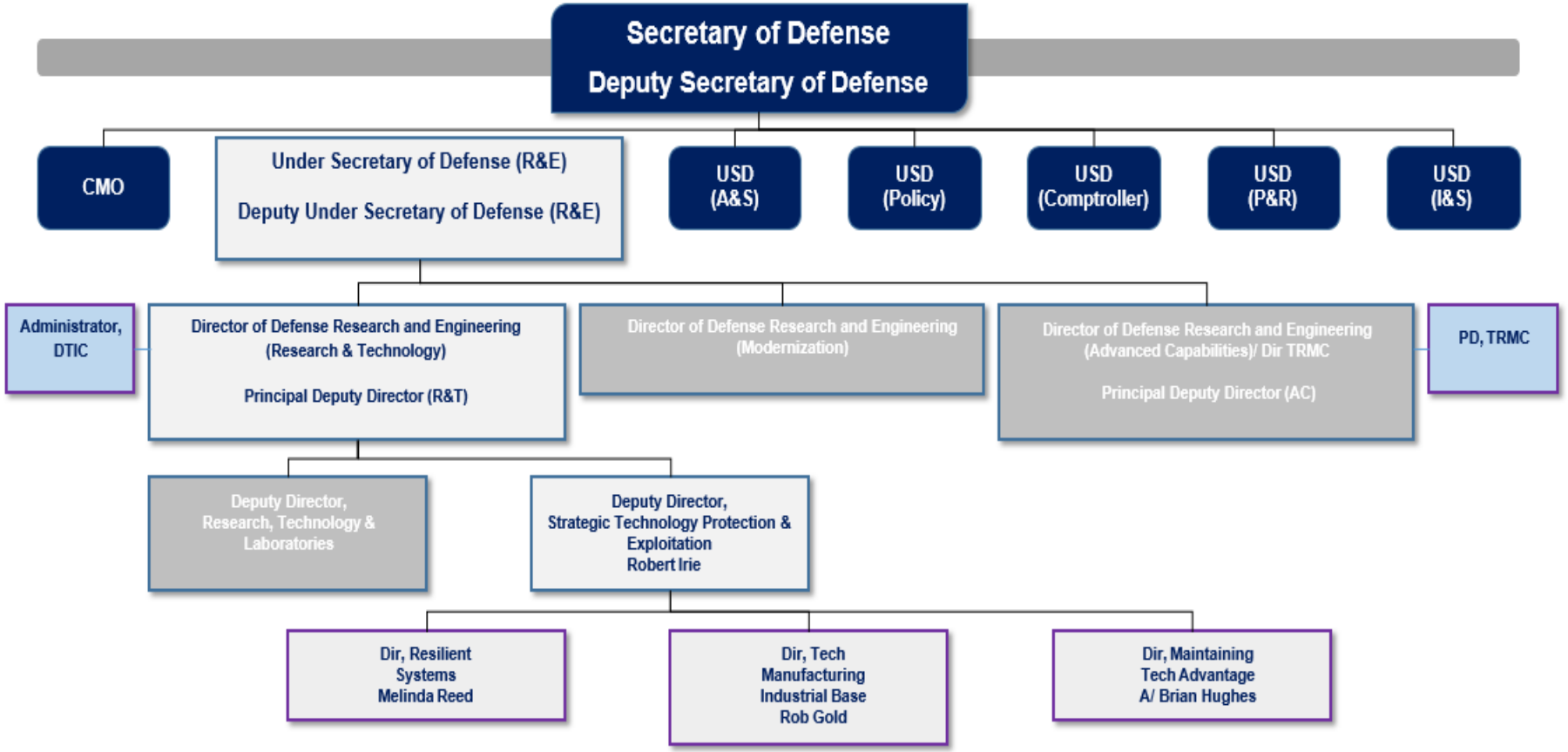
Technology and Manufacturing Industrial Base Overview

Rob Gold
Director, Technology and Manufacturing Industrial Base (TMIB)
Office of the Under Secretary of Defense
for Research and Engineering (OUSD(R&E))

