DISTRIBUTION STATEMENT A: APPROVED FOR PUBLIC RELEASE

SENSORS Community of Interest

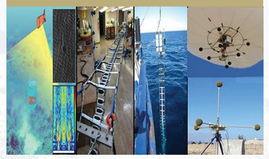
Provides a forum for sharing new ideas, technical directions and technology opportunities, jointly planning programs, measuring technical progress, and exchanging advances in sensors and surveillance technology.

Sensors Taxonomy

Radio Frequency (RF [non-EW])

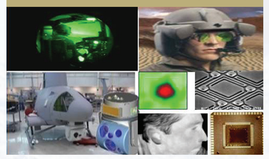
- RF Sensors
  - Active
    - Monostatic Radar
    - MIMO
  - Passive
  - Cooperative
    - Multistatic Radar
  - Non-Cooperative
    - PCL
    - SIGINT

Acoustic, Seismic, Magnetic (ASM)



- Acoustic
  - Active
  - Passive
- Seismic/Acceleration
  - Ocean
  - Terrestrial
- Magnetic/E-M Field
  - Maritime
  - Terrestrial

Electro-Optics /Infrared (EO/IR)



- Imaging
  - Active
  - Passive
- Lasers
  - High Power CW
  - Pulsed
- Displays
  - Direct View
  - Virtual

Sensor Processing is an Element of All Areas

Common Warfighter Needs *Met* By Sensors COI

- Survivable Broad Area Persistent Surveillance
- Target Detection, Recognition & ID at Standoff Ranges
- Force/Platform/Sensor Protection
- Target Tracking
- Early Warning
- BDA
- Precision Strike
- Resilient Architectures

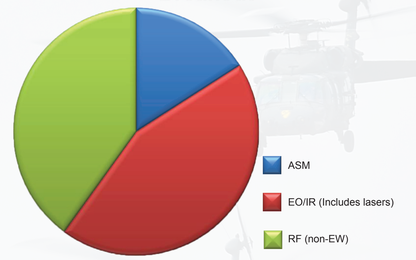
EO/IR
Air Force
Army
Navy

RF
Air Force
Army
Navy

ASM
Army
Navy

Overview of Portfolio

DTA FY15 Breakout



Total COI Portfolio by Executing Organization

DTA/EP COI Taxonomy Areas (Note3)	FY11 EP COI Health Assessment	DTA FY14 Breakout (Note 1)	DTA FY15 Breakout
EO/IR (includes lasers)	$401.9M (59%)	$427.9M (61%)	$242.8 (44%)
RF (non-EW)	$165.8M (24%)	$217.3M (31%)	$223.6 (40%)
ASM	$114.8M (17%)	$61.2M (9%)	$89.8M (16%)
Total	*$682.5M*	*$706.4M*	*$556.3M*

DTA FY14 Breakout

FY11 EP COI Health Assessment

EO/IR Challenges

- Many IR applications require wide area, fine resolution, fast frame rate and high dynamic range operation which in turn stresses state-of-the-art image readout technology, bandwidth available with RF links and sensor SWaP
- Development of Digital Read Out Integrated Circuits (D-ROICs) provides the highest potential for leap-ahead technology for sensing capability with high frame rates, wider dynamic range & increased on-chip signal processing for Triservices and 9W community
- Technology has been demonstrated with dual-band smaller pixels with higher resolutions; however, smaller pixels are required and advances will be required to meet this
  - Success in this area will have operational benefits for: Wide Area Motion Imagery/ Persistent Surveillance, Degraded Visual Environment (DVE) penetration, Fast scanning for Forward Operating Base (FOB) Protection and Intelligence, Reconnaissance, Search & Track (IRST)
- We conquered darkness (Own the Night) with the development of advanced night vision equipment, but world-wide proliferation of night vision technology has decreased operational superiority of our warfighters. The next step is to "Own the Atmosphere," mitigating effects of deleterious atmospheric conditions (turbulence, clouds, haze, fog, rain, snow, dust, smoke) on long range high resolution sensing.
- Broad Area Maritime Surveillance capability is severely impacted by presence of cloud cover and marine haze/fog.

