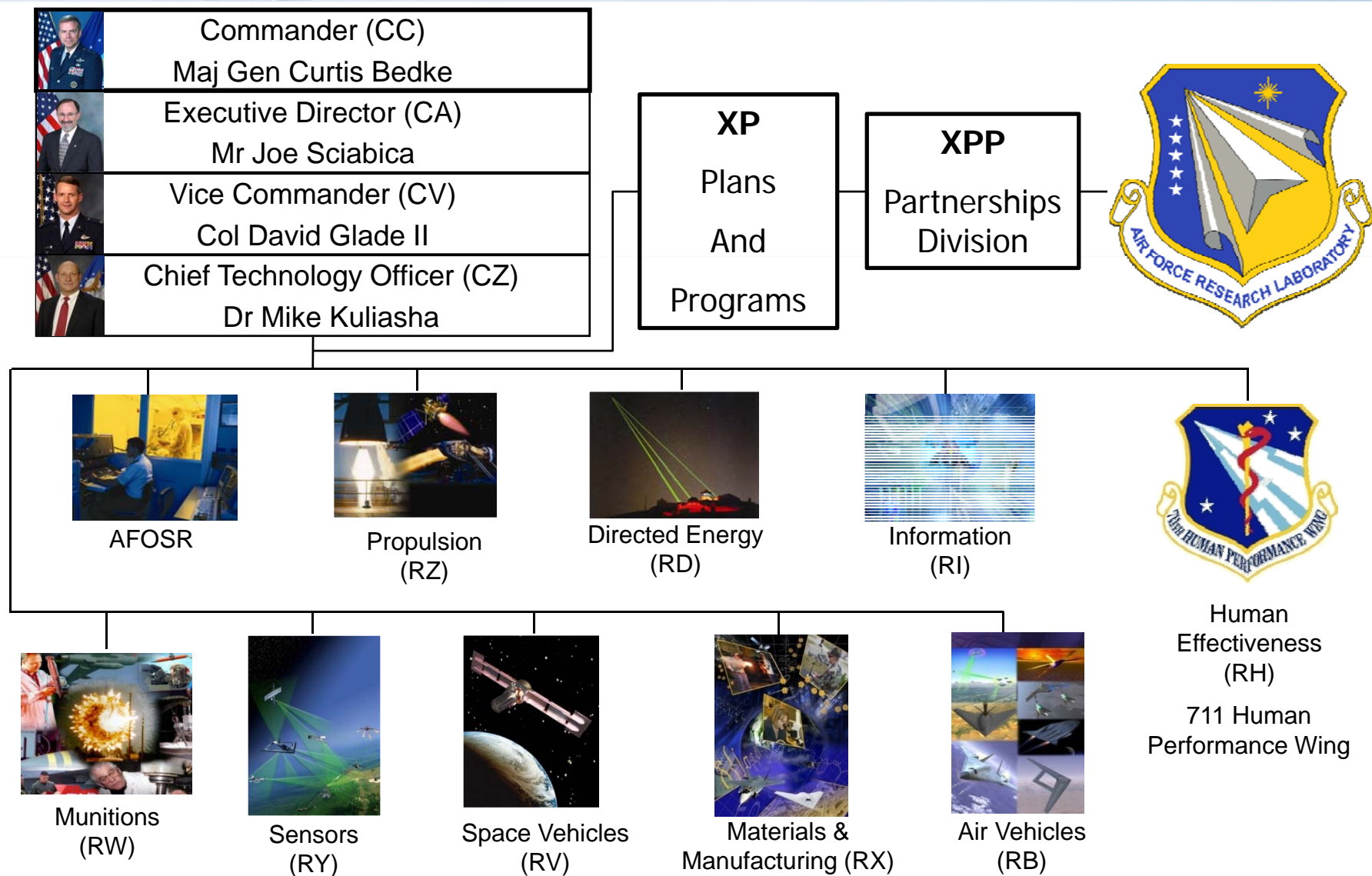


# AFRL/XPP Partnering Division





# AFRL Organization





# Air Force Materiel Command



Research &  
Technology  
Development

System Development & Production

Test & Evaluation

Operation  
& Support



