



# **Combatant Commands Science and Technology Panel**

**Mr. Elmer Roman**

Director, Joint Capability Technology Demonstration  
Office of the Assistant Secretary of Defense for Research and Engineering  
Emerging Capability & Prototyping

elmer.l.roman.civ@mail.mil / 703-697-3985 (O)

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# Defense R&E Strategy



*The United States depends on science, technology and innovative engineering to not only protect the American people but to advance our national interests and to prepare us to meet the challenges of an uncertain future.*

*– ASD(R&E) Mission*

**Mitigate** current and anticipated **threat** capabilities.

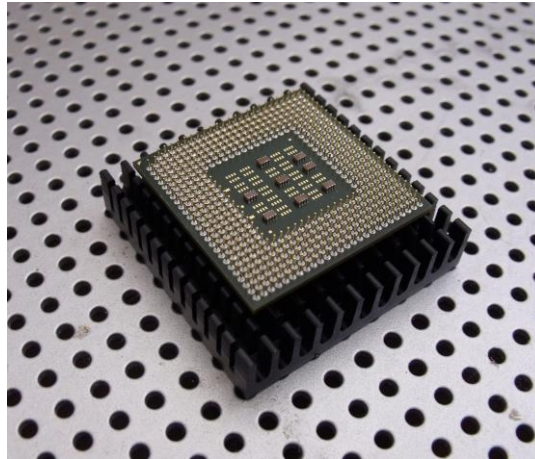
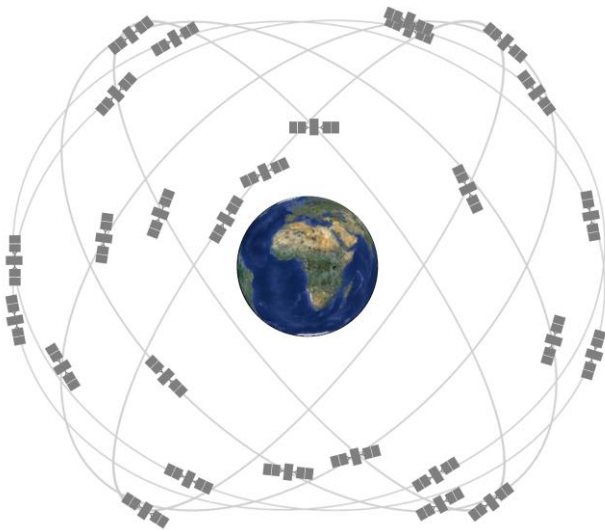
Affordably **enable new capabilities** in existing military systems.

**Create technology surprise** through science and engineering.

**Investing in science and technology to support the Warfighter.**



# Preserving Technological Superiority



**But the environment and the threats are changing...**

- Global access to resources, technology and talent
- Competitors investments
- Speed and pace of technical opportunity
- Cost and cycle time



# Technology Focus



*Seeks to deny adversary objectives, and strengthen conventional deterrence by:*

- **Leveraging autonomy and artificial intelligence**
  - Get inside an adversary's decision cycle
- **Greatly expanding manned-unmanned combat teaming**
  - Extend our attack surface
- **Re-amplifying our guided-munitions advantage**
  - With 'raid-breaking' capabilities
- **Creating new mass**
  - Disaggregating complex systems to deliver combined effects
- **Developing 'inside-out' and 'over-under' capabilities**
  - Leverage dispersal, sanctuaries, and speed
- **Developing new forms of distributed maneuver**
  - Combining kinetic, EW, cyber





# 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	Trans-national Terrorists
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- **Advanced design and manufacturing tools enable faster and more affordable prototype development**

