



# Public-Private Partnerships (P3) for R&D in Emerging Innovation Ecosystems

Richard Vaia

Materials and Manufacturing Directorate, Air Force Research Laboratory,  
Wright Patterson Air Force Base, Ohio, USA

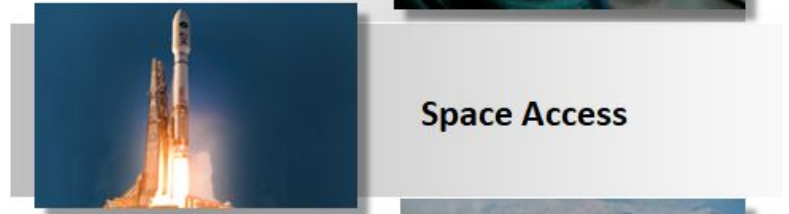
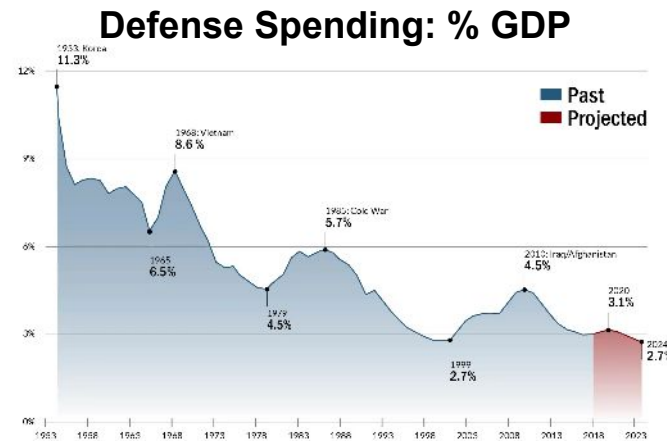
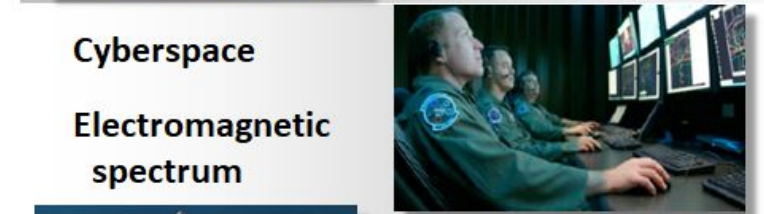
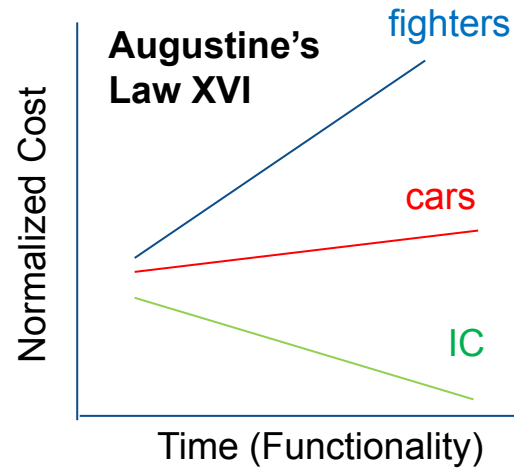
[richard.vaia@us.af.mil](mailto:richard.vaia@us.af.mil)

## Special Thanks:

NBMC, NextFlex, AFRL Regional Hub Teams

JR Russell, Kim Yoder, Tom Nelson, Chuck Ward,  
John Miller, Giorgio Bazzan, Lt Suren Uswatta





**Create Future Force**

**Changing Economics**

**Adapt to Evolving Innovation Landscape & Reduced Influence**

**Deterrence is based on cost-imposing technological superiority**



**BUDGET**

**\$4.9 Billion**

\$2.6B – Core  
\$2.3B - Customer

**Employees**

	Civilian	Military
<b>S&amp;Es</b>	3,611	570
<b>Total</b>	5,038	1,222

**6,260**

**5 Major CONUS Locations**  
**4 OCONUS Locations**  
**Many Smaller Research Locations**

- Wright-Patterson AFB, OH**
  - AFRL HQ
  - 711 Human Performance Wing
  - Sensors
  - Aerospace Systems
  - Materials and Manufacturing
- Rome Research Information**
- Arlington, VA**
  - Office of Scientific Research
- AFRL OCONUS**
  - Santiago, Chile
  - London, UK
  - Tokyo, Japan
  - Maui Research Site, HI
- Kirtland AFB, NM**
  - Space Vehicles
  - Directed Energy
- Eglin AFB, FL**
  - Munitions