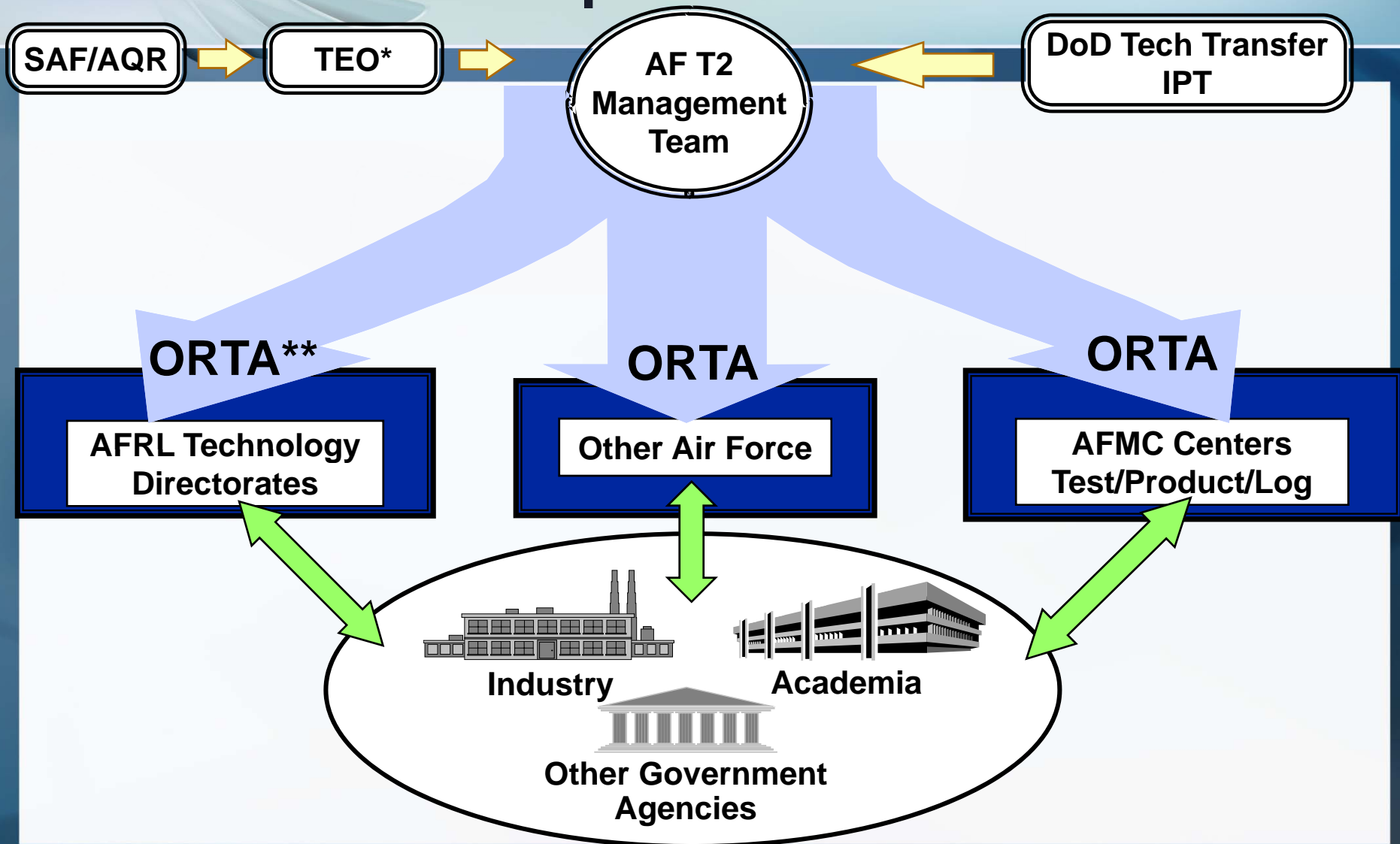
# USAF Major Commands



**AFRL/XPPD Manages T2 Program For Entire AF**



# T2 Relationships



\*Technology Executive Officer (AFRL/CC) \*\*Office of Research & Technology Applications (ORTA)