NDIA SE Division Meeting

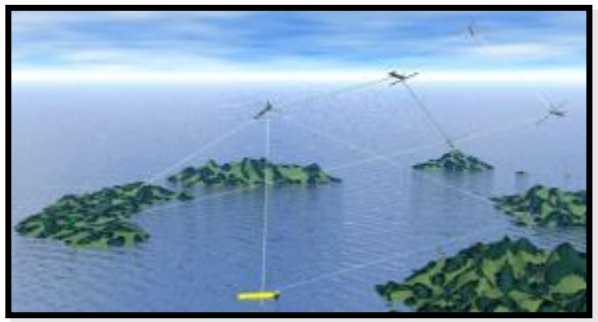
May 2021

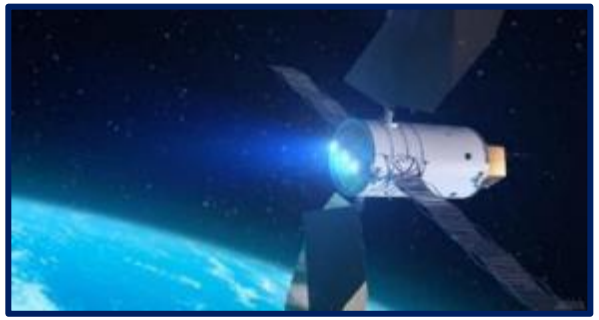
OUSD(R&E) in DoD



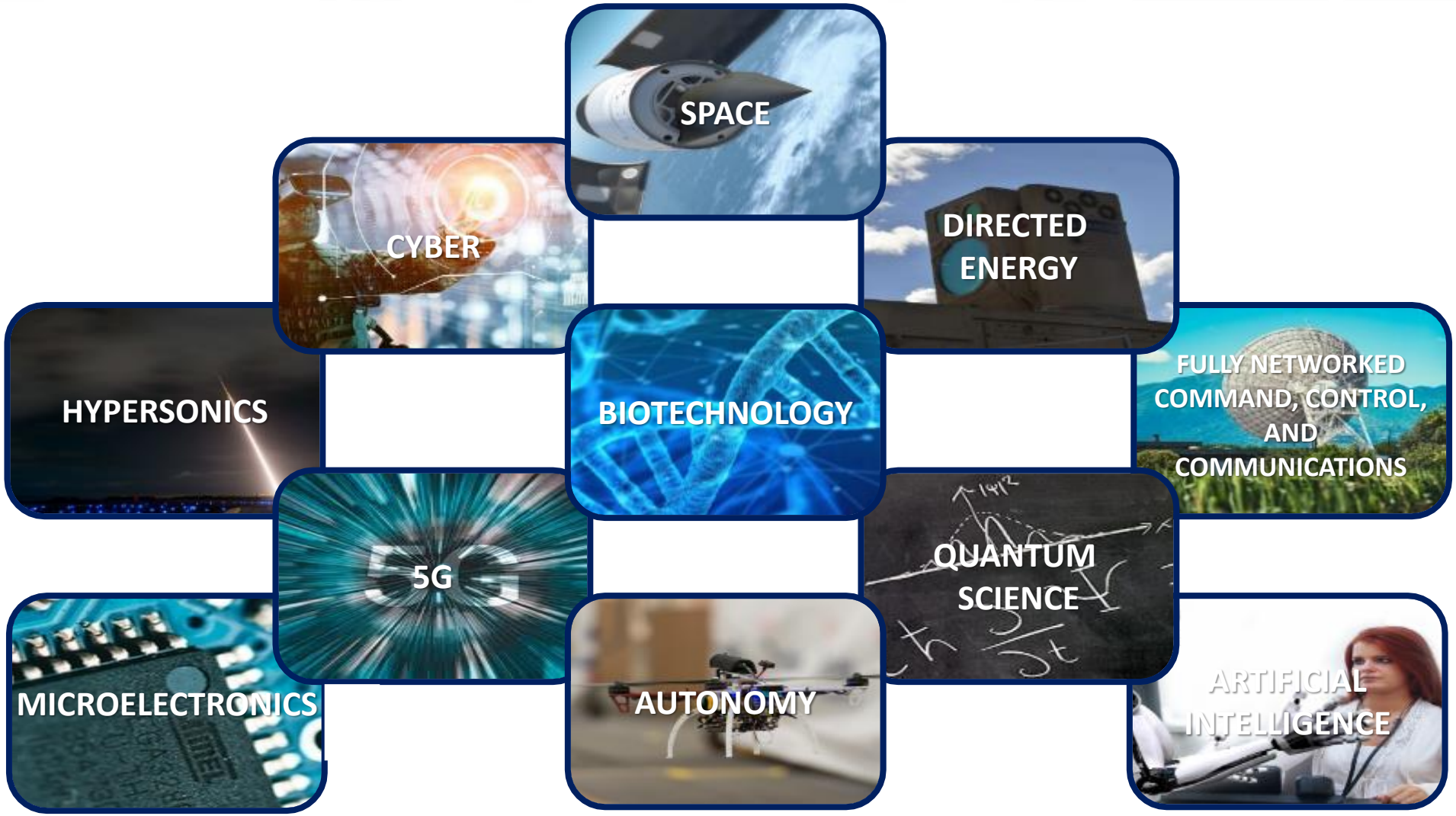
Office of the Under Secretary of Defense for Research and Engineering (OUSD(R&E)) Mission

- **Ensure Technological Superiority for the U.S. Military**
  - Set the technical direction for the Department of Defense (DoD)
  - Champion and pursue new capabilities, concepts, and prototyping activities throughout DoD research and development enterprise
- **Bolster Modernization**
  - Pilot new acquisition pathways and concepts of operation
  - Accelerate capabilities to the Warfighter



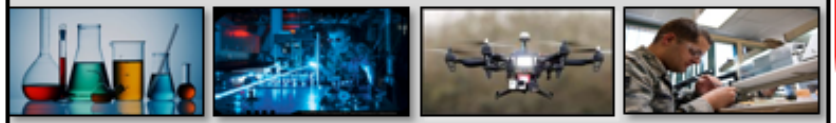


Technology Modernization Priorities

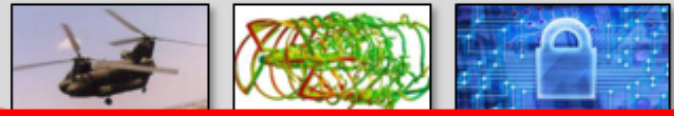


OUSD(R&E) "Corporate" At A Glance

Research, Technology & Labs
- Provides affordable options for new concepts and capabilities from basic science to advanced tech
- Oversees FFRDCs/UARCs and 64 DoD Service Labs/Centers
- Leads strategic outreach (SBIR, cross-agency)



Strategic Tech Protection & Exploitation
- Assesses and mitigates risk of loss of critical tech
- Leads Manufacturing Technology Development and the National Manufacturing Institutes
- Established Resilient-by-Design Methodologies



OUSD(R&E) provides leadership from concept to capability to meet the challenges of an uncertain future through advances in science, technology and innovative engineering, informed by developmental test & evaluation

Engineering
- Assesses feasibility and programmatic risk for major programs throughout the acquisition life cycle
- Establishes mission portfolios and joint open system architectures

Test Resource Management Center
- Provides adequate testing in support of development, acquisition, fielding and sustainment of defense systems and maintains awareness of T&E facilities and resources, within and outside DoD

Developmental Test, Evaluation & Prototyping
- Advances developmental test standards and policy, assists major programs in developing test plans, and provides oversight for developmental test community
- Identifies, develops, and demos multi-domain concepts and tech to satisfy DoD, Joint, interagency, & CCMD priorities
- Works within operational mission threads and obtains Warfighter feedback

SIAC | DTIC | DMEA

Strategic Technology Protection & Exploitation (STP&E) Organization and Mission

Deputy Director
STP&E
Dr. Robert Irie

Acting D, Maintaining Technology Advantage
Mr. Kristopher Gardner

Maintain Leadership in Critical Technology Modernization Areas

D, Resilient Systems
Ms. Melinda Reed

Foster Assured Resilient Missions, Systems and Components

D, Technology and Manufacturing Industrial Base
Mr. Robert Gold

Advance Domestic Innovation Base to Deliver Modernization Goals

STP&E MISSION:
Promote and protect technology advantage and counter unwanted technology transfer to ensure Warfighter dominance through superior, assured, and resilient systems, and a healthy, viable national security innovation base.