***Prototyping advances technology frontiers...***

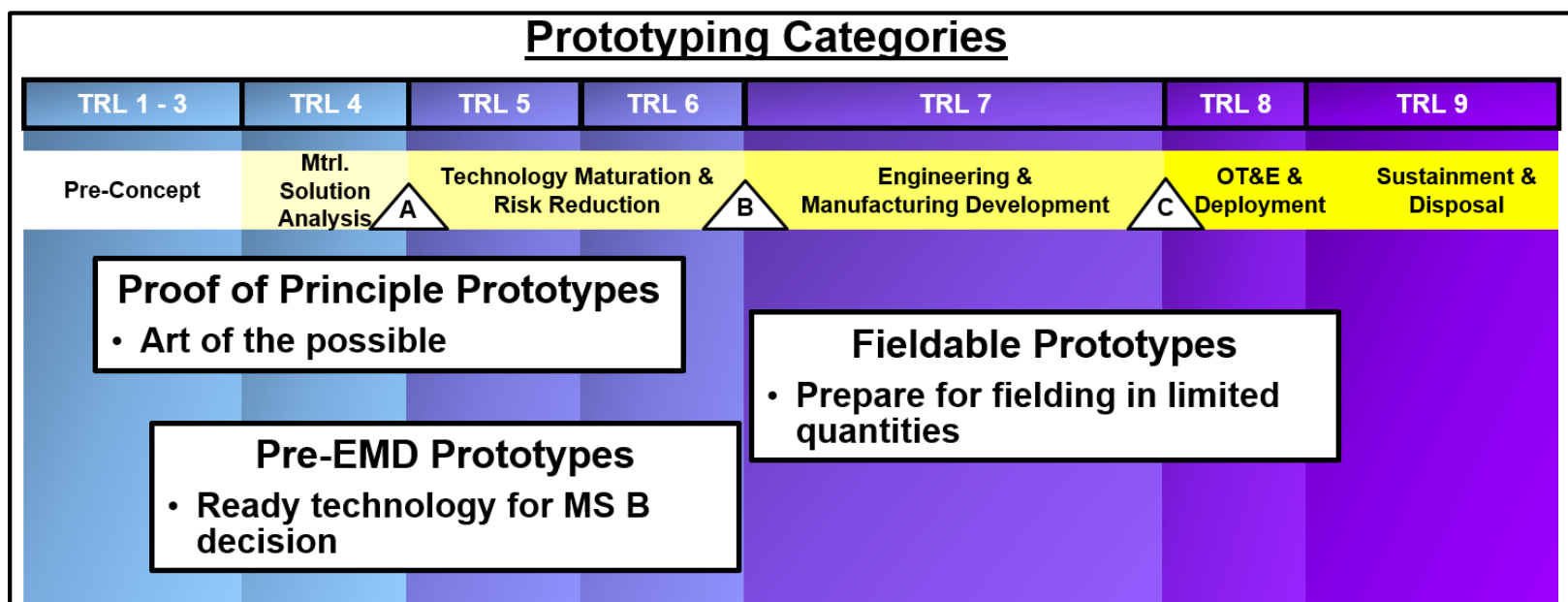


# DoD Prototyping

What do we mean by Prototyping?

“A set of design and development activities intended to reduce technical uncertainty and to generate information to improve the quality of subsequent decision making.”

– On Prototyping, RAND Corporation, 2009



Enables Department of Defense to:

- Explore the realm of the possible without commitment to follow-on procurement
- Cost-effectively enhance interoperability and reduce lifecycle costs
- Devise / demonstrate a hedge against technical uncertainty or unanticipated threat
- Drive down technical risk, inform realistic requirements, and get warfighter feedback



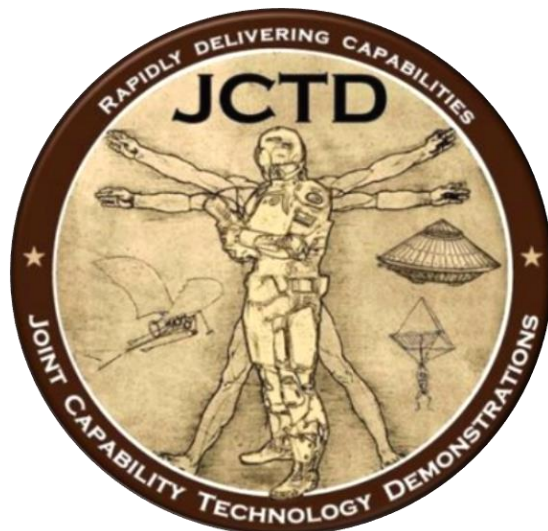
# Prototyping & Experimentation FY 17 Focus



