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# **Prototyping - *A Path to Agility, Innovation, and Affordability***

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# Defense Strategy

**Secretary of Defense detailed three lines of effort for the Department:**

- *Restore military readiness as we build a more lethal force*
- *Strengthen alliances and attract new partners*
- *Bring business reforms to the Department of Defense*



*“More than any other nation, America can expand the competitive space.... A more lethal force, strong alliances and partnerships, American **technological innovation**, and a culture of performance will generate decisive and sustained U.S. military advantages.”*

2018 National Defense Strategy

**A culture of innovation delivered at the speed of war**



# Why greater emphasis on prototyping?



- **Constrained Budgets - we cannot afford to procure unique or exquisite systems for every potential threat**
- **Complex Threat Environment**

Russia, China

North Korea, Iran

Non-State Actors

- **Advanced design and manufacturing tools enable faster and more affordable prototype development**

**Prototyping accelerates the cycle of innovation**



# Imperatives & Activities

- **Research and Engineering Imperatives**
  - Mitigate current and anticipated threat capabilities
  - Affordably enable new capabilities in existing military systems
  - Create technology surprise through science and engineering
- **Prototyping Activities**
  - **Conceptual Prototypes**
    - Demonstrate feasibility of an integrated capability
    - Overcome technical risk
    - Enable cost vs. capability trades
  - **Developmental Prototypes**
    - Demonstrate military utility of integrated solution
    - Demonstrate robust manufacturing processes
    - Define form, fit and function
  - **Operational Prototypes**
    - Suitable for a targeted purpose in a specific environment
    - Demonstrate form, fit, and function

**“Prototyping and experimentation should be utilized prior to defining requirements, and commercial-off-the-shelf systems should be leveraged more often” (Source: 2018 National Defense Strategy)**



# Source documents & inputs for identifying needs



- National Defense Strategy
- Chairman's Capability Gap Assessment
- CCMD Integrated Priority Lists (IPLs), Joint Urgent Operational Needs (JUONs), and Joint Emerging Operational Needs (JEONs)
- USD(R&E) and Military Services' Science and Technology (S&T) Strategies
- End-user and/or Warfighter involvement





# EC&P's Mission & Objectives

***Identify, develop, and demonstrate technical concepts to address defined national security challenges faced by the DoD, Joint Force, and Combatant Commands (CCMDs)***

- Operationalize leading edge technologies and leverage the entire R&E enterprise for sources of innovation
- Partner with Joint, interagency and international players
- Foster innovation using prototyping and experimentation
- Broaden the supplier base to include non-traditional, domestic, & international performers

