



United States European Command

Joint Electromagnetic Spectrum Operations (JEMSO)

Association of Old Crows Europe

Mr. Jared Duckworth

12 October 2021

Overall Classification: **UNCLASSIFIED**



Agenda

- What are JEMSO?
 - JEMSO Doctrine...What's Different?
 - Defensive JEMSO in the 21st Century
- USEUCOM JEMSO Cell (JEMSOC)
 - Organization, Tasks and Products
 - Success Stories
- Future Vision



UNCLASSIFIED

What are JEMSO?

UNCLASSIFIED

POC: Jared Duckworth, ECJ39, Phone 324-412-3900

JEMSO Doctrine...What's Different?

"JEMSO are military actions undertaken by a joint force to exploit, attack, protect, and manage the Electromagnetic Operational Environment (EMOE)."

Joint Publication 3-85, 22 May 2020

- JEMSO doctrine revolutionizes thinking about the electromagnetic spectrum (EMS):
 - Treat the EMS as a maneuver space, not merely a resource to be consumed
 - Recognize that the EMS is increasingly congested, contested and constrained
 - Reflect the reality of dynamic changes to the Electromagnetic Operational Environment (EMOE)
 - Integrate related mission areas – cyber, space, air/land/maritime operations

"JEMSO integrate and synchronize electromagnetic warfare (EW), EMS management, and intelligence, as well as other mission areas, to achieve EMS superiority."

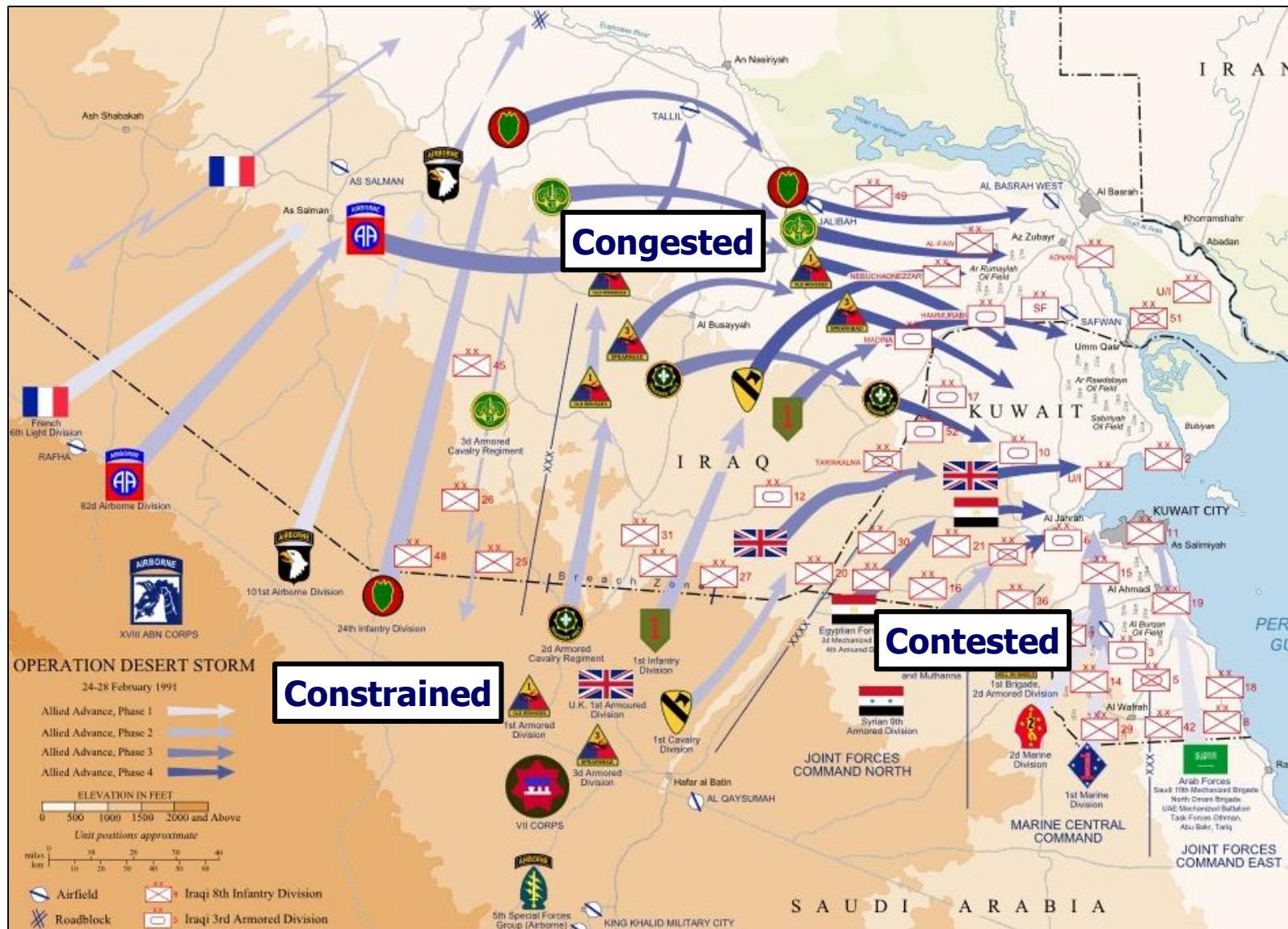
Joint Publication 3-85, 22 May 2020





UNCLASSIFIED

Defensive JEMSO in the 21st Century



UNCLASSIFIED

POC: Jared Duckworth, ECJ39, Phone 324-412-3900

Defensive JEMSO in the 21st Century

Improve visualization of the EMS at scale (formations not systems, operational-level Courses of Action not 1-v-1)