RESPONSIVE	RELEVANT	REVOLUTIONARY
Now	Mid	Far
15-20% (\$375-\$500M/yr)	40-45% (\$1,000-\$1,125M/yr)	35-40% (\$875-\$1,000M/yr)



## Outcomes

### Advance the Ecosystem

- Road-Mapping
- Collaboration & Networks
- Resources (Databases, Standards & Practices)
- Create Markets (Stakeholders-2-Innovations)

### Pre-Competitive Risk Reduction & Assessment

- Techniques, Approaches, Shared Tools
- Product Exploration
- Supply Chain Development

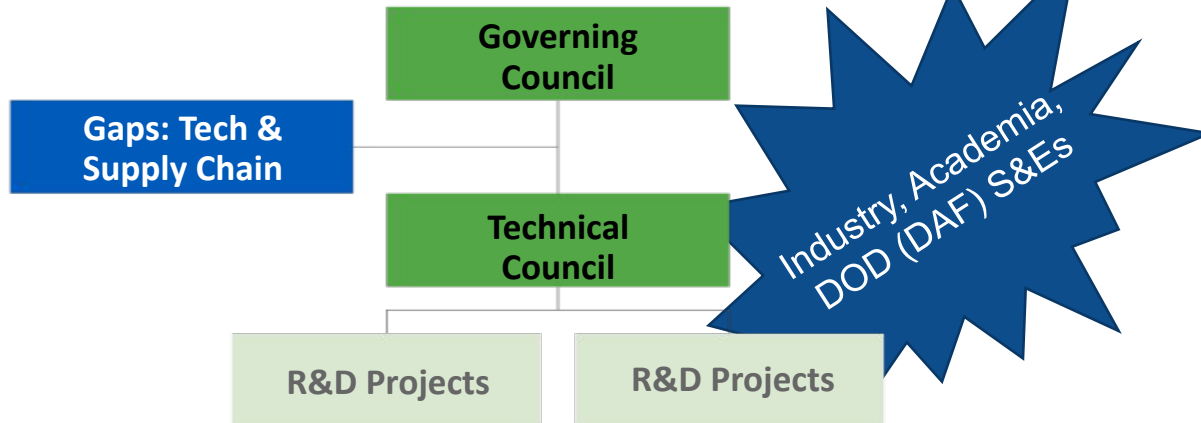
### Workforce Development

- Professional
- Production & Manufacturing

### DoD Transition (“Dual Utilization”)

- Developing National Validated Databases
- Commercialize Modeling, Analysis, & Design Tools
- Standards Initiation
- Web based Tools to Help Small Businesses

## Shared Purpose & Goals

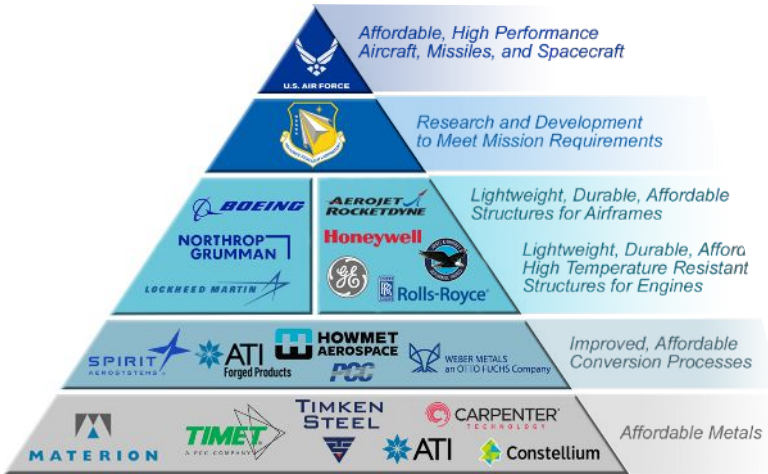


Cooperative Agreement: (DoDGARs) “support a public purpose” “substantial staff involvement” from a federal agency”

