

# Spectrum Warfare Systems Department



*CAPT Duncan McKay, USN  
Commanding Officer*

*Dr. Angela Lewis, SES  
Technical Director*



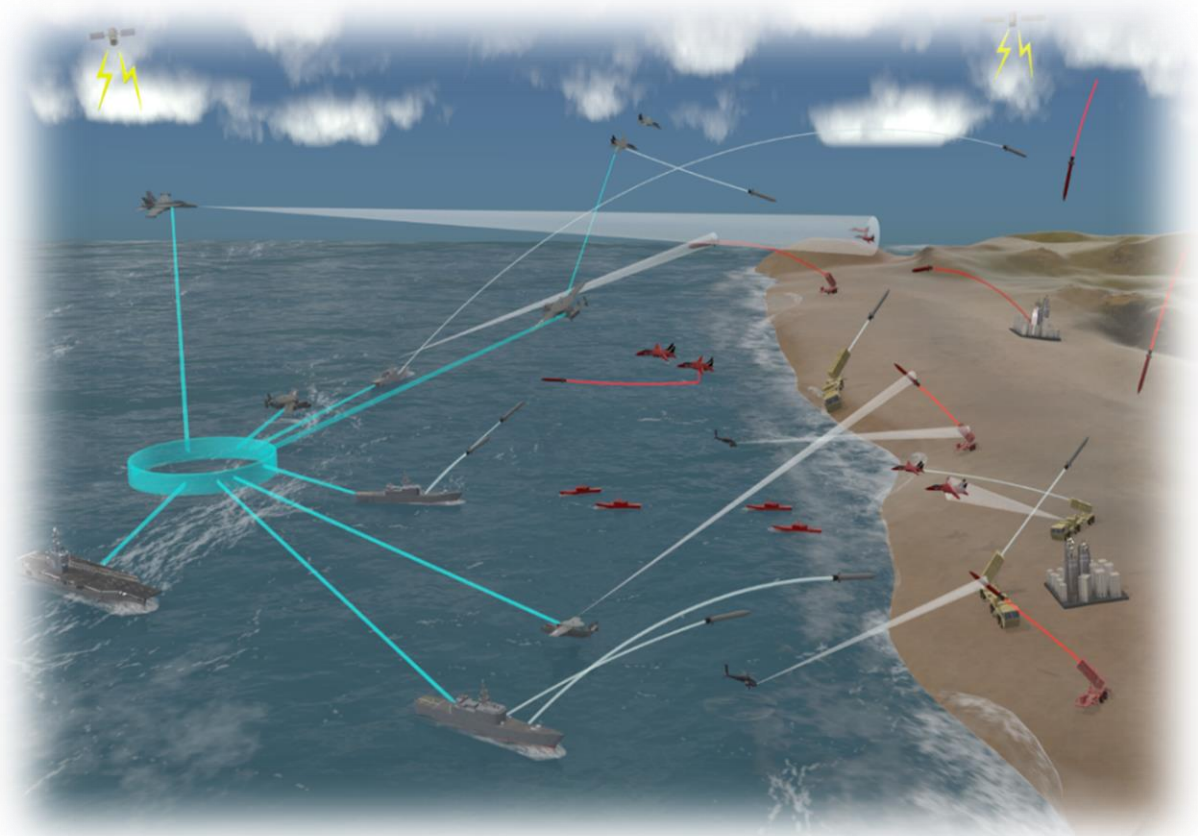
*Mr. Zahid Din  
Department Director*

*Ms. Erika White  
Deputy Department Director*

Distribution A: Approved for Public Release; Distribution is unlimited.

**National Leaders in Force Level EW for Department of Defense: Influence EW Operational employment (Doctrine, TTPs, CONOPs, CONEMPs) and create multi-domain and full spectrum electromagnetic warfare solutions to provide the Electromagnetic Spectrum advantage.**

- *National Defense Strategy, DoD EW Strategy, Distributed Maritime Operations, Design for Maintaining Maritime Superiority, USMC Commandant's Guidance* all call out the need for distributed, integrated Force Level EW.
- NSWC Crane provides Non-Kinetic Expertise for Electromagnetic Spectrum Dominance
  - Multi-domain, Multi-spectral, and Multi-service
  - Cognitive & Distributed Non-Kinetic System of Systems Solutions
  - Offensive and Disruptive Concepts and Technologies
- Strong Collaborative Partnerships across the Naval Research and Development Enterprise, Air Force Research Laboratories and Army Research Laboratories



**Focus:**

On leveraging our technical capabilities as well as our multi-domain, multi-service, multi-spectral, full lifecycle knowledge and experience to provide innovative, leading-edge technical solutions for the rapidly changing threat environment.