**Accomplished through:**

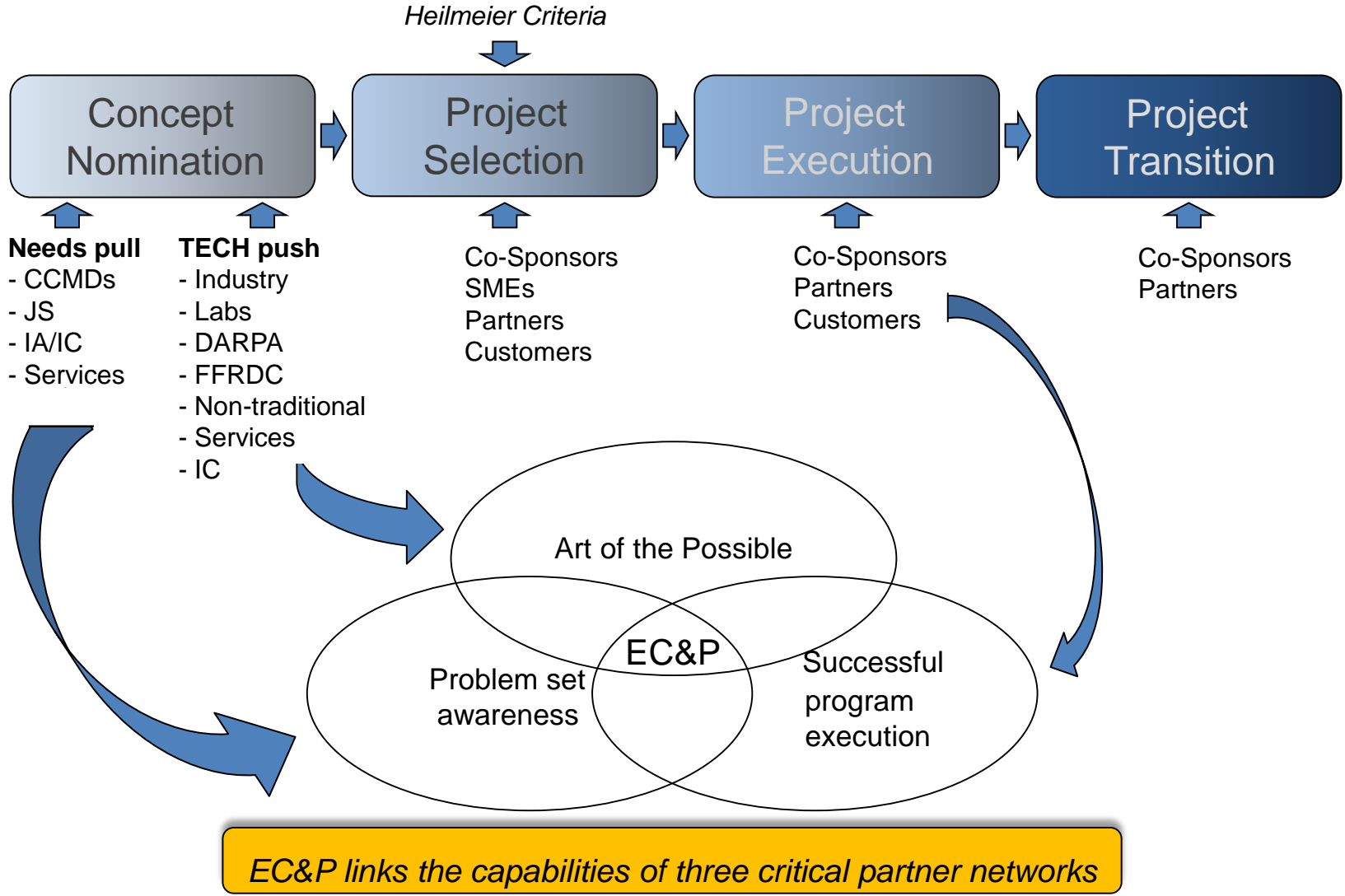
- Experimentation
- Prototyping
- Test & Evaluation
- Demonstration

**Transition**

**DoD & interagency programs of record and/or sustained capabilities**



# EC&P's Methodology & Critical Network of Partners





# Characteristics of EC&P Projects

- **Span all Joint Capability Areas**
- **Emphasize Joint and interagency problem sets**
- **Inform requirements development**
- **Most have co-sponsors (partnerships are critical to success)**
- **Emphasize user involvement with technology demonstration and experimentation**
- **Include transition planning from the start**
- **Most provide residual capabilities**