TMIB Overview

TMIB Mission

- Advance domestic innovation base to deliver modernization goals

Rob Gold
TMIB Director

Key Activities

- Assess and monitor emerging technology, workforce, engineering, test, & infrastructure base
- Facilitate U.S. Government mechanisms and tools to close gaps, foster enabling domestic technology development and manufacturing capability, and counter strategic competitor actions
- Manage the OSD Manufacturing Technology program and Manufacturing Innovation Institutes

Key Personnel

- Rob Gold, TMIB Director
- Tracy Frost, Office of the Secretary of Defense Manufacturing Technology (OSD ManTech) Lead
- Lirio Aviles, Technology Industrial Base Protection and Promotion Lead
- Bethany Harrington, Assessments Lead

Protecting & Promoting the Technology Innovation Base

TIB Process to Assess, Protect, Promote, and Monitor U.S. Technology and Innovation Base

Step 1: Assess

What is critical to advance a technology? Technology components, suppliers, manufacturing processes, others

What is the current and future status of a technology and the IB supporting it? Global position/competition, technical maturity, workforce development, supply chain, infrastructure, others

Identify risks and opportunities

Outputs: Studies including capabilities analysis, technology taxonomy, supply-chain mapping, workforce requirements, infrastructure and facilities analysis, others

Strategy Development

Step 2: Protect & Promote

Promote: Exploit opportunities to advance technologies and support the innovation base

Protect: Implement strategies to protect critical technology; mitigate industrial base issues & risks

Leverage DoD and USG tools to implement the strategies: tools like CFIUS, DPA Title III, IBAS, ManTech, and others

Outputs: Increased capacity, domestic supply, financial viability, tech transfer from labs to production, improved manufacturing, export controls and foreign investments, improved workforce

Strategy Validation

Step 3: Monitor

Establish performance metrics and success criteria for each strategy implemented

Measure effectiveness of the strategies implemented

Evaluate additional assessments, mitigations, and investment strategies

Outputs: Performance, cost, and schedule reports, investment evaluations, recommendations to modify strategy or perform additional assessments

TMIB's efforts focus on:

- **Developing long-term strategies and employing mechanisms to retain U.S. advantage in existing and emerging technologies, and for the innovation base developing, manufacturing and sustaining those advantages**
- **Providing direct support to Principal Directors' technology roadmaps development and implementation**
- **Collaborating with industry, academia, allies, and USG stakeholders to leverage resources, prioritize investments, and advance technology**

Emerging Technology Supply Chain Assessment

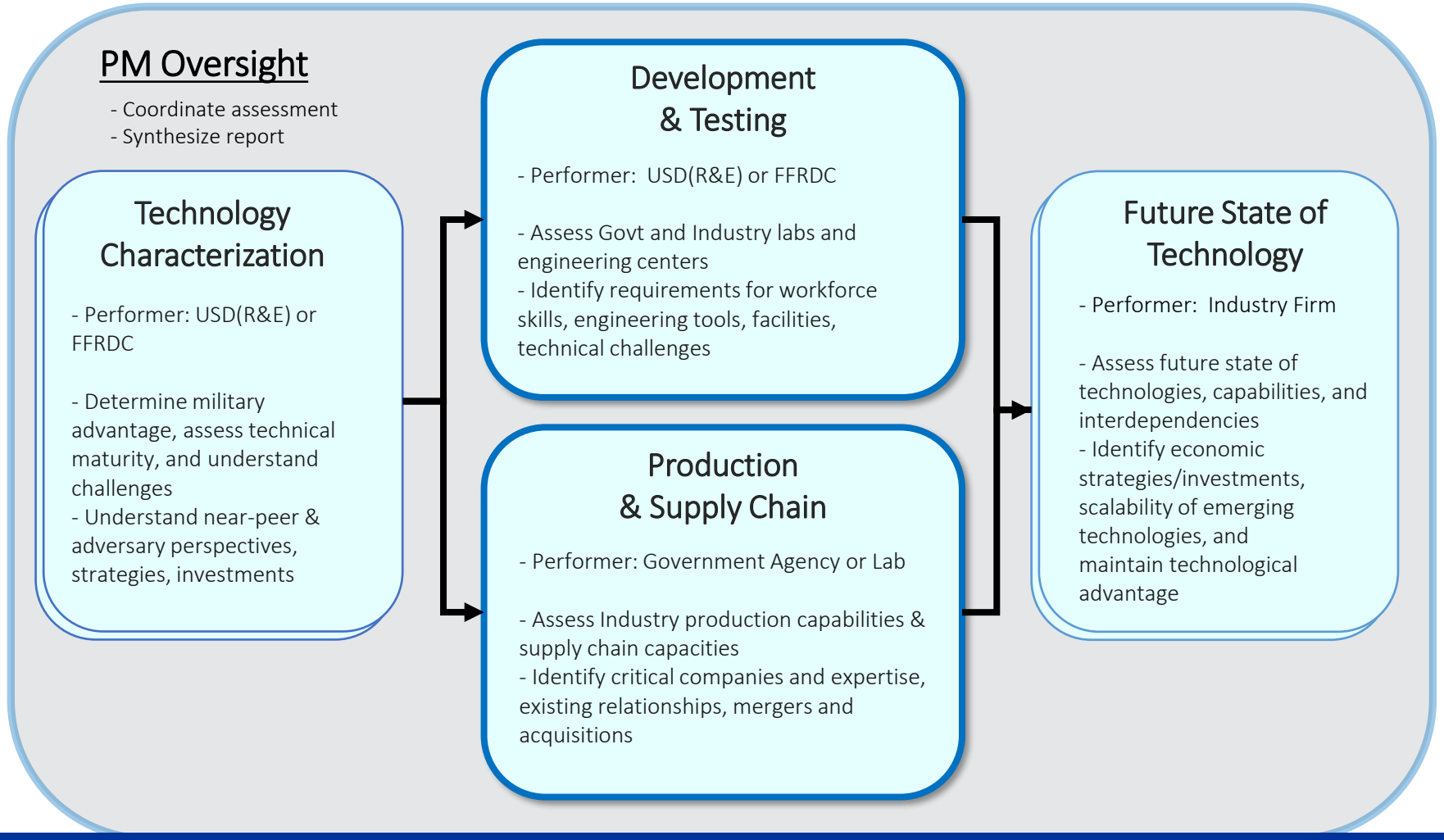
- **Achieve and sustain long-term technology advantage over near-peer adversaries by:**
  - Assessing the ability of DoD's internal and external technology and supplier base to provide the technology and resources necessary to develop, field, and sustain systems.
    - Capabilities, workforce, capacity, technology maturity levels, IP
    - Forward-looking supply chain analysis – 5 to 15 years
  - Identifying specific risks and opportunities to enhance the current technology and supplier base.
  - Developing long-term technology advantage and protection investment strategies.

Focus of Assessment

- **Focus on 11 OUSD(R&E) technology priority areas:**
  - Hypersonics
  - Directed Energy Weapons
  - Machine Learning including Artificial Intelligence (ML/AI)
  - Quantum Science
  - Microelectronics
  - Fully Networked Command, Control and Communications (FNC3)
  - Space
  - Autonomy
  - Cyber
  - Biotechnology
  - 5G
  - Other technology focus areas added as required (i.e., Critical Tech List)

- **For each technology priority area, ensure:**
  - Tech base is sufficiently prepared to move the tech priority area through maturation, development, production, and fielding.
  - Supply chain and access to critical materials is robust and available to Defense Industrial Base (DIB) partners to develop and sustain systems and capabilities.
  - DoD has a strategy to protect the tech base/supply chain from foreign intervention and we have devised mechanisms to prevent or slow adversary access to U.S. technology.