**Product Areas:**

- Electromagnetic Warfare Science & Technology and Advanced EW Concepts
- Naval Integrated Fire Control Model Based Systems Engineering
- Infra-Red (IR) Countermeasure S&T, R&D, Design Flares/Chaff/Lasers
- Surface Electronic Warfare Systems and Off board Countermeasures
- Counter Radio Controlled Improvised Explosive Device Warfare (CREW) Systems
- Airborne Electronic Attack Systems
- Phased Array and Solid State Technologies
- Counter Unmanned Aerial Systems

**Roles:**

- S&T
- Research and Development
- Design
- Modeling and Simulation
- System Engineering
- Test and Evaluation
- Threat Load Development
- In-Service Engineering
- Integrated Logistics
- Configuration Mgmt
- Sustainment
- Installations
- Fleet Support
- Software

Airborne Electronic Attack



Infrared Countermeasures  
S&T/R&D

Integrated EW/Fires SoS



Counter IED & UAS

Anti-Ship Missile Defense



Shipboard Radar Technologies

**EW MISSION  
AREA GUIDANCE**

Critical Leader in Innovation & Sustainment for Navy EW Mission

Develop our Workforce as National Leaders in EW

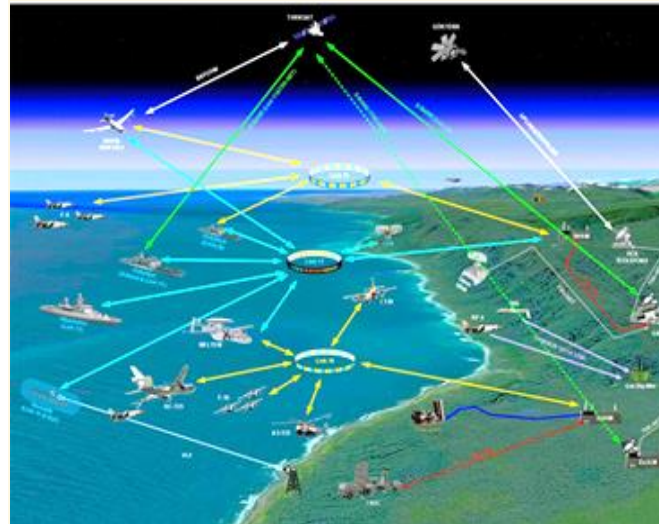
Transform to Be Agile and Outpace Threats

**NATIONAL LEADERS IN ELECTRONIC WARFARE**

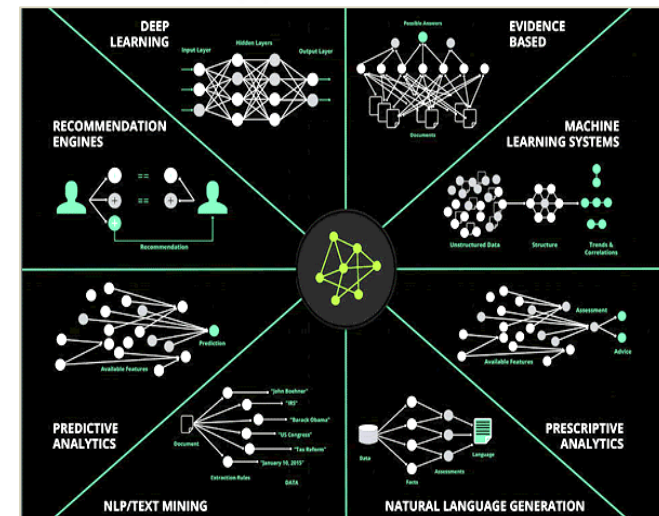
## Modeling & Analysis



## Mission Engineering



## Apps for EW



**SPECTRUM SCIENCE**

## Navy's Distinguished Scientist for Advanced Electronic Warfare, Mr. Tom Dalheim SSTM

- Leads Navy efforts for EW advancement and transformation
- Responsible to ensure NSWC provides the best technical solutions for EW to the warfighter
- Develop and lead NSWC actions to establish and sustain effective and valued NSWC/stakeholder relations

### Leadership in Live Virtual Constructive Environments

- Key Player in LVC across NRDE Community
- Nationally Recognized (Decisive Sting – NILE)
- Expanding Capability at Crane across Mission Areas

### NSWC Technical Lead for C-UAS

- Lead NSWC's C-UAS technical solutions across WFC
- Champion C-UAS Across NR&DE Community
- Expanding Capability at Crane across Mission Areas

### Leader in Cognitive EW

- Lead for OSD Cognitive EW Study
- DARPA & ONR Machine Learning Technical Support
- Principle Investigator on Airborne Electronic Attack FNCs

### Navy Program Manager, IBAS - Radar/EW Technologies

- Advise on Health of Industrial Base and Drive Solutions
- Technical Expertise on DoD's RF/Microwave Technologies
- Leverage Industrial Base to Enable Research and Advance Technology for RF technologies for Transition to DoD Applications