- **Joint Capability Technology Demonstration (JCTD):** Pre-EMD and fieldable prototypes; < 48 months, < \$100M
  - Information Operations and Analytics
  - Asymmetric Force Applications
  - Autonomous Systems
  - Electromagnetic Spectrum (EMS) Agility
- **Emerging Capabilities Technology Development (ECTD):** Proof-of-Principle and fieldable prototypes; < 36 months, < \$6M
  - Multi-domain, Autonomous Systems
  - Counter-Weapons of Mass Destruction
  - Dismounted Soldier Systems
  - Energy Efficient Systems
- **Quick Reaction Special Projects (QRSP):** Time-sensitive operational needs
  - QRF: Conventional Warfare, <12 months, < \$3M    RRF: Irregular Warfare, <18 months, < \$1M
  - Counter Anti-Access / Area Denial
  - Persistent Intelligence, Surveillance & Reconnaissance
  - Low-cost Precision Engagement
  - Open Source Data Exploitation



# JCTD Program



*Created in 1995, the Advanced Concepts Technology Demonstration Program (precursor to JCTDs) emerged from the Packard Commission as a way to reduce cost and risk of entering full-scale acquisition.*

## Mission

- Execute prototypes and experimentation through operational demonstrations of game-changing technologies to meet DoD strategic needs while addressing Joint Force and Combatant Commands (CCMD) capability gaps.

## Objectives

- Stimulate innovation by bridging Science and Technology (S&T) to operational use and formal acquisition
- Accelerate fielding of decisive technical capabilities within 3 to 5 years
- Leverage open architectures to enhance interoperability and promote affordability
- Reduce technical risks and mitigate operational risk to the warfighter

## Unique project structure

- Integrated management team consisting of individuals from the operational, technical, and acquisition communities
- Jointly develop the technology with CONOPS & TTPs

***A long history of accelerating the transition of affordable, game-changing capabilities that mitigate operational risk to the warfighter***



# JCA: Partnership Engagement FY12-15

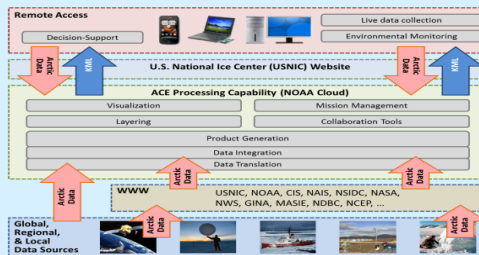


## (U) Pre-positioned Expeditionary Assistance Kit (PEAK)



(U) Deployable, system to provide essential services in the immediate aftermath of a crisis event – water desalination, independent communications, and satellites for web based situational awareness tool. Used in Honduras, Philippines, Ethiopia, Kenya and Thailand.

## (U) Arctic Collaborative Environment (ACE)



(U) Arctic decision support system that integrates US and partner nation data on arctic sea ice flow and characteristics. Used on the internet, available to anyone.

## (U) Trans-national Information Sharing Cooperation (TISC)



(U) Unclassified information exchange between US and foreign governments, partner organizations, and private sector to support HA/DR operations. Used as APAN in responses to Haitian earthquake, tsunami in Japan, hurricane in Philippines, Ebola in Africa, and more.

## (U) Regional Domain Awareness (RDA)



(U) Unclassified infrastructure to assist in combating illicit trafficking, support HA/DR efforts and foster regional information sharing and cooperation.

## (U) Humanitarian Expeditionary Logistics Program (HELP)



HELP User Interface

(U) Provides customers the ability to maintain visibility of DoD/non-DoD disaster relief supplies.

## (U) Rapid Open Geospatial User-driven Enterprise (ROGUE)



(U) Unclassified geospatial data and analytical software capability to enable US and mission partners to share data in HA/DR operations. Now in DisasterAware, used by DoD, DHS, DoS, National Guard, and several countries.



# CCMD S&T Panel Members



- **Mr. Ricardo Arias** **USAFRICOM**
- **Mr. Marty Drake** **USCENTCOM**
- **Mr. Michael T. McGuinness** **USEUCOM**
- **Mr. Mike Jones** **USPACOM**
- **Col Paula Hamilton, USAF** **USNORTHCOM**
- **Dr. Andrew Higier** **USSOUTHCOM**
- **Mr. Dan Bernard** **USSOCOM**
- **Mr. Martin "Marty" Ledington** **USTRANSCOM**
- **LTC Scott W. Key, USA** **USSTRATCOM**