# Office of Research and Technology Applications

## *Inside the Lab*

**Scientists and Engineering Staff**

**Lab Management**

**Public Affairs**

**Legal Staff**

**Equipment Custodians**

**Procurement Staff**

**Human Resources**

## **ORTA**

- Office of
- Research &
- Technology
- Application

### Functions:

- Supports S&Es
- Coordinates transfer activity
- Negotiates All Agreements

## *Outside the Lab*

**Private Sector**

**Academia**

**State and Local Organizations**

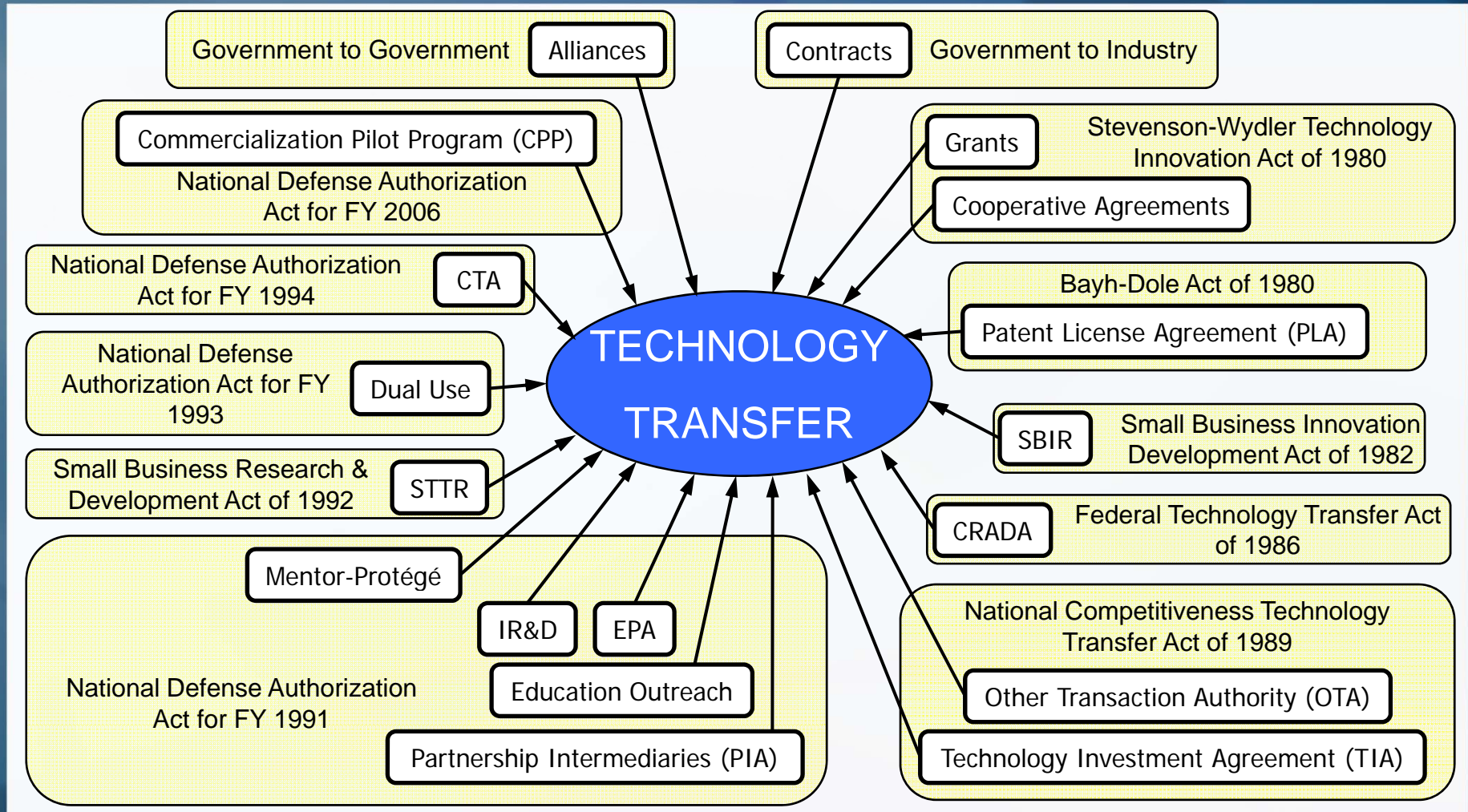
**National Networks**

**Professional and Trade Groups**

**Other Federal Labs**



# Technology Transfer Mechanisms





## Cooperative Research and Development Agreements (CRADAs)

- A written agreement between one or more Air Force Activities and one or more non-federal parties to conduct specified research
  - Must be consistent with Air Force Mission
- Non-federal party may provide personnel, facilities, equipment and/or funds
- Air Force Activity may provide personnel, facilities, and/or equipment
  - Air Force Activity can not provide any funds
- Authorizes parties to determine rights in inventions, patents and other intellectual property
- Trade secret and commercial and financial information protected from disclosure under the Freedom of Information Act
- Preference for small business and businesses located in the US (15 U.S.C. § 3710a)



## Uses of a CRADA

- CRADAs should meet one of the following criteria:
  - Access to Emerging Technology
    - Ex: Thin film coating for airplane wing to decrease drag
  - Provide Mutual Benefit
    - Ex: Transfer hot air balloon and research equipment to a university in return for their data
  - Expand AF Activities Technical Knowledge
    - Ex: Testing of magnets attached to engine fuel line to determine if magnetic field increases combustion efficiency
  - Transfer Technology for Commercialization
    - Ex: Transfer fighter pilot hearing protection and communication technology to motor sport drivers



# BARRIER AND SIGN KIT (BASK)



## Objective:

- 2006 AFRL Commander's Challenge Project
- To Develop an Effective, Easily Deployed, Less-Lethal Solution to Stopping Uncooperative Cars at Snap/Flash Checkpoints.

## Benefits:

- Increased Communication with Approaching Vehicles, Positive Checkpoint Identification, Troop Exposure, Situation Awareness and Determining Driver Intent.

## Status:

- Active CRADA
- 2 of 3 Products Commercially Available
- Current Customers Include: Georgia and Illinois National Guard

## Participants:

- AFRL/RV (Sensors Directorate)
- Universal Safety Response, Inc. (USR)
- DoD TechMatch
- FirstLink (Pittsburg Gateways Corp.)

## Technology:

- **A portable system of vehicle barriers and signs**
  - **Collapsible Star Barrier:** Portable, light-weight, and compact alternative to concertina wire. They can be used as a channeling device or a blockade device.
  - **Collapsible Signs:** Portable, reflective, and difficult to replicate. Holographic signs makes phony signs easy to identify.
  - **Bumper Thumper:** Rugged speed-bump / sign hybrid.