Assessment Methodology

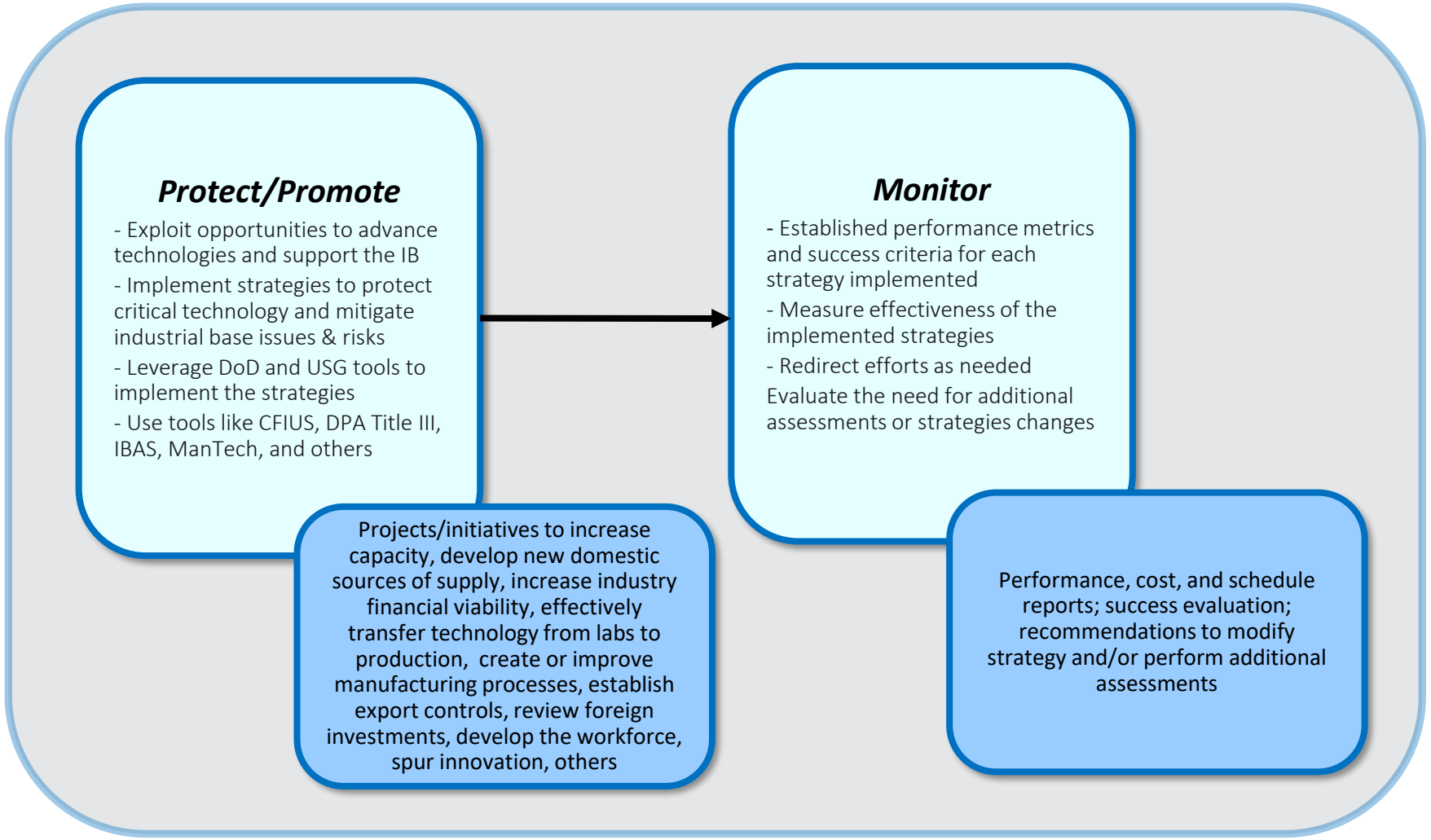


Leverage previous efforts and existing data across DoD (e.g., EO 13806 study, DCMA Hypersonics study)

Technology Industrial Base Protection & Promotion

- **Develop technology protection and promotion strategies**
  - Identify all the tools available to protect and promote
    - Leverage current programs (ManTech, DPA Title III, IBAS, SBIR, others)
  - Attack the root cause of the issues/risks. If necessary, use multiple tools to mitigate industrial base risks
    - Short-term and long-term Strategies
  - Identify opportunities to advance critical technologies
  - Consider the National Defense Strategy Lines of Effort to select your protection tools
    - Build a More Lethal Force
    - Strengthen Alliances and Attract New Partners
    - Reform the Department for Greater Performance and Affordability
- **Implement and monitor**
  - Measure success

Protect, Promote, Monitor



Focusing Programs/Tools to Protect & Promote U.S. Technology Areas

Protect - Promote

Technology Maturation and Risk Reduction	Technology Area Protection Plans (TAPPs)	International Cooperation Programs	Defense Production Act Title III
Acquisition Programs	Manufacturing Innovation Institutes	Small Business Innovation Research	Hart-Scott-Rodino Act
Manufacturing Technology (ManTech)	Policies and Regulations	Export Controls	Small Business Technology Transfer
Committee on Foreign Investments in U.S.	Industrial Base Analysis & Sustainment	Warstopper Program	Other U.S. Government Programs

OSD ManTech Program

OSD ManTech Program

MISSION:

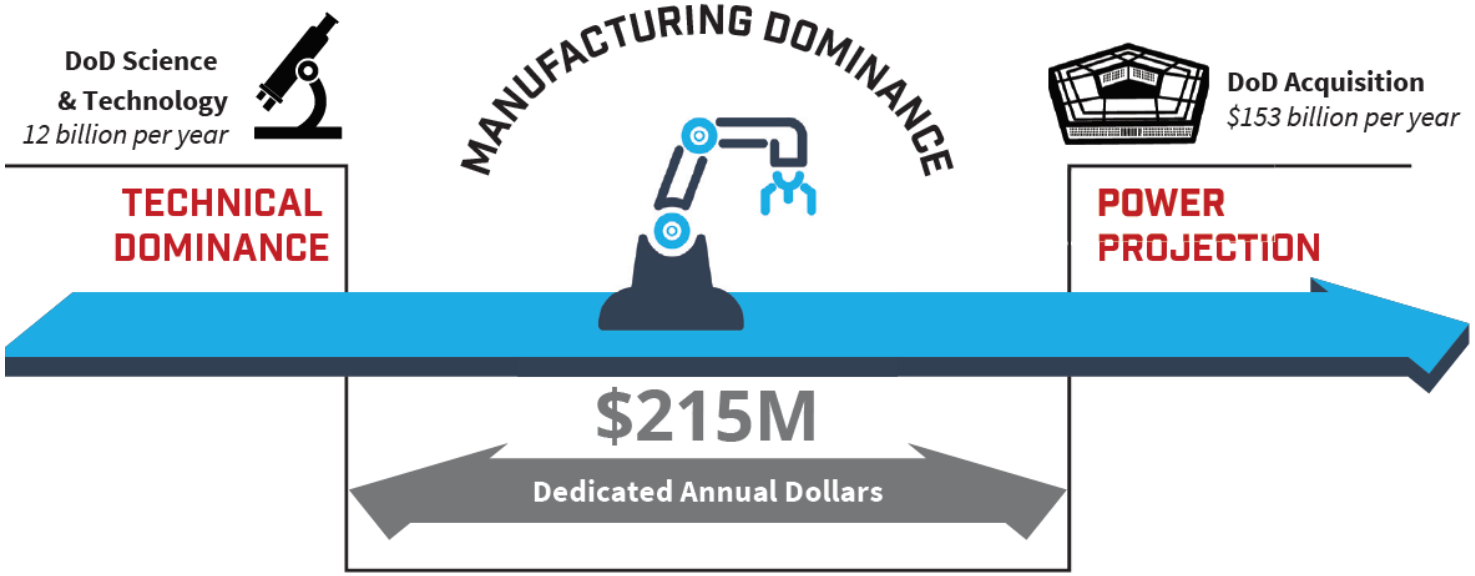
Anticipate and close gaps in manufacturing capabilities for affordable, timely, and low-risk development, production, and sustainment of defense systems.

ManTech carries out its mission through programs in the Military Departments, participating Defense Agencies, and OSD

DoD Manufacturing Innovation Institutes are executed out of OSD with support from the Services.

OSD ManTech
The Power to Connect and Drive Transition

- Convenes the Services and Agencies for DoD ManTech strategic plan
- Positioned to operate across and coordinate the manufacturing enterprise
- Focuses S&T priorities and responds to operational shortfalls to create Warfighter capabilities
- Highly leveraged to maximize resources to improve capability and reduce cost



Joint Defense Manufacturing Council

- Strengthen Cross-Cutting Initiatives in Advanced Manufacturing
- Address Department of Defense Modernization Priorities
- Provide Strategic Management for Manufacturing Innovation Institutes

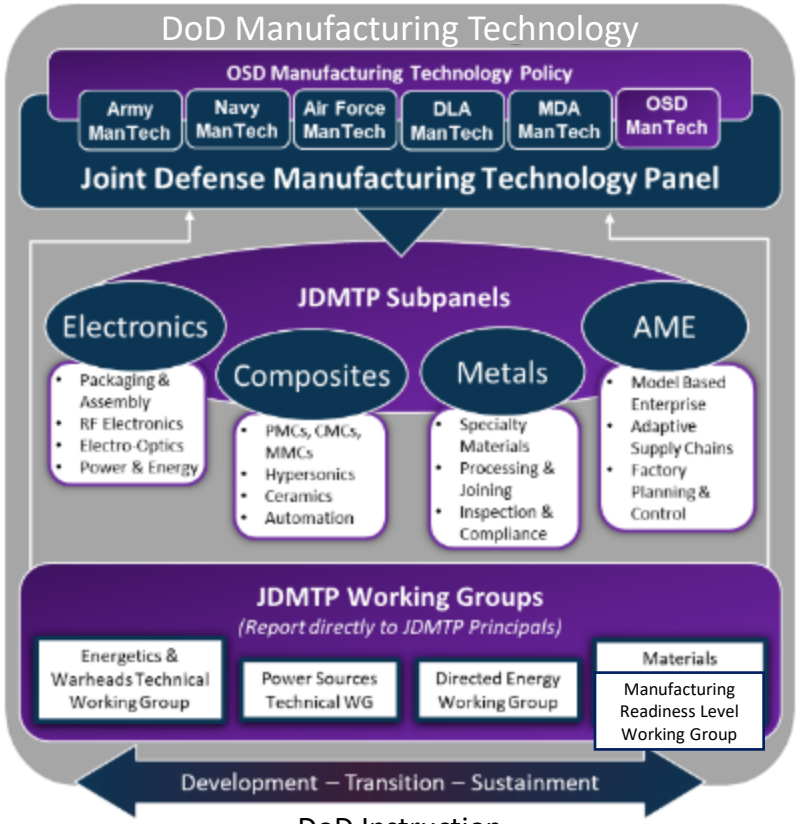
Build a More Lethal Force

Strengthen Alliances & Attract New Partners

Greater Performance & Affordability

OSD ManTech
Joint Defense ManTech Panel (JDMTP)

- **Principals (06/NH-IV equivalent):** Conduct reviews across all ManTech portfolios & joint strategic planning
  - Identify & integrate common manufacturing needs through joint strategic planning
  - Chair of the panel selected on a rotating basis from Service/agency ManTech Principals
  - The Panel reports to & receives direction from OSD
- **Subpanels:** Conduct annual project reviews; identify trends, gaps, & opportunities as Joint Technology Pursuits Areas (JTPAs)
- **Working Groups:** Focused tiger teams developed for emerging technologies & business practices
- **JTPAs:** Provide opportunities for modernization priorities focus



DoD Instruction 4200.15

Acronyms

MDA – Missile Defense Agency	S&T – Science and Technology
DLA – Defense Logistics Agency	JTPA – Joint Technology Pursuit Areas
RF – Radio Frequency	WG – Working Group
CMC – Ceramic Matrix Composite	PMC – Polymer Matrix Composite
MMC – Metal Matrix Composite	AME – Advanced Manufacturing Enterprise

OSD ManTech Investment Portfolio

Investment Programs Under PE 0603680D8Z

- P680 – Manufacturing Science & Technology (MSTP)
  - Budget: FY20 - $30.2M
  - Congressional Adds: $17M (Advanced Manufacturing)
- P350 – Manufacturing Innovation Institutes (MIIs)
  - Budget: FY20 - $66.2M
  - Congressional Adds: $84M
    - $20M (Program Increase)
    - $5M (Manufacturing Engineering Program)
    - $10M (Manufacturing Innovation Institutes)
    - $10M (Advanced Manufacturing)
    - $14M (Manufacturing Cyber Security)
    - $25M (Silicon Based Lasers)