# CCMD S&T Panel Questions



1. **What is your S&T role and how do Prototyping and Technology Demonstrations work within your command?**
2. **How do you partner with industry and others to address capability challenges and gaps within your command? Please provide examples, such as how you leverage the Defense Innovation Marketplace, SCO, DIUx, etc.**
3. **During your tenure, what do you consider the single biggest S&T success and how have your collaborations with industry, academia, and partner nations enabled that success?**

# ***US Central Command Concept & Technology Development***





# Air Power Support - Combat Dragon II



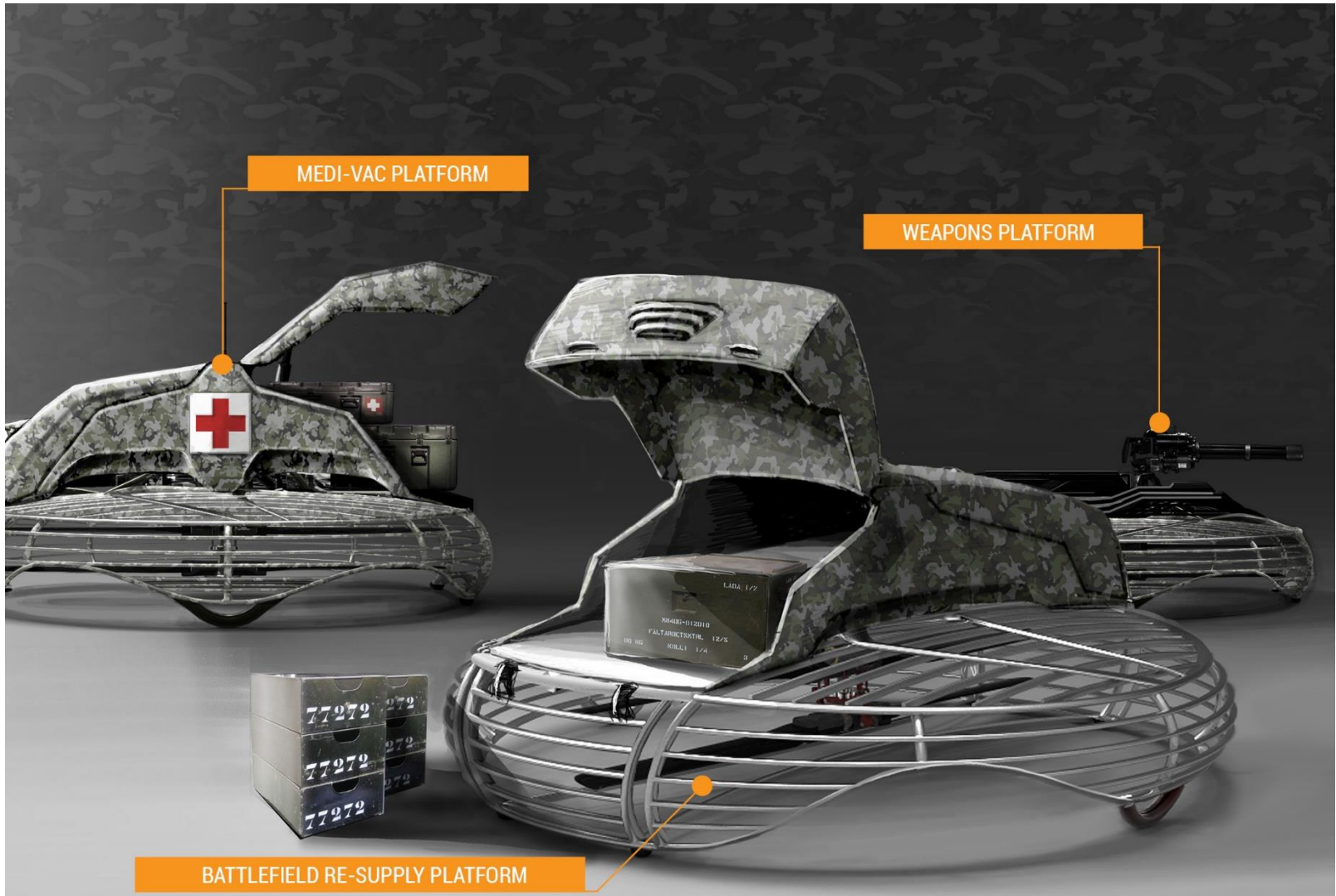


# *Future Mobility - Sky Bike*





# Multi-function – LOG, CASEVAC, ISR, Armed Overwatch, Aerial Comms . . .



MEDI-VAC PLATFORM

WEAPONS PLATFORM

BATTLEFIELD RE-SUPPLY PLATFORM

# Partnering in S&T to enhance Peace and Stability



## J804 Science, Technology & Innovation (ST&I)

Ricardo Arias  
8 March 2017



# Science, Technology & Innovation

## Role, Mission, Vision, Activities

### ROLE

- Lead Command’s S&T activities.

### MISSION

- Lead, plan, coordinate and manage Command’s participation in and support for S&T activities *aligned to Command-validated requirements.*