**“Seams, cracks and fissures”**





# EC&P Programs

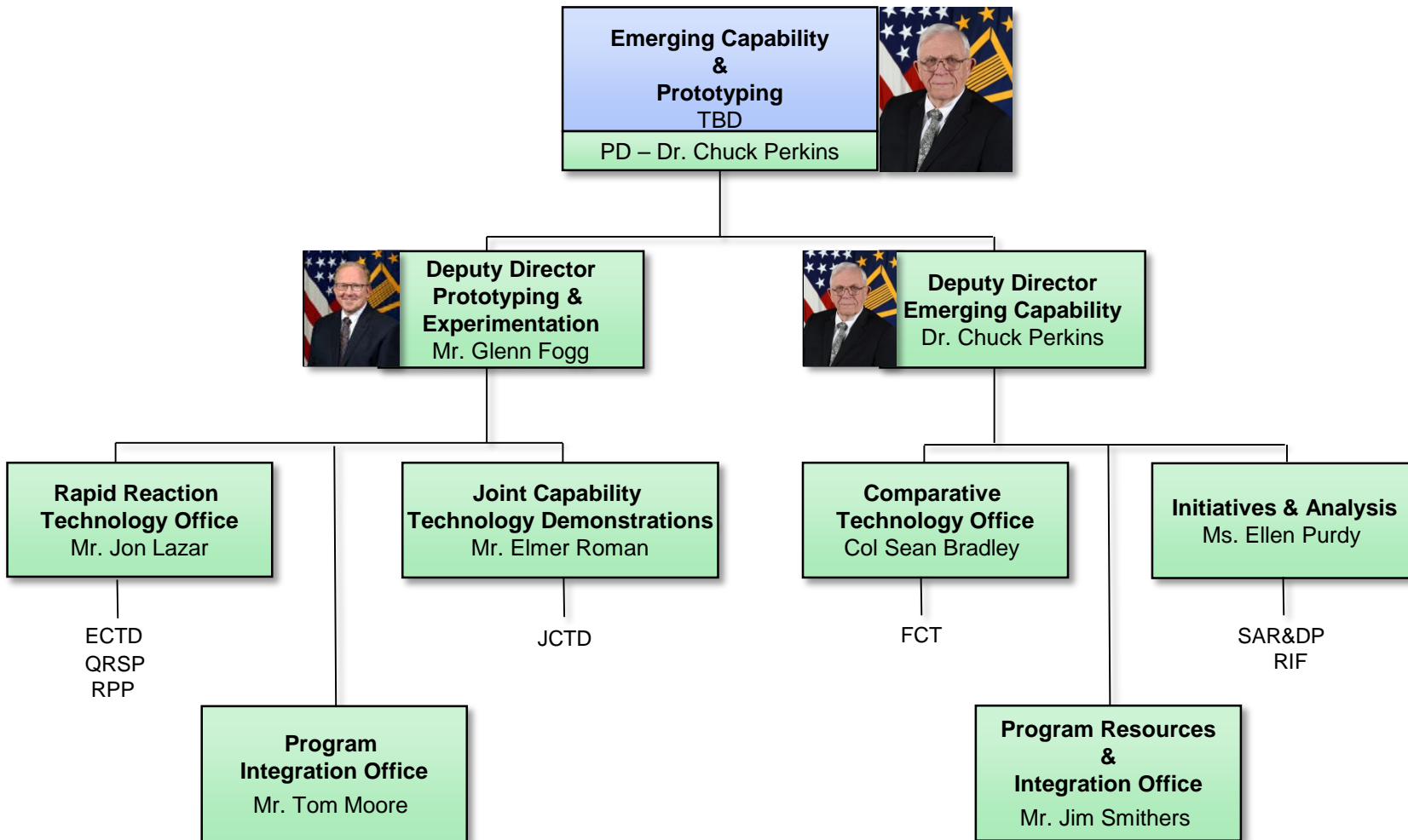
***EC&P's objectivity, freedom to cross boundaries, and freedom to take risks enables us to provide game-changing capabilities to the Joint Warfighter through seven programs.***

- **Joint Capability Technology Demonstration (JCTD)**
- **Emerging Capabilities Technology Development (ECTD)**
- **Quick Reaction Special Projects (QRSP)**
- **Rapid Prototyping Program (RPP)**
- **Foreign Comparative Test (FCT)**
- **Spectrum Access Research & Development Program (SAR&DP)**
- **Rapid Innovation Fund (RIF)**





# Emerging Capability & Prototyping



Political appointee

Career SES/GS-15/Mil 0-6



# Joint Capability Technology Demonstration (JCTD)



Execute prototypes and experiments to address DoD strategic needs, fill operational gaps and reduce technical risk

Anti-jam Precision Guided Munition (AJPGM)



Autonomous Mobility Applique System (AMAS)

Joint Multi-platform Advanced Combat ID (JMAC)



## Joint Capability Technology Demonstration (JCTD)

- Foster innovation and contribute to accelerated acquisition and weapon system affordability while providing the Joint Force with a decisive technical advantage
- Developmental/Operational Prototypes & Demonstrations; < 48 months, < \$100M



# JCTD Program Overview



***The JCTD Office is the conduit between the Military Services, CCMDs, and industry.***

- Execute DoD-wide prototyping and demonstration of high-payoff capabilities in operationally relevant environments
- Each project is sponsored by a CCMD and is managed and executed by a DoD or Military Service activity which fields needed technical capabilities within 2 to 4 years
- Inform requirements generation process (projects produce Initial Capabilities Document)
- FY18 on-going efforts include developing capabilities in four focus areas:
  - Asymmetric Force Application
  - Intelligence Surveillance & Reconnaissance (ISR)/Counter-ISR
  - Electromagnetic Spectrum Agility Maneuver
  - Information Operations & Analytics