## Contact:

- Beverly Thompson (AFRL/RVOX)
- (e): [Beverly.Thompson@wpafb.af.mil](mailto:Beverly.Thompson@wpafb.af.mil) (P): 937-904-9771



# Unitized Group Ration-Express (UGR-E)



## Objective:

- To develop an innovative method for providing hot meals to Warfighters operating in field locations where they're unable to maintain remote food service operations.

## Benefits:

- Tremendous morale booster and nutritional asset
- Independent of field kitchens, cooks, fuel and power
- 84% reduction in cost compared to trucking meals forward from a rear kitchen and a 90% reduction in cost compared to operating a field kitchen

## Status:

- Fielded with ongoing improvements (TRL/MRL 9)
- Follow on support to improve heater technologies and design

## Participants:

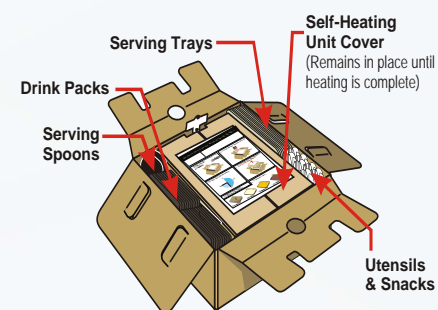
- (CRADA)
  - Think Inc.
  - Bargain Production Group
- (Grant/Contract)
  - Wornick Corp, - TruTech, Inc.
  - TDA Research, - Honynoon Paper Corp
  - Innophos, Inc.

## Technology:

- UGR-E or "Kitchen-in-a-Carton," is a compact, single-use, self-contained module that provides hot meals for up to 18 people. With the pull of a tab, the integral heaters are activated and the food is heated to 140°F in 30-45 minutes. Each 45-pound carton contains four trays of food (entrée, vegetable, starch, and dessert), and also includes serving utensils, trash bags, and 18 disposable dining packets. The UGR-E does not require refrigerated storage and has a minimum shelf life of 18 months at 80°F



## The "Kitchen-in-a-Carton"



## Contact:

- Jeffrey DiTullio (US Army)
- (e): [Jeffrey.DiTullio@us.army.mil](mailto:Jeffrey.DiTullio@us.army.mil) (P): 508-233-4184



# Education Partnership Agreements (EPAs)

- Focused on promoting the fields of Science, Math, and Engineering
- Vehicle for Specific Collaboration with Academia and Educational Institutions
- Allows for Sharing of People and Expertise
- Allow for Transfer/Donation of Equipment
  - Scientific Equipment
  - Computers





# Thurgood Marshall College Fund



## Objective:

- Prepare, develop and sign five Education Partnership Agreements between AFRL Directorates and TCMF

## Benefits:

- AFRL exposes a diverse group of engineering students to numerous AF research projects and future job opportunities
- TCMF students gain valuable experience and insight with AF research programs

## Technology:

- The TCMF provides scholarships as well as internship programs for students in Historically Black Colleges and Universities
- TCMF joined with AFRL to provide summer research programs for TCMF sponsored engineering students

## Status:

- In less than 60 days, five EPAs were signed and 12 students began research efforts at five of the AFRL Directorates
- By the end of summer, all students completed and reported on their research assignments to their S&E mentors

## Participants:

- AFRL/RI, RW, RY, and RZ
- 711 HPW/RH



## Contact Info:

- Kristen Schario, AFRL/RZOP, (937)255-3428
- [Kristen.Schario@wpafb.af.mil](mailto:Kristen.Schario@wpafb.af.mil)





# Animal Support Equipment (EPA)



## Objective / Benefits:

- To encourage and enhance the study of mathematics and science or for the conduct of technical and scientific education and research activities through the transfer of excess or surplus Department of Defense laboratory research or other scientific equipment

## Technology:

- Animal support equipment
  - Transport cages
  - Cage/Rack systems
  - Power washer

## Status:

- Education Partnership Agreement
- Title of Equipment shall transfer to Partner on the final day of this agreement unless otherwise terminated by either party

## Participants:

- 711 HPW/RH (Human Effectiveness Directorate)
- The University of Texas Health Science Center at Houston



## Contact:

- Dr. Jim Kearns (711 HPW/XPO)
- (e): [James.Kearns@wpafb.af.mil](mailto:James.Kearns@wpafb.af.mil) (P): 937-255-3765



## Patent License Agreements (PLAs)

- Industry can take advantage of Government Developed Technology
- Negotiated by ORTA and assisted by patent counsel for Government-owned inventions
- Government purpose license normally retained
- Government usually receives royalties
  - Government Inventors can receive Royalty Income





# 3-D Audio Technology



## Objective:

- To develop technology to counter spatial disorientation.
  - Spatial disorientation--the inability of a pilot to correctly interpret the attitude, altitude, or airspeed of an aircraft relative to the earth or other reference points

## Status:

- (3) non-exclusive license agreements have been signed for rights to 3-D Audio patent.