NIST AMNPO circa 2012; 5<sup>th</sup> Persh Conference Report, 1 Nov 2013



## Virtual (Tech Sector)



### Metals Affordability Initiative (1999)

Pre competitive, Air Force & aerospace metals supply chain (17 members) (TRL 2-5)

103 insertions into different defense systems ROI of over \$1.86 B

(Military (CII): \$1,175 M; Dual-Use: \$690 M)

## Physical Hub + Virtual (Tech Sector)



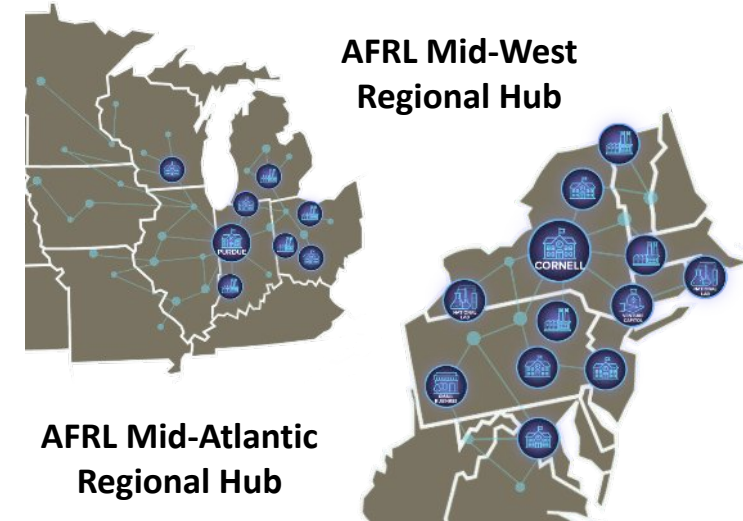
### Manufacturing USA (MIIs) (2012)

Pre-competitive, manufacturing technology & supply chain creation (MRL 3-5)

1,590+ companies, universities, and non-profit members or partners

Committed Funding: \$1.5B+ Federal and \$2.1B+ Private/State Government Investment

## Physical Regional Network (Multiple Tech Sectors)



### AFRL Regional Hubs (2022)

Accelerate translation via convergent research, in member facilities by academic-industry-government teams focused on risk reduction for commercial investment

2 Hubs, 20+ founding member nodes (academia, industry, national labs)



## Define a clear objective/mission to remain focused

- Common, shared purpose for all stakeholders
- Vision and business plan are linked to achievable results

## Determine period of the partnerships and the means to sustain it

- Ensure all partners have a financial state in the PPP (cost sharing)
- Sufficient program funding

## Determine incentives and benefits for all partners

- Determine critical mass
- Determine right mix of members and shared risks

## Establish a proactive governance

- Engagement by industry & government leaders
- Professional management

## Establish metrics and milestones

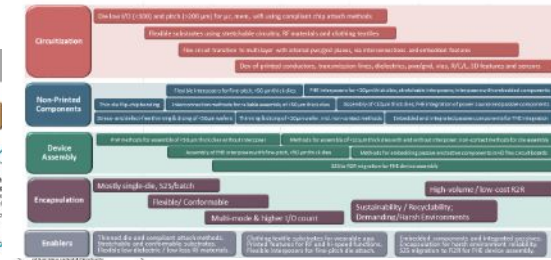
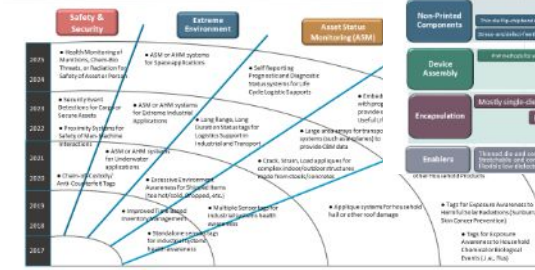
## Develop a communication process for open sharing of information