***JCTDs seek Industry collaboration in technology development to ensure innovative capabilities are fielded to build military strength and establish competitive advantages***



# Emerging Capabilities Technology Development (ECTD)



## Explore art of the possible

### Infrared Motion Detection (IrMD) Using Existing EO/IR Assets



Long Range Engagement Weapon (LREW)

### Remote Weapon System Auto Prioritization, Targeting, and Operator Cueing (RAPTOR)



## Emerging Capabilities Technology Development (ECTD)

- Pursue risk-reducing technology prototypes and demonstrations of cutting-edge land, sea, air, and space systems for the Joint Warfighter
- Proof-of-Principle prototypes; < 36 months, < \$6M



# ECTD Program Overview



- Produce risk-reducing, proof-of-principle prototypes that inform streamlined, rapid, and iterative development of new emerging capabilities for the Joint Force
- Mitigates new and emerging threats through rapid prototyping in support of near- and mid-term operational engagements and stability operations
- Partners with the Military Services and interagency to support demonstrations and experimentation with the goal of accelerating prototyping and rapid fielding
- Rapid prototyping areas include:
  - Advanced computing
  - Multi-domain artificial intelligence
  - Unmanned autonomous systems
  - Directed energy
  - Dismounted soldier systems

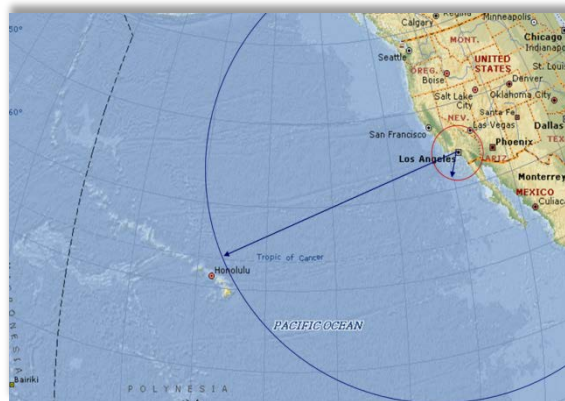
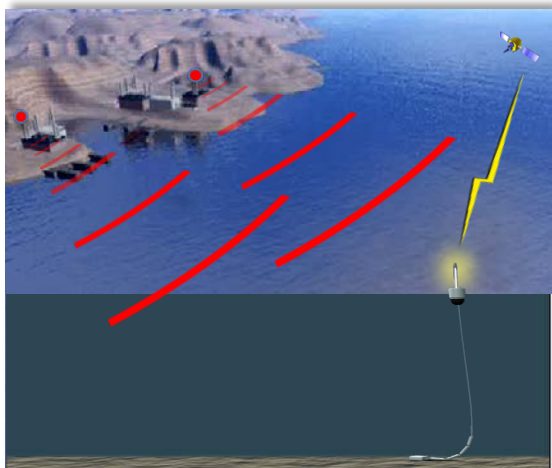


# Quick Reaction Special Projects (QRSP)



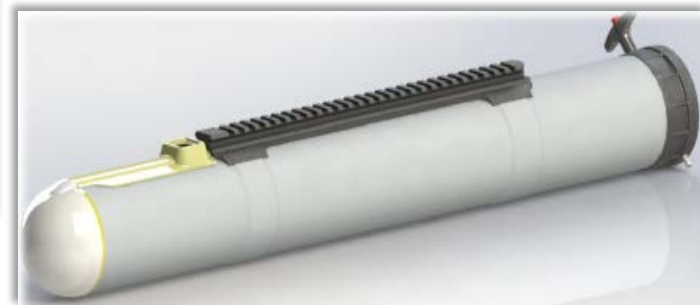
Offer rapid response to emerging capability shortfalls

Bloom



Aluminum-Seawater Fuel Cell Start System

UAV Payload Dispenser



## Quick Reaction Special Projects (QRSP)

- Mature emerging technologies for operational use by the Joint Warfighter
- QRF – Conventional warfare needs focusing on A2/AD; < 12 months, < \$3M
- RRF – Irregular warfare needs with global focus; < 18 months, < \$1M