### VISION

- Be the most effective Command agent for ST&I to address AFRICOM operational challenges & to **leverage the resources of the DoD S&T enterprise** to minimize the Command’s capability gaps.

### S&T activities

- Sponsorship
- Endorsement
- Program Management
- Project Management
- Staffing

DoD Account	FY14 Enacted	FY15 Enacted	FY16 Enacted	FY15→16
RDT&E	63.5	64.0	70.0	9.4%
S&T	12.0	12.3	13.3	8.2%
6.1 BR	2.2	2.3	2.3	1.4%
6.2 AR	4.6	4.6	5.0	7.7%
6.3 ATD	5.2	5.3	5.9	11.5%
<b>TOTAL</b>	<b>75.5</b>	<b>76.3</b>	<b>83.3</b>	<b>9.0%</b>

**FY16 Appropriation: \$83.3B, 202 line items, 126 labs, 9.0% increase year previous. DoD employs the largest amount of scientists and engineers (150K) in the world.\***

\* National Science Foundation (NSF) Science and Engineering Indicators 2014 Arlington, VA (NSB 14-01) | February 2014



# A Complex and Challenging Environment

- Human Development

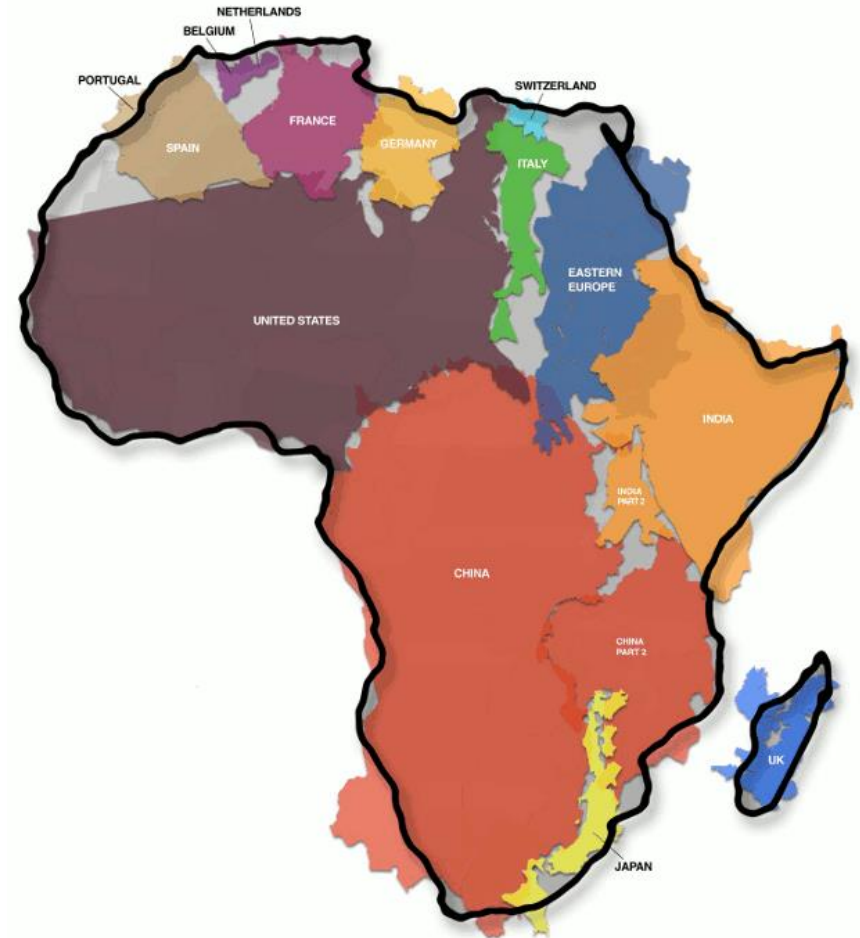
- Population Growth (estimate of 1 billion in 2010 with predicted growth to 1.6 billion by 2030)
- Already struggling with wide-spread unemployment and disenfranchisement
- Migration and urbanization