- Steady cadence of activity and reporting to stakeholders

## Determine fair and balanced industry-friendly IP structure

- New IP generation, early access to supply chain, R&D funding, etc

### Asset Monitoring Systems



5<sup>th</sup> Persh Conference Report, 1 Nov 2013;  
 NBMC, NextFlex, MMIs

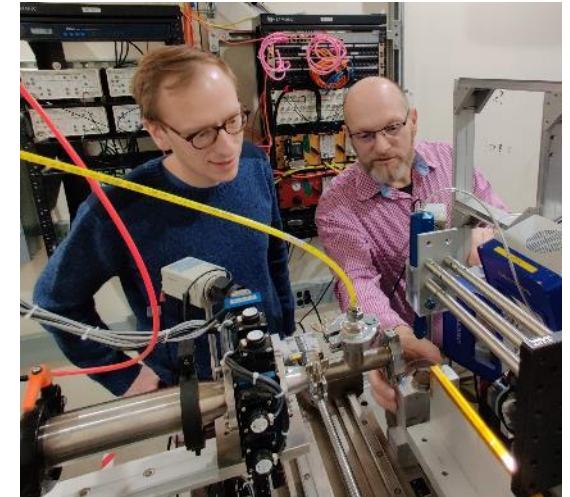
- **Organized Information Dissemination with Controlled Access**
  - Descriptions and contact info of diverse membership (OEMs, tier 1s/2s, SME, community colleges, labor unions, technical societies, start ups, etc..)
  - Roadmaps, standards, best practices, etc..
  - Quarterly project updates for all active projects to members (live and recorded)
- **Relationships that would not happen Outside P3 (networking, participation in technical working groups, etc.)**
  - Demand and supply working together to drive the agenda; P3 is a neutral 3<sup>rd</sup> party
  - Association with DoD (S&Es, Future Concepts, etc.)
  - Develop community definitions, roadmap development
  - Participate in the development of industry best practices for R&D and manufacturing
  - Supply chain expansion and integration/engagement with small businesses & innovators
- **Prioritizing the Technical Agenda**
  - Participate in formulation, evaluation, and review of Project Calls,
  - Receive MRL and TRL assessments, evaluations, feedback and assistance
  - Participation in Project Calls
  - Access to Intellectual Property
  - Access to Technical Expertise
  - Access and utilize the facilities on a preferential basis
- **Small Businesses get Solutions they couldn't have Afforded Otherwise**

*JR Russell (MII Health Assessment),  
NBMC, NextFlex, MMIs*



**For DOD to maintain strategic influence & utilize benefits, must continue to invest (\$\$\$ AND people) after the initial stand-up period**

- Government teams are underfunded/understaffed to adequately assess & engage in technical progress
  - Government SME engagements often other duties as assigned
- Government oversight of the contractual relationship is business as usual (more FAR based contract than OTA)
  - High demands for information, attendance at meetings/events, expectations for outreach/PR / etc.
  - Minimal experience in executing Cooperative Agreements, etc.
  - Options to Cooperative Agreement required (e.g. charge fee for service, agency directed projects, etc.)



**Quantifying impact is challenging when focus is only on the pre-competitive technology development for transition to DOD (or commercial profitability).**

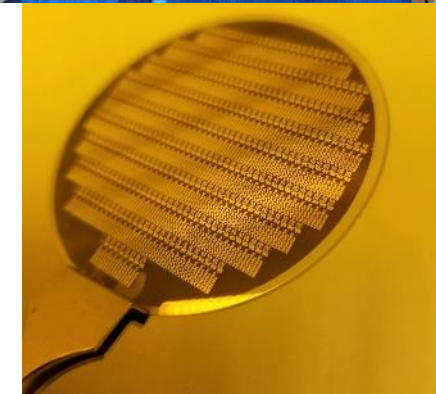
- How to quantify intangible benefits brought to the table, such as: created in-house knowledge that the DoD can tap into, connecting diverse members, connecting Agencies with new performers.