# QRSP Program Overview

- Mature potentially game-changing capabilities for increased lethality and Joint Force effectiveness through rapid prototyping and novel business practices
- Rapidly develops leap-ahead technology solutions to meet the most pressing Joint capability needs of the CCMDs and warfighter
- Partners with CCMDs, Military Services, government labs, the Interagency, academia, and industry
- Program specifically targets small businesses and non-traditional sources, as well as traditional innovators using a streamlined entry process that increases the rate of innovation, affordability, and responsiveness to the changing nature of warfare
  - Supports modernization of key capabilities & provides a hedge against technology surprise
  - Develops modular capabilities to improve lethality in existing systems
  - Addresses strategic competition & counters non-traditional, non-kinetic threats
- **Low barrier of entry**; quad charts/white papers provide details for funding decisions
  - Technical review through network of government developers and users
  - Small Group Review of technical and operational experts to de-conflict and provide recommendations
- Proposal vetting and project selection made throughout the year of execution



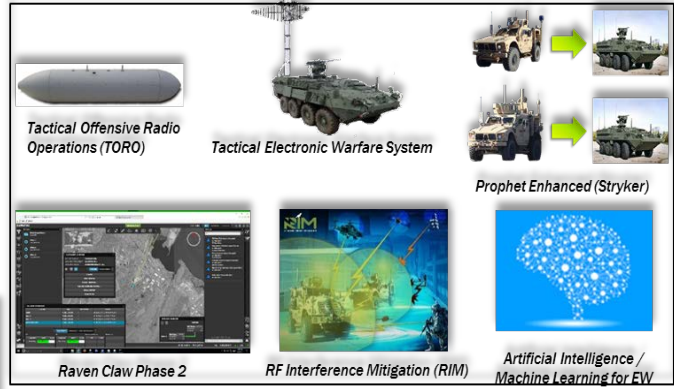
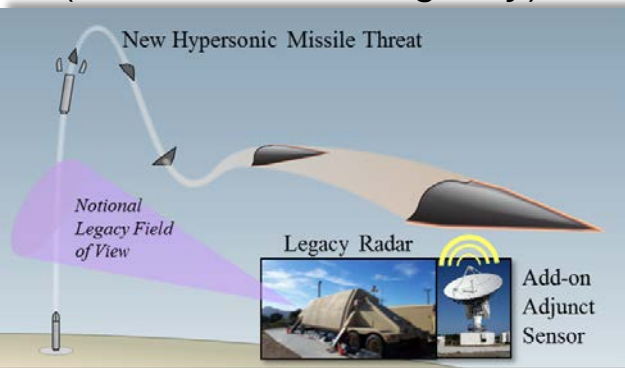


# Rapid Prototyping Program (RPP)



## Accelerates prototyping capabilities of the Military Services and defense agencies

Transportable Radar Surveillance and Control Model 2 (TPY 2) Adjunct Sensor Prototype for Hypersonic Glide Defense (Missile Defense Agency)



Rapid Prototyping of Multiple Electronic Warfare (EW) capabilities (U.S. Army RCO)

High Power Microwave (HPM) for Airbase Defense (U.S. Air Force)



### Rapid Prototyping Program (RPP)

- Reduce technical and integration risk and accelerate transition of new capabilities to programs of record
- Developmental and operational prototypes



# RPP Program Overview

- RPP program facilitates and accelerates prototyping efforts for the Military Services and Defense Agencies
- Develops prototypes that reduce technical and integration risk; obtain warfighter feedback that result in affordable and realistic requirements; and, support development of prototypes that can be demonstrated in an operational environment in timelines supportive of warfighter requirements
- 6.4 funding facilitates maturation of prototypes and development of CONOPS/TTPs
- Proposals are accepted on an annual basis

**RPP enables Military Services and defense agencies to rapidly prototype, evaluate, and transition new capabilities to programs of record**



# Foreign Comparative Test (FCT)



Authorized to leverage international allies' and partners' R&D investments

Pilot Physiological Monitoring and Warning System (Israel)

Pilot Oxygen/Blood Flow Sensors



Soldier-Sniper Weapon Observation Reconnaissance Device (Canada)

Secondary Propulsion Thrusters (Germany)



New Pump Jet Technology

**Foreign Comparative Test (FCT)**

- Evaluate foreign prototype technology to adapt / transition for DoD use
- Pre-EMD prototype and non-development item demonstrations; < 24 months, < \$2.5M