## Participants:

- 711 HPW/RHCB
- PIAs: TechLink, DoD TechMatch

## Benefits:

- Increased situational awareness for general aviation pilots
- Increases flight safety by helping pilots avoid conditions that result in spatial disorientation

## Technology:

- This technology processes data from GPS systems and flight indicators then provides non-visual, non-invasive audio feedback to the pilot through the existing entertainment and communication systems.
- The Auditory Horizon technology provides a three dimensional auditory artificial horizon that the pilot can use to orient the aircraft. The audio display is continuously available, but is easily relegated to the pilot's mental background when it is not needed.



## Contact:

- Dr. Jim Kearns (711 HPW/XPO)
- (e): [James.Kearns@wpafb.af.mil](mailto:James.Kearns@wpafb.af.mil) (P): 937-255-3765



Picture depicts simulation exercise

## **FEBSS**

### **Field Expedient Bleeding Simulation System**

Created by former Army Medic Instructor Sgt. Lynn King

**Evans Army Community Hospital, Fort Carson, CO**

**Army Medical Department (AMEDD)**

### **Problem**

High percentage of fatalities and disabilities resulting from delays in effective hemorrhage control in the field

*Unrealistic tools for medic training:*

- didn't recreate the stress and difficulty of real life hemorrhage control in the field
- mannequin hooked up to laptop was cumbersome and impractical

### **Validation**

- Fort Carson 91W School – developed by combat medics and used in training of combat medics
- Used and tested in Department of Combat Medic Training classes at Fort Sam, Houston

### **Solution**

- Cooperative Research and Development Agreement (CRADA) with Skedco, Inc. and Army to develop prototype (mannequin to backpack)
- Prototypes can simulate several concurrent wounds, either mild or severe, from a venal nick to a pulsing arterial hemorrhage. Units are suited for mannequins or can be worn by Army personnel in a role playing exercise.

### **Technology Transfer**

- Exclusive patent license of US and international intellectual property
- Units acquired by Army, Navy and Air Force, as well as sales to a university and also to industry (US and Netherlands).



## ***Bednets***

### **Personal Popup Protection Tent**

Invented by Colonel Raj Gupta (retired)

**Walter Reed Army Institute of Research (WRAIR)  
Medical Research and Materiel Command (MRMC)**

### **Problem**

Soldiers sleeping in the field and civilians in endemic countries are bitten by insects that transmit debilitating and deadly bacteria, viruses, and parasites such as Malaria and Dengue Fever.

Topical insecticides require reapplication and are hard to apply to all exposed skin.

Current screened tents are too large and weighty for carrying by each soldier in the field; setup time can also be a problem.

### **Validation**

- Currently purchased and used by multiple Army and Marine Corp units
- Available for sale to the public

### **Solution**

- Small, collapsible bednet that can fit inside a backpack yet unfolds to a full, single-person tent
- Unique patented support coils allow the tent to popup and be instantly usable, as well as quickly stowable
- Permethrin-treated tent material repels insects while fine screening blocks insect entry

### **Technology Transfer**

- U.S. Patent filed, prosecuted, and issued
- Nonexclusively licensed to two companies for military and civilian markets
- Specialty bednet markets being pursued



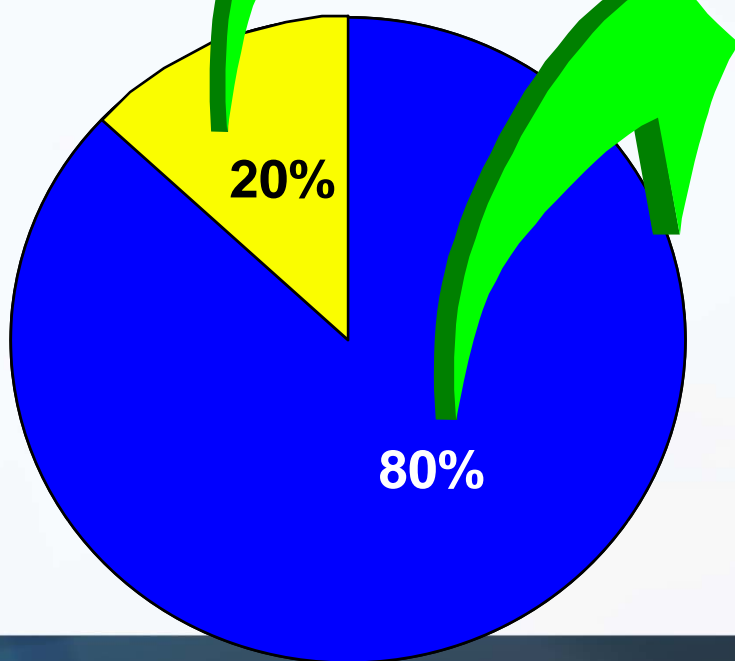
# Patent License Agreement Payoff



**20%** of royalty income to *Inventor*,  
(up to \$150K/year!)

## **Balance to organization for:**

- Incidental Administrative Expenses
- Rewarding Technical Employees
- Promoting scientific Exchange
- Funding Tech Transfer Education & Training