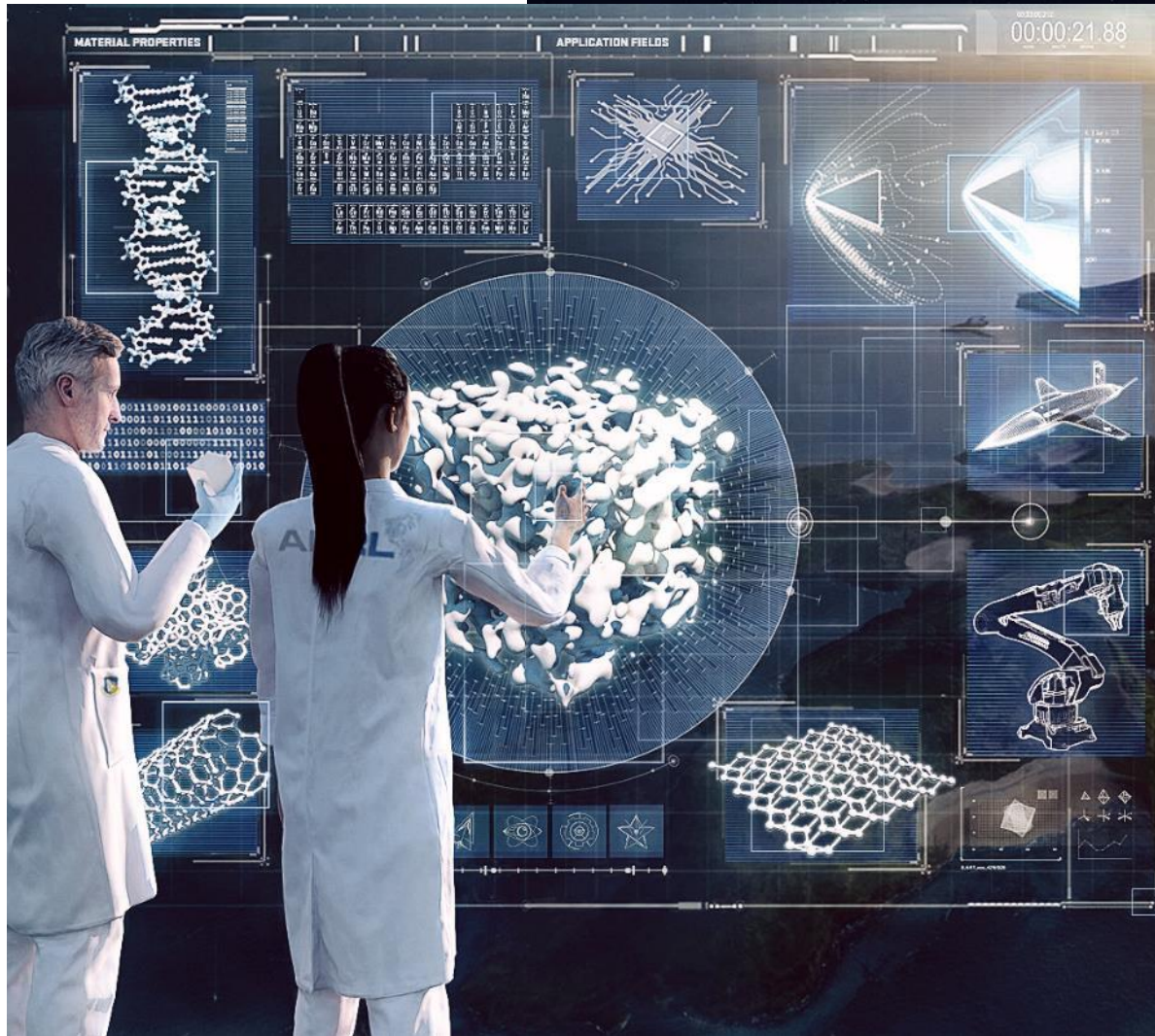






- **Professional management team w/agility and openness**
  - Government expertise and network to define use case and practitioners
  - Industry expertise and network for commercialization opportunities
  - Entrepreneurial experience for support small business development
- **Essential to focus on all-aspects of advancing the technology state of the art**
  - Projects often have no entrance or exit criteria or gate review
  - Flexible IP policy - Issues getting VC backed start-ups on contract
- **Adjusting membership fees and in-kind contribution necessary to maintain critical mass memberships number**
  - Hard requirement for cost-share challenging for start-ups & academia; must be clear on what can be included
- **Share Infrastructure**
  - Build it and they will come does not (uniformly) work
  - Can't turn the facility into a business and compete with their members
  - Needs to be directive and deliberate; respond to what community needs; partner & leverage local universities/companies to establish agile test beds for new technologies and industrial readiness





## Invent the Stuff that Makes the Future

Public-Private Partnerships for R&D are Crucial for Future Force

Data driven assessment for Regional v. Virtual?

What is the “correct” resource balance (amount & stakeholders)?

What are the ideal expectations, ROI, & metrics to define success?

What is the desired synergy between explosion of options?

What does a lifecycle look like?

***Cost-Imposing Technological Superiority Begins with Convergence & Translation***