# FCT Program Overview

- Implement Title 10 provision to conduct “side-by-side” evaluation of friendly, foreign technologies to meet DoD requirements
- Evaluate foreign prototype technology to adapt / transition for DoD use
- Facilitate the use of foreign developed technologies to solve OSD priorities and cross-domain challenges (e.g., interoperable open systems and affordable capabilities)
- Buys foreign test articles and oversees testing of 10-12 new projects each year with focus on:
  - Asymmetric Force Application
  - Autonomous Systems
  - Information Operations and Analytics
  - Electromagnetic Spectrum Agility
  - Other National Priorities

**The FCT Program leverages global technology investments and innovation, promotes competition to reduce DoD costs, and strengthens key alliances and partnerships**





# SAR&DP Overview



- Projects mitigate risks associated with the third Advanced Wireless Services (AWS-3) repurposing of DoD spectrum to commercial use and associated transition
- Maintain operational capability resilience in the EMS environment
- Initiated via partnership between the Under Secretary of Defense for Research & Engineering, DoD Chief Information Office, and Joint Staff J6
- First \$500M increment funded via the Spectrum Relocation Fund (non-appropriated funds). Newly established as an EC&P Program Element in FY18Q1.



# Rapid Innovation Fund (RIF) Overview



- Stimulates innovative technologies and reduces acquisition or lifecycle costs
- Addresses technical risks and improves timeliness and thoroughness of test and evaluation outcomes
- Focuses on short-duration innovative technology development predominantly from small businesses as means of sustaining technology refresh in defense industry and technology dominance for U.S. forces
  - Key program to bridge "valley of death" between advanced technology and programs of record, and sustain small business growth
- Rapidly inserts products directly in support of primarily major defense acquisition programs, but also other defense acquisition programs that meet critical national security needs
- Partners with Office of Small Business Programs (OSBP), Military Services, defense agencies, CCMDs, and industry



# How to work with us

## JCTD

- Submit proposals in quad chart format to JCTDHelpDesk@osd.mil, Military Services, CCMD, or defense agency technology development offices
- POC: Mr. Elmer Roman, elmer.l.roman.civ@mail.mil

## ECTD & QRSP

- Submit proposals in “quad chart” or “white paper” format to us directly at: osd.pentagon.ousd-atl.list.rcto-poc@mail.mil
- POC: Mr. Jon Lazar, jon.e.lazar.civ@mail.mil, (703) 697-4084

## RPP

- Submit proposals to Military Service and/or defense agency POCs in response to solicitations on FedBizOps and other open source business announcement/advertisement venues, or, contact us directly at osd.pentagon.ousd-atl.list.rcto-poc@mail.mil
- POC: Mr. Jon Lazar, jon.e.lazar.civ@mail.mil, (703) 697-4084

## RIF

- Find more information about RIF on the Defense Innovation Marketplace RIF Portal at: <http://www.defenseinnovationmarketplace.mil/rif.html>
- Contact us directly at osd.pentagon.ousd-atl.mbx.ia-poc@mail.mil
- POC: Ms. Ellen Purdy, ellen.m.purdy.civ@mail.mil, (571) 372-7545





# How to work with us *cont:*



## FCT

- Contact the Security Cooperation Office and/or the Defense Attachés in the U.S. Embassy in your country, or, the Defense Attaché and/or trade or science and technology reps in your Embassy in Washington D.C.
- Contact CTO directly at [osd.fct@mail.mil](mailto:osd.fct@mail.mil), or visit our website at: <https://cto.acqcenter.com>
- POC: Col Sean “Stu” Bradley, [sean.a.bradley.mil@mail.mil](mailto:sean.a.bradley.mil@mail.mil), (571) 372-6825

## SAR&DP

- Submit proposals to Military Service and/or defense agency POCs in response to solicitations through the National Spectrum Consortium at: <https://www.nationalspectrumconsortium.org>, or, contact us directly at: [osd.pentagon.ousd-atl.mbx.ia-poc@mail.mil](mailto:osd.pentagon.ousd-atl.mbx.ia-poc@mail.mil)
- POC: Ms. Ellen Purdy, [ellen.m.purdy.civ@mail.mil](mailto:ellen.m.purdy.civ@mail.mil). (571) 372-7545

**Visit our website at: <https://www.acq.osd.mil/ecp>**



# For Additional Information



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