- Governance

- Role of the State
- Power Transitions
- Criminal and terrorist networks exploit marginalized masses and take advantage of ungoverned and under governed areas

- Environmental Security

- Climate extremes
- Water Security and Food security
- Energy Security









# Opportunities for Partnering in S&T

## USAFRICOM ST&I Focus Areas



### ISR

- Long-Range / Long Endurance, Persistent Collection, Radio Frequency Direction Finding (RFDF), Fused Multi-Int Airborne / Full Motion Video (FMV), Coalition / Airborne / Autonomy-enabled Processing, Exploitation, Dissemination (PED), Machine Language Translation



### PERSONNEL RECOVERY:

- Personnel Recovery / Combat Search and Rescue-enablers, Drone-assisted, Modeling & Simulation (M&S).



### COUNTER-IED:

- Defeat the Device / Attack the Network / Train the Force-enablers



### OPERATIONAL ENERGY:

- Reduced Expeditionary Footprint, Alternative Energy, Waste-to-Energy Disposal, Water Purification, Energy Efficient Housing, Power Distribution, Force Protection



### IDENTITY ACTIVITIES:

- Biometrics, Forensics, Documentation and Media Exploitation (DOMEX), Denial of Anonymity, Repository, Interoperability



### MARITIME DOMAIN AWARENESS:

- Beyond Line-of-Sight, Reporting, Sensor Interoperability, Automated Anomaly Detection, Common Maritime Picture (CMP)



### COMMUNICATIONS:

- C4ISR for Multi-national / Coalition / Joint Operations, Expeditionary / Scalable "Blackberry to Joint Network Node"



### MEDICAL:

- Disease Prevention, Immunization, Detection, Diagnosis, Treatment, Biosurveillance, Modeling, Informatics, Telemedicine, Remote / Austere Trauma Medicine



### NON-LETHAL SYSTEMS:

- Mobile Counter-Personnel (Sound, Light, Munition), Counter-Materiel (Vehicle, Vessel, Radio-Frequency), Active Denial



## Key Take Away and POCs

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- ST&I Office (ACJ804) manages USAFRICOM's **novel materiel** and **non-material** solution responsibilities.
- USAFRICOM is willing to Partner in S&T to address command requirements and to promote peace and stability.
- ISR, PR, C-IED, OE, IDRES, MDA, Comms, Medical, Non-Lethal.
- USAFRICOM S&T POCs:

### Mr C. Van Anderson

DSN 314-421-7921

COMM +49 711-729-7921

NIPR [christen.v.anderson4.civ@mail.mil](mailto:christen.v.anderson4.civ@mail.mil)

SIPR [christen.v.anderson4.civ@mail.smil.mil](mailto:christen.v.anderson4.civ@mail.smil.mil)

### COL Richard Gulley

DSN 314-421-2702

COMM +49 711-729-2702

NIPR: [richard.g.gulley.mil@mail.mil](mailto:richard.g.gulley.mil@mail.mil)

SIPR: [richard.g.gulley.mil@mail.smil.mil](mailto:richard.g.gulley.mil@mail.smil.mil)

### Mr Ricardo Arias

DSN 314-421-3245

COMM +49 711-729-3245

NIPR [ricardo.arias.civ@mail.mil](mailto:ricardo.arias.civ@mail.mil)

SIPR [ricardo.arias.civ@mail.smil.mil](mailto:ricardo.arias.civ@mail.smil.mil)

### Mr Tom Putnam

DSN 314-421-4752

COMM +49 711-729-4752

NIPR [thomas.a.putnam.civ@mail.mil](mailto:thomas.a.putnam.civ@mail.mil)

SIPR [thomas.a.putnam.civ@mail.smil.mil](mailto:thomas.a.putnam.civ@mail.smil.mil)