Other major ManTech activities include…

- ✓ Participation on the White House's Subcommittee on Advanced Manufacturing
- ✓ Helping stand up the Joint Defense Manufacturing Council
- ✓ Overseeing and coordinating with the Joint Defense Manufacturing Technology Panel
- ✓ Coordinating with the Department of Commerce-hosted Manufacturing USA network
- ✓ Chairing the Joint Additive Manufacturing Steering Group and Working Group

Alignment with DoD Modernization Priorities

P350 – Manufacturing Innovation Institutes

America Makes – materials development, qqualification, ccertification, & standards for *additive manufacturing*

Manufacturing times Digital (MxD) *Digital* design; National Cybersecurity for Manufacturing Center

AIM Photonics – Integrated Quantum *Photonics*; 300 mm Silicon Quantum Photonic Wafer (largest DoD Quantum Photonic Wafer)

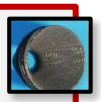
NextFlex – Flexible hybrid electronics; first flexible Arduino circuit board

BioFabUSA – advanced regenerative medicine institute; tissue foundry

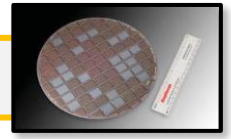
- HYPERSONICS
- DIRECTED ENERGY
- COMMAND, CONTROL & COMMS
- SPACE OFFENSE AND DEFENSE
- CYBERSECURITY
- ARTIFICIAL INTEL/MACHINE LEARNING
- MISSILE DEFENSE
- QUANTUM SCIENCE AND COMPUTING
- MICROELECTRONICS
- NUCLEAR MODERNIZATION
- BIOTECH

P680 – OSD ManTech Core Examples

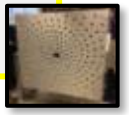
- **MOC3HA** – 2D & 2.5DS Thin-Walled Carbon-Carbon Aeroshell Material Development
- Oxide-Oxide CMCs Mfg. Automation
- Hypersonic RF Seeker Window Mfg. Development

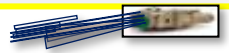


- High Yield Infrared
- Focal Plane Arrays



- Lightweight Hydrogen Fuel Cell Power for Remote Sensing Applications
- pWave passive mmW Sensors
- Vertical Cavity SurfaceEmitting Lasers





- Monolithic Spectral Beam Combiners
- Non-Eroding
- Metallic Throat

- Aerosol Production of Alane
- Nanocomposite Optical Ceramic Dome

MEMS Navigation Grade Inertial Sensors

OSD Manufacturing Science and Technology Program (MSTP) Overview

- A “traditional” research investment approach
  - Targeted investments in specific projects to advance manufacturability of emerging technologies
  - Typical projects run 1-3 years, annual budget $500k-$1M

- Explicit partnership with DoD government labs
  - Contracting support to execute the funds
  - First-line project management
  - Empowered as advocates for OSD and project technology
    - Conferences, program offices, Industry panels
    - Seeking transition and adoption

- Annual call for proposals
  - 1-5 Focused Investment Areas (FIAs) derived from:
    - OSD strategies, e.g. modernization priorities
    - Joint Defense Manufacturing Technology Panel technology watch items
    - Industry Survey
  - Currently accepts proposals only from DoD labs
  - Technologies not aligned to FIAs are accepted and duly evaluated

DoD Manufacturing Innovation Institutes
Current Network

Since Launching in 2012*

- $1B+ Federal; $1.9B+ non-Federal
- 1,420+ companies, universities, & non-profits members or partners
- 45 states represented

*Information as of October 2020

DoD MII Mission and Vision Chartering Principles

Advancing Research & Technology	Establishing & Growing Manufacturing Ecosystems	Securing Human Capital
Partner with industry to invest in applied research and industrially-relevant manufacturing technologies	Establish regional manufacturing hubs and ecosystems for long-term, national impact	Develop manufacturing-specific education and workforce development resources to ensure innovative technology is manufacturable

- Industry driven, public-private partnerships are a resource for the entire DoD and other Federal Agencies
- Principles support the OSD ManTech congressionally-mandated mission to support the Warfighter while enhancing the U.S. manufacturing base capabilities, expertise, and intellectual property (IP)

DoD MII Mission and Vision
Business Model Overview and Tenets

MISSION

Catalyze the establishment, effective operation and integration of industry-led public-private research partnerships that connect and develop people, ideas and technology in ways that accelerate the transition of new capabilities into defense products and systems.

Regional Hubs with National Impact to U.S. Ecosystem	Led by non-profit acting as "honest broker," accountable for viability	Industry-led, DoD-informed technical roadmapping
Industrially relevant, DoD oriented Research and Development (R&D) to "Bridge-the Gap" [TRL/MRL 4-7]	Access to shared assets for U.S. companies: IP and infrastructure	Education and training for sufficient, skilled manufacturing workforce
Significant initial federal investment ($70-$120M) over 5-7 years	Leverage minimum of 1:1 cost share from non-federal sources	Formal evaluation prior to continued DoD engagement and funding

MII Public-Private Partnership Model Comparison with Traditional Systems Acquisition

Strategy	Traditional Model for Engaging with Industry *DoD & industry invest independently*	Manufacturing Innovation Institutes *DoD partnership with industry*
Access to Technology	**Limited** DoD engagement with non-traditional contractors	**Expanded** partnerships with entrepreneurs, students, startups, & manufacturers to innovate
	Disparate time spent on understanding the domestic ecosystem & commercial supply chain capabilities	**Organized** ecosystems & technology roadmaps enable DoD to leverage commercial technologies
Cycle Time	**Long** Technology often out-of-date by the time its fielded	**Agile** Commercially validated capabilities reduce or eliminate the need for a longer R&D phase
Cost	**Not Affordable** High likelihood that DoD replicates & invests in technology already commercially available	**Saves R&D Dollars** Validates & gains commercial buy-in for DoD dual-use technology
Education & Workforce Development	**Minimal** ability for DoD to significantly affect change in the career trajectory of students	**Integrated** partnerships with academia to train & inspire students to engage in defense manufacturing

DoD MIIs
Education & Workforce Development Initiatives

Representative DoD Institute Initiatives

- LIFT's Operation Next: http://www.opnextjobs.com/
- LIFT's Maker Minded: http://makerminded.com
- NextFlex's Flex Factor: https://www.nextflex.us/news-events/news/flexfactor-changing-lives-one-high-school-student-time/
- America Makes' ACADEMI Program: https://www.americamakes.us/academi/
- AIM Photonics' Future Leaders Program: https://aimphotonics.academy/education/student-resources/future-leaders

Photo courtesy of NextFlex

DoD's Manufacturing Innovation Institutes: Demonstrating Growing, Tangible Impact

- ✓ Helping to bridge the gap between basic research and product development/fielding
- ✓ Providing DoD with access to key, domestic enabling technologies
- ✓ Advancing manufacturing innovation for specific, focused technology areas
- ✓ Ensuring a strong ecosystem of companies and organizations
- ✓ Maintaining close manufacturing partnering relationships
- ✓ Providing shared assets among MII member organizations; key benefit for small and medium enterprises
- ✓ Creating an environment to develop the skills and educate / train the workforce

DoD's Manufacturing Innovation Institutes are creating new, collaborative environments spurring innovation, performance, and competitiveness across the U.S. industrial base.