## Partnerships Add Value to Air Force Programs

- Brings Additional Dollars to Research Programs
- Expands Capabilities
  - Provide/Receive Facilities & Equipment
  - Maintain and Upgrade Current Facilities
  - Market Facilities to Commercial Partners
- Reduce the Overall Schedule of Programs
  - Collaborate on Research
  - Conduct Additional Research of Interest
- Builds Air Force Future Workforce





## Why is Tech Transfer Significant to AF Scientists and Engineers?

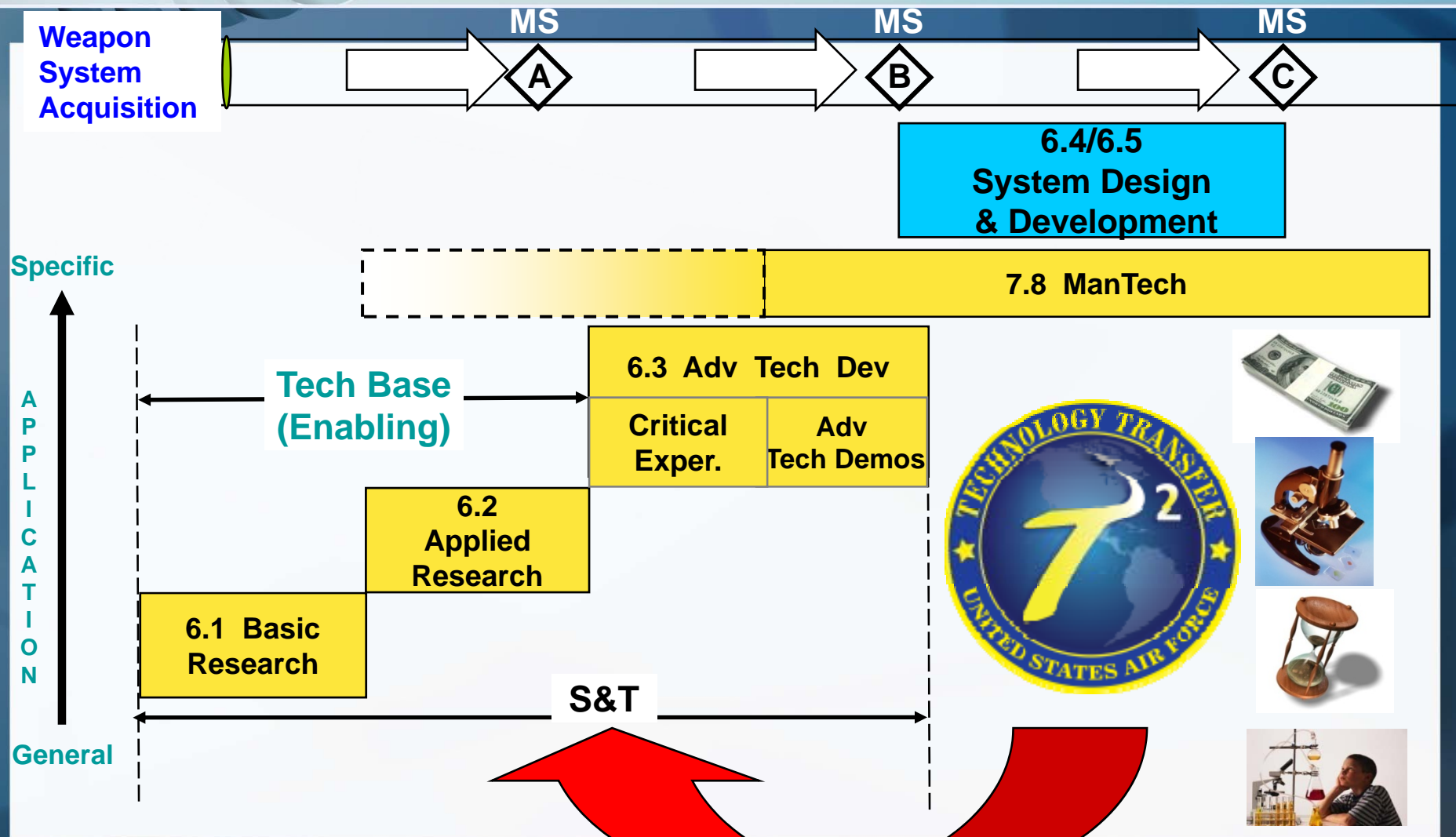
- Scientific Advisory Board Reviews
- Flat or Declining 6.1 & 6.2 Budgets
- Faster Response to Warfighter Needs
- AF Scientists and Engineers required to support Technology Transfer
  - As required by law and AF policy
  - In the Lab Demo Program: All S&Es are evaluated on Technology Transfer Efforts