EO/IR Way Forward

Recommendations to close challenges

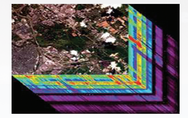
- Army has programmed out-year S&T dollars to partially address the challenges
- ManTech investment will be required to provide affordability
- Potential resource leveraging with Defense Advanced Research Projects Agency (DARPA) or Missile Defense Agency (MDA)
- Initiate 6.1 and 6.2 research activities in exploring diversity sensing (time, spectrum, polarization) combined with multi-frame image processing and enhancements to achieve desired operational capability.
- Recent Army efforts on degraded visual environment has demonstrated promising results

D-ROICS Will Enhance Multiple War Fighting Capabilities And Maximize Performance Of Existing And Emerging FPAs

Explore Advanced Sensors And Processing Techniques To Provide War Fighters Enhanced Capabilities When Operating In Degraded Visual Environments

EO/IR Opportunities

- Development of passive millimeter wave region for atmospheric transmission in degraded visual environment possibility for improved navigation and increased target detection and identification
- Multiple modalities associated with electromagnetic waves (spectral, polarimetric, temporal…) in addition to conventional spatial information will provide additional information about the targets and hence improved performance under all weather conditions.
- Extend the static target models for dynamic target acquisition by employing new modes for development in SAR and EO/IR fusion to improve decision, feature, and signal level fusion to augment ATR fusion of Battle Damage Assessment
- Miniaturization of sensors to fit reduced size and weight of new military platforms especially to ease physical burden for soldiers and small UAVs



ASM Challenges

- U.S. Navy Destroyers, Submarines, Maritime Patrol Aircraft (MPA), and SURTASS/LFA ships utilize active sonar systems to detect, classify, and track adversarial submarines.
- Other Navy assets utilize active sonar systems to detect and classify mines.
- Many of the mine detection systems that are in use or under development are operated from Unmanned Undersea Vehicles (UUVs) that have limited energy storage capacity.
- All types of active sonar systems, and particularly the UUV based ones, can be greatly enhanced by the development of high-power, high-efficiency, low-cost, low-weight/volume transduction materials.

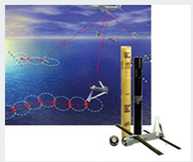
ASM Way Forward

Recommendations to close challenges

- Research on innovative materials and device structures is being pursued to enhance the performance of the electro-mechanical transducers used by the Department of Navy to generate, detect and suppress undersea sound waves.
- The present Office of Naval Research program has two thrusts:
  - The first, aims to devise and validate first-principles quantum-mechanical methods to evaluate the properties of materials with structural phase transitions; this will enable the exploration of the properties of new materials systems in advance of their synthesis.
  - The second, focuses on the new high-coupling, high-strain relaxor piezoelectric single crystals; efforts underway aim to produce and characterize these piezocrystals and to design/fabricate innovative transducers from them for Navy sonar systems.

A New Acoustic Source Array Is Needed With A Larger Bandwidth And A Reduced Cost

ASM Opportunities



- Broad Area Persistent Surveillance
- Detection of Proud, Buried and Volume Mines
- Detect and Track Targets
- Detect and Locate Underground and Surface Activity
- Magnetic Anomaly Detection (MAD) for ASW Targets
- Buried Mine Identification
- Surveillance
- Magnetic Stealth for the Fleet
- E-& B- field phenomena exploited as a signal of opportunity
- Unique active sensing possibilities
- Low Cost, High Sensitivity Sensors that Consume Little Power

RF Challenges

- Dynamic flexibility to support the most urgent tactical needs of the moment will come from multifunction within each system which will require a reasonable degree of openness
- Development of a cooperative networked radar will improve search coverage, detection range and resolution without increasing individual platform Aperture, Power, Processing
- Even with the open systems work being done by the services, there is a need for an effective standards body to achieve meaningful interoperability at the RF and systems level

RF Way Forward

Recommendations to close challenges

- Develop Government-owned, hardware-independent Open Systems Architecture to support increased competition, broaden vendor base, improved tech insertion and decreased Life Cycle Cost
- Leverage on-going service lab research efforts to demonstrate that fully utilizing multiple platform resources in a collaborative manner with a Sensor Resource Manager (SRM) we can schedule, execute, receive, process, share, and reprocess those same resources for a significant improvement in performance
- Potential resource leveraging with DARPA SoSITE Program addressing open systems

Open RF System Architecture Will Add Significant Operational Capability And Improve The Material Development Process Providing The Systems

RF Opportunities

- Long Stand-Off Sensing of A2/AD Environments
- Persistent Stand-In Sensing in Area-Denied Environments
- Detection and Identification of Enemy Combatants
- Detection of Concealed Targets & Threats
- Multi-Platform Integrated Sensor Resource Management (SRM)