### NIFC TDA – SoS MBSE

- Systems Engineering for Execution of MBSE Plan
- Nationally recognized MBSE Expertise
- Force Level Solutions & Mission Engineering

### TDA & ISEA for EW Mission Payloads for USVs

- EW Mission Area Lead for USVs
- NAVSEA Warfare Centers recognized TDA and ISEA for EW payloads on USVs

## Offsite Leadership Positions



Mr. Matthew Miller  
OSD R&E EWCO



Mr. Steve Mervyn  
USFFC N8/N9  
EW Technical Advisor



Mr. Adam Miller  
Dr. Trevor Snow  
Mr. Patrick Flannagan



Mr. Jason Mayer  
EW Liaison to  
COMPACFLT N9WAR



Mr. Rob Gamberg  
(Acting)  
N2/N6 EMW Liaison  
ELEKTRA Lead



Mr. Jonathon Fesler  
Dr. David Emerson  
IWSC – Naval Integrated  
Fire Control Technical  
Leads



Mr. Derek Leney  
PMA 234  
NCIP – From the Air  
EW Lead

- Trusted EW: Expand IBAS, MINSEC, Cognitive Security
- 5G – Next Generation Wireless / Internet of Things
- Electronic / Electromagnetic Protection
- RF Enabled Cyber
- Unmanned Capabilities – Scalable EW Systems
- Electronic / Electromagnetic Attack: High Power Microwave, Non-Lethal Directed Energy, Other Non-kinetic Countermeasures

## Sensing

- Spectrum Agile Communications
- Cognitive Classification
- Command Level Decision Aids
- Data Compression
- Distributed Collaboration
- Force Level Platform Passive Precision Targeting
- Resilient Datalinks
- Sensor Networks
- Nonlinear Radar for Discernment
- Predictive Modeling
- Optical Sensing
- LPI/LPD active monostatic sensing
- Satellite Surveillance and Comms
- Low Probability of Intercept/Detect
- Multi-Band Radar Techniques
- Optical and RF Obscuration
- Quantum Platform Sensing
- SAR-Based Bearing Angle Estimation

## Tracking / Targeting

- Software Reconfigurable platforms
- Common Tactical Displays (2D/3D)
- Correlation in Space, Time, Spectrum
- Neural Networks for Acquisition
- Photonic Sensors Exploitation
- Ultra-wide Band Apertures
- Adaptive, wideband EW/EMSO systems
- Advanced Digital Signal Processing
- Scalable and Modular EMW Payloads
- RF Enabled Cyber Effects
- Multi-Domain Tracking Techniques
- Tracking via Sensors of Opportunity
- Constructive Interference for Targeting
- Passive Targeting Countermeasures
- Laser Targeting Countermeasures
- Optical Track and Targeting Defeat
- UxS Micro-Doppler Tracking
- EMS Deception Techniques
- Nonlinear Radar for AI Targeting

## Engage

- Adaptive/Cognitive Reasoning/Assessment
- Advanced DRFM/PRFM
- Advanced Electronic Attack Techniques
- Collaborative Effects
- Multifunction ES/EA capabilities
- Coordinated/Coherent Jamming
- cUXS/cSwarm
- Cyber Effects
- Directed Energy
- Distributed Effects
- Force Level Platform Coordinated/Coherent EA Techniques
- Infrared Countermeasures
- Real Time BDA
- RF Expendable Countermeasures
- Unmanned Capabilities

- Artificial Intelligence - Autonomous and Cognitive Algorithms
- Data Science
  - Big Data Analytics
  - Mathematicians/Statisticians
  - Predictive Analytics
- Mission Engineering – System of Systems Engineering
  - Model Based Systems Engineering
  - Advanced Analytics of Non-Kinetic Effects
  - Modeling & Simulation
  - LVC
  - Operational – Former Military Experience
  - Threat Analysis and Solution Formulation
- Model Based Product Support
  - Supportability Analysis and Sustainment Solutions
- Software Engineering, Software Development, FPGA, Networks
- Cyber Experience to include cybersecurity and RF Enabled capabilities
- Quantum Science
- Software Defined Radio Experience – scalable EW Systems Design
- Engineering
  - RF Engineers
  - Communications and digital signal processing experience
  - Hardware Engineers with understanding of Analog and Digital Circuits
  - Systems Engineers
- Test and Evaluation Experience
- Logistics
- Acquisition
- Fabrication Support
- Fleet and Installation Support
- Program Support
- Research and Development Support
- Program Management
- Repair, Production, Depot Support
- Material Science
  - Additively Manufactured EM components
  - Spectrum Based EnMats
  - Phase Changing Materials