# Technology Transfer's Role in Acquisition



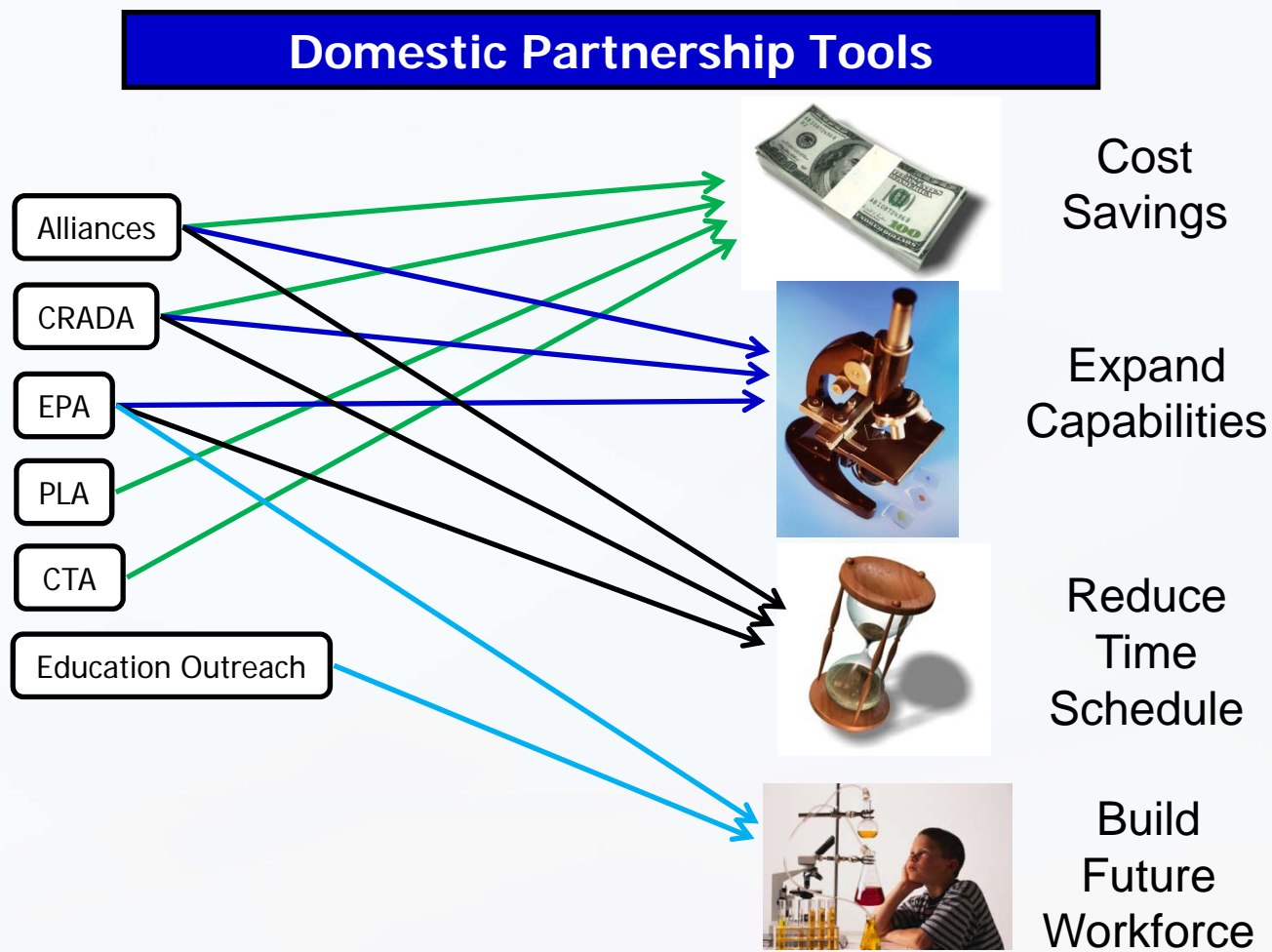


# FY08 Technology Transfer Agreement Information

T2 Mechanism	(Started/Open)
CRADA	92/514
EPA	42/296
CTA	4/16
PLA	141/48
<b>Total</b>	<b>138/904</b>
Patents Issued	57
Patent Applications Filed	53
Invention Disclosures	67
CRADA Income	\$3,791,246
CTA/TSA Income	\$2,007,767
Patent License Income	\$29,347
<b>Total Income to AF Programs</b>	<b>\$5,828,360</b>



# Domestic Partnerships Tools Benefit to the Air Force





## How to Reach Us

**Air Force Research Laboratory  
Technology Transfer Office  
Building 16, Room 107  
1864 Fourth Street  
WPAFB, OH 45433**

***Air Force T2 Office: David Sikora***  
**(937) 656-9868 Email: [David.Sikora@wpafb.af.mil](mailto:David.Sikora@wpafb.af.mil)**