Joint Additive Manufacturing Working Group (JAMWG)

Coordinating Across the DoD Enterprise: Research & Engineering, Acquisition, Sustainment and Logistics

Organization:

Joint Defense Manufacturing Council — *SES/2Star - AM Overall Responsibility for org.*

Joint AM Working Group — *GG-15/AO Level/Org. Implementation Leads for AM*

Subject Matter Experts

- **Data & Model Sharing Council**
- **Qualification & Certification Council**
- **Education & Workforce Development Council**

Objectives:

Outcomes:

JAMMEX - DoD 3D file exchange

Advanced Tools for Rapid Qualification

Opportunities:

- Qualification Tools
- Digital Thread
- Workforce
- Communication
- Business Practices
- Cybersecurity
- Supply Chain Integration

Discussion

1. How to jointly address manufacturing across DoD and industry?
   - Industry participation in JDMC (NDIA, AIA, NAM?)
   - 1-on-1 meetings with major performers
   - Small & Medium Manufacturers?

2. How to collectively assess and manage the industrial base?
   - Pre-acquisition program
   - Widely varying DoD influence
   - Tech Maturation, Development, Manufacturing, Test

31

Backup

Why Additive Manufacturing?

- **Modernize Defense Systems**
  - New geometries enabled by AM
  - Part reduction
  - Faster prototype and build cycles
  - ***Faster, lighter, stronger, more impactful systems***
- **Increase Material Readiness and Efficiency**
  - Address part obsolescence
  - Reduced logistics footprint
  - Rapid tooling and job aids
  - ***Increased system availability and lower cost***
- **Enhanced Warfighter Innovation & Capability**
  - Training and job aids
  - Innovative solutions in theater
  - ***More responsive and capable units***

SOURCE: Defense.gov

DoD AM Strategic Goals

1. **Integrate AM into DoD and the Defense Industrial Base.**
2. **Align AM activities across DoD and with external partners.**
3. **Advance and promote agile use of AM.**
4. **Expand proficiency in AM: learn, practice, and share knowledge.**
5. **Secure the AM Workflow.**

OUSD(R&E) Approaches to AM

Lead and Facilitate	Partner	Invest in R&D

• Joint AM coordination and collaboration
• Funding to support joint priority AM projects
• Sponsor the Additive Manufacturing Innovation Institute
• Develop DoD AM Strategy
• Develop DoD AM Policy
	• Manufacturing Innovation Institutes:
	  • America Makes
	  • Manufacturing times Digital (MxD)
	  • Lightweight Innovations for Tomorrow (LIFT)
	  • NextFlex
	• Other Partnerships:
	  • NDIA Manufacturing Division
	  • Additive Manufacturing for Maintenance Operations
		• Manufacturing of Gradient Index (GRIN) Polymer Lenses for Military Optics
		• Cold Spray Additive Manufacturing (AM) & Structural Repair (SR)
		• Enhanced Energetics
		• Conformal Antennas

STP&E Focused Activities for FY21

- Transform Program Protection methods and practices; enable transition of S&T protections
- Establish Software Assurance Flyaway Teams and modernize Joint Federated Assurance Center capabilities
- Lead secure cyber resilient engineering standards and methods
- Refine Technology Area Protection Plans and conduct outreach
- Engage allies and partners with promote, protect, and counter activities
- Counter strategic competitor exploitation of S&T through Foreign Talent Recruitment Plans
- Identify and assess gaps in emerging technology industry, workforce, and infrastructure base to ensure a smooth and rapid transition from research to fieldable capability for the modernization priorities **[TMIB]**
- Develop innovation base promote/protect strategies; process technology-related CFIUS and export control cases **[TMIB]**
- Develop and transition new manufacturing technologies; implement a new institute for synthetic biology and a strategic management approach for the Manufacturing Innovation Institutes; mature a Defense manufacturing human capital strategy **[TMIB]**

CFIUS Overview

The Committee on Foreign Investments in the United States reviews investment transactions that could result in foreign control or access of a U.S. business for potential National Security risks

CFIUS Overview

- Parties to a transaction voluntarily notifies CFIUS of a transaction in order to obtain "safe harbor."
- Nine voting agencies and seven non-voting participants seek to establish consensus regarding the risk arising from each transaction.
- Reviewed a record 231 transactions in 2019.

DoD CFIUS Process

- Approximately 33 DoD stakeholders, including the Military Services and Defense Agencies, review each transaction for national security concerns.
- DoD Industrial Policy serves as the focal point for CFIUS reviews, coordinating due diligence and recommendations for DoD.

TMIB Manages R&E CFIUS Reviews/Process

Fast Facts

- Operates pursuant to Section 721 of the Defense Production Act of 1950
- Codified at Section 4565 of Title 50 U.S.C.
- 14 interagency participants
- Department of Treasury Chairman
- DoD staffs 33 stakeholders including the MILDEPs and Agencies

Export Controls Review

What are Export Controls?

- Laws, regulations, and policies that control the disclosure, release, and/or transmission of sensitive technologies, products, and/or services.
- Two main laws and sets of regulations: Arms Export Control Act (AECA)/International Traffic in Arms Regulations (**ITAR**) and Export Control Reform Act (ECRA)/Export Administration Regulations (**EAR**)

Why do we have Export Controls?

- To protect U.S. national security by preventing hostile foreign persons, entities, governments, or their representatives, from obtaining important technologies and products.
- To advance U.S. foreign policy by supporting capabilities and interoperability of friends, allies, and partners abroad.

Who primarily administers Export Controls?