**On the Web:**

**AF T2 CoP: <https://afkm.wpafb.af.mil/afpartnerships>**

**AF T2 Factsheet: <http://www.wpafb.af.mil/library/factsheets/factsheet.asp?id=6026>**



# Air Force T2 Focal Points

## Air Force Research Laboratory (AFRL):

### **Directed Energy Directorate**

Casey Deraad, AFRL/RD  
Phone: 505-846-9352  
Email: casey.deraad@kirtland.af.mil

### **Human Effectiveness Directorate**

Jim Kearns, 711 HPW/RH  
Phone: 937-255-3765  
Email: james.kearns@wpafb.af.mil

### **Propulsion Directorate**

Kristen Schario, AFRL/RZOP  
Phone: 937-255-3428  
Email: kristen.schario@wpafb.af.mil

### **Information Directorate**

Frank Hoke, AFRL/RIB  
Phone: 315-330-3470  
Email: franklin.hoke@rl.af.mil

### **Office of Science Research**

Dr. Chuck Chatlynne, AFRL/AFOSR  
Phone: 703-696-9558  
Email: chuck.chatlynne@afosr.af.mil

### **Space Vehicles Directorate**

Casey Deraad, AFRL/RV  
Phone: 505-846-9352  
Email: casey.deraad@kirtland.af.mil

### **Materials & Manufacturing Directorate**

Greg McGath, AFRL/RXOP  
Phone: 937-255-5669  
Email: gregory.mcgath@wpafb.af.mil

### **Air Vehicles Directorate**

Stephanie Flanagan, AFRL/RBOP  
Phone: 937- 255-4179  
Email: stephanie.flanagan@wpafb.af.mil

### **Sensors Directorate**

Beverly Thompson AFRL/RYOX  
Phone: 937-255-5285/6453 x4022  
Email: beverly.thompson@wpafb.af.mil

### **Munitions Directorate**

Jill Barfield, AFRL/RWOB  
Phone: 850-872-3920  
Email: jill.barfield2@eglin.af.mil



# Air Force T2 Focal Points (cont'd)

## Other AF Centers

### **Ogden Air Logistics Center**

Mr. Craig Shaw, OO-ALC/ENSN  
Phone: 801-586-2721  
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Email: craig.shaw@hill.af.mil

### **Oklahoma City Air Logistics Center**

Mr. Edwin Kincaid, OC-ALC/ENSN  
Phone: 405-736-2577  
Email: edwin.kincaid@hill.af.mil

### **Warner-Robins Air Logistics Center**

Mr. Bob Wade  
Phone: 478-327-4129  
Email: bob.wade@robins.af.mil

### **Arnold Engineering Development Center**

Mr. Steve Bancroft, AEDC/XRS  
Phone: 931-454-6418  
Email: steve.bancroft@arnold.af.mil

### **AF Flight Test Center**

Mr. James Deckert, AFFTC/XPR  
Phone: 661-277-6883  
Email: james.deckert@edwards.af.mil

### **AF Center for Environmental Excellence**

Ms. Erica Becvar, AFCEE/TDE  
Phone: 210-536-4314  
Email: erica.becvar@brook.af.mil

### **Electronics Systems Center**

Mr. Paul Richter, ESC/XR  
Phone: 781-377-6145  
Email: paul.richter@hanscom.af.mil

### **Aeronautical Systems Center**

Mr. Jon (Tom) Graves  
Phone: 937-255-0071  
Email: jon.graves@wpafb.af.mil

### **AF Information Operations Center**

Ms. Celia (Sally) Sobey, AFIOC/XPX  
Phone: 210-977-5563  
Email: celia.sobey@lackland.af.mil



# Air Force T2 Focal Points (cont'd)

## Other AF Organizations

### **Air Force Academy**

Mr. Mike Crane, USAFA/DFER  
Phone: 719-333-8484  
Email: michael.crane@usafa.af.mil

### **AF Institute of Technology**

Dr. Michael Caylor, AFIT/ENR  
Phone: 937-255-3636 x7104  
Email: michael.caylor@afit.edu

### **311th Human Systems Wing**

Mr. Brian Raabe, 311 HSW/XPA  
Phone: 210-536-2069  
Email: brian.raabe@brooks.af.mil

### **Air Combat Command**

Mr. Robert (Bob) Tom  
Phone: 757-764-8202  
Email: robert.tom.ctr@langley.af.mil

### **AF Logistics Management Agency**

Ms. Mary Donald, AFLMA  
Phone: 334-416-4296  
Email: mary.donald@maxwell.af.mil

### **AF Weather Agency**

Dr. John Zapotocny, HQ AFWA/A8CS  
Phone: 402-294-5520  
Email: zapotocj@afwa.af.mil

### **AF Intelligence, Surveillance & Reconnaissance Agency**

Ms. Susan Barmore, AFISRA  
Phone: 210-977-2994  
Email: susan.barmore@lackland.af.mil



## Conclusion

- T2 facilitates Transition and is an Air Force acquisition strategy that supports the Warfighter
- T2 provides a return on our AF S&T investment and enhances economic development







Questions?