International Traffic in Arms Regulation (ITAR)	Export Administration Regulations (EAR)
Department of State	Department of Commerce
Defense articles, technical data, and services	Dual-use commodities, software, technology
United States Munitions List (USML)	Commerce Control List (CCL)

Others:

TMIB Manages R&E Export Control Reviews/Process

OSD ManTech Core Program
Example Success: Organic Light Emitting Diode (OLED) Microdisplays

Background: High brightness color OLEDs are typically high cost with low manufacturing yields

OSD ManTech Outcomes: Manufacturing

- Scrap/repair rate reduced by:
  - 86% (circuit boards)
  - 47% (fully assembled packs)
- New on-shore manufacturing capability developed for bulk Si and SOI backplanes
- Improved both Cost and Yield by 5x

OSD ManTech Outcomes: Tech Transfer

- Will be used in several systems, including:
  - F-35 Head Mounted Display Systems, NAVAIR's Enhanced Visual Acuity Goggles, The Army's Enhanced Night Vision Goggles, and Family of Weapon Sights

Photo courtesy of OSD ManTech

Bright Environments Challenge Traditional LEDs

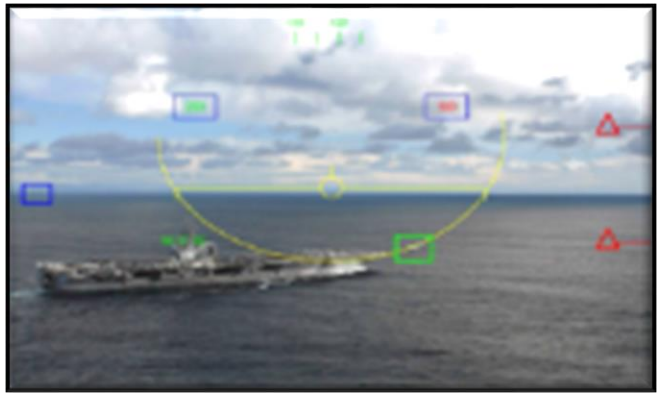


Photo courtesy of OSD ManTech

OLEDs Fully Support Bright Environments

OSD ManTech Core Program
Example Success: Vertical Cavity Surface Emitting Lasers (VCSELs)

Background:

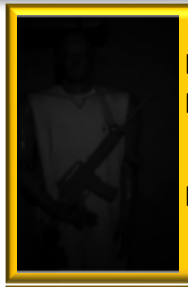
- VCSELs are semiconductor diode lasers that emit radiation normal to the wafer surface
- The unique structure leads to inherent strength for high power laser applications

OSD ManTech Outcomes: Manufacturing

- U.S. based, VCSEL technology manufacturing facility
- Initial low-rate production: ~ 77,000 units
  - Lower Cost: 10x reduction for VCSEL Arrays
  - Thermal Mgmt: Systems cost reduced by 70%

OSD ManTech Outcomes: Tech Transfer

- Potential applications to multiple systems, including:
  - NAVAIR UAVs, AFSOC CP3 and AngelFire



Light Emitting Diode Sensor
Pos.: Low Power
No Speckle
Neg.: Illumination
Short Range

Edge Emitting Laser, ver. 1
Pos.: Marginal Illumination
Neg.: Small Scale Speckle
Non Circular Beam
Artifacts from Optics

Edge Emitting Laser, ver. 2
Pos.: Better Illumination
Neg.: Large Scale Speckle

Top Emitting "VCSEL"
Pos.: Best Illumination
Limited Speckle

Photos courtesy of OSD ManTech

DoD MIIs
Example Success Stories

Army

Tactical Identity and Access Management (TIDAM)

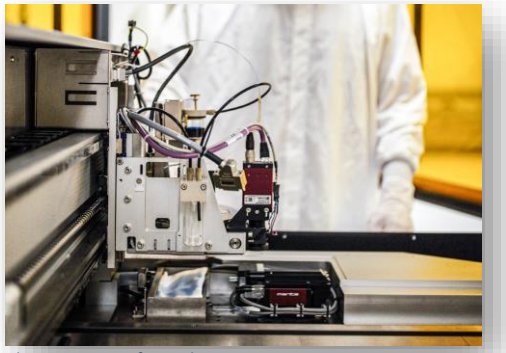


Photo courtesy of NextFlex

NEXTFLEX

NextFlex: America's Flexible Hybrid Electronics Institute
https://www.nextflex.us/

Navy

Streamlined Shipbuilding

Photo courtesy of LIFT

lift

LIFT: Lightweight Innovations For Tomorrow
https://lift.technology/

Air Force

Maturation of Advanced Manufacturing for Low Cost

USAF A-10 Thunderbolt II (Wikipedia)

America Makes

America Makes: The National Additive Manufacturing Innovation Institute
https://www.americamakes.us/

DoD wide

National Center for Cybersecurity in Manufacturing (NCCM)

Photo courtesy of MxD

M D

MxD: Manufacturing x Digital
https://mxdusa.org/

DoD MIIs
Example Success Stories – DoD Applications

Flexible Write of Array Antenna & FSS on UAV Surface

Light-Weighting to Reduce Fatal Rollovers

LiFi

LOOks

Printed Casting Molds Improve Aircraft Readiness

Reducing Orthotic Out-Patient Visits from 3 to 1

JAMWG FY20-21 Priorities

1. Accelerate qualification and certification of AM materials, machines and parts.

- Scope a joint AM Qualification data generation pathfinder project for metals.
- Execute pilot materials data federation project and scope a joint AM materials database approach if appropriate.
- Increase engagement with standards development organizations.
- Promote and transition R&D to mature AM technologies that will increase reliability and accelerate qualification.

2. Enhance a secure common digital thread across DoD and industry.

- Complete demonstration of Joint Additive Manufacturing Model Exchange (JAMMEX) system, roll out to users and define future requirements.
- Common Technical Data Package standard developed, accepted by all Services and published.
- Identify challenges and scope possible solutions to key cyber-physical security needs for AM across DoD.

3. Expand proficiency in AM: learn, practice and share knowledge.

- Identify common requirements, complete asset mapping and a path to fill in gaps with joint Education and Workforce (EWD) Development programs to support Service Implementation plans.
- Develop an artisan/technician certification program and share outcomes across DoD.

4. Develop DoD and supply chain integration policies and guidance.

- Publish DoD Instruction (Policy) on AM.
- Share and issue best practices for AM acquisition and cataloging.
- Provide policy and guidance to integrate the supply chain.

5. Improve internal and external communication effectiveness on AM.

- Publish DoD AM Strategy.
- Develop AM communication plan and utilize AM collaboration tools.
- Share information on metrics to capture value of AM and agree on common metrics.

Contacts & Reference Links

- Rob Gold, TMIB Director: robert.a.gold4.civ@mail.mil
- Tracy Frost, OSD ManTech Director: tracy.g.frost.civ@mail.mil
- DoD ManTech Program & Sponsored Institutes: https://defenseinnovationmarketplace.dtic.mil/business-opportunities/mantech-program/
- The Manufacturing USA Program: https://www.manufacturingusa.com/
- DoD AM Strategy: https://www.cto.mil/dod-additive-manufacturing-strategy/