Better integrate friendly, adversary and neutral EMS impacts

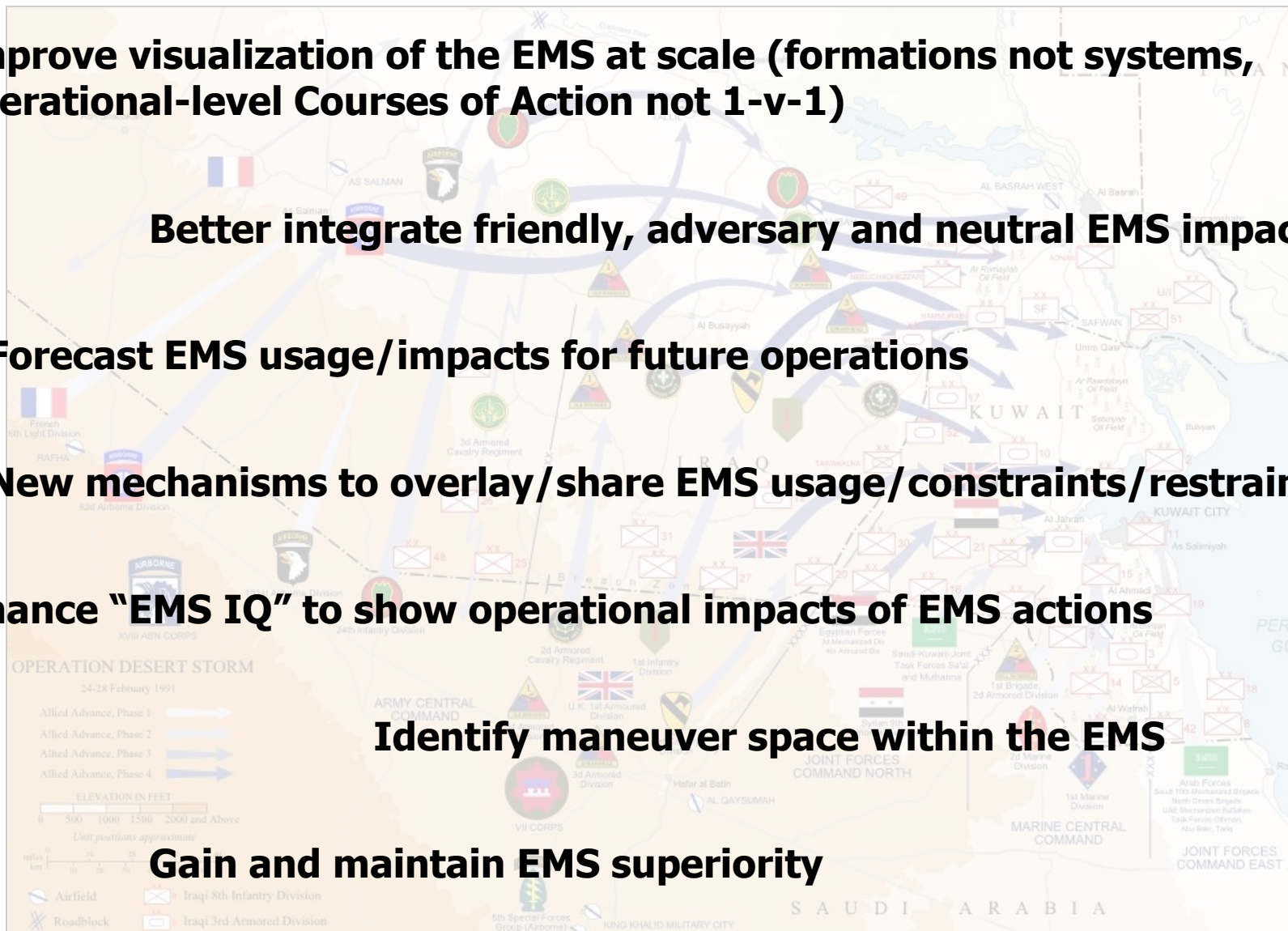
Forecast EMS usage/impacts for future operations

New mechanisms to overlay/share EMS usage/constraints/restraints

Enhance "EMS IQ" to show operational impacts of EMS actions

Identify maneuver space within the EMS

Gain and maintain EMS superiority





UNCLASSIFIED

USEUCOM JEMSOC

UNCLASSIFIED

POC: Jared Duckworth, ECJ39, Phone 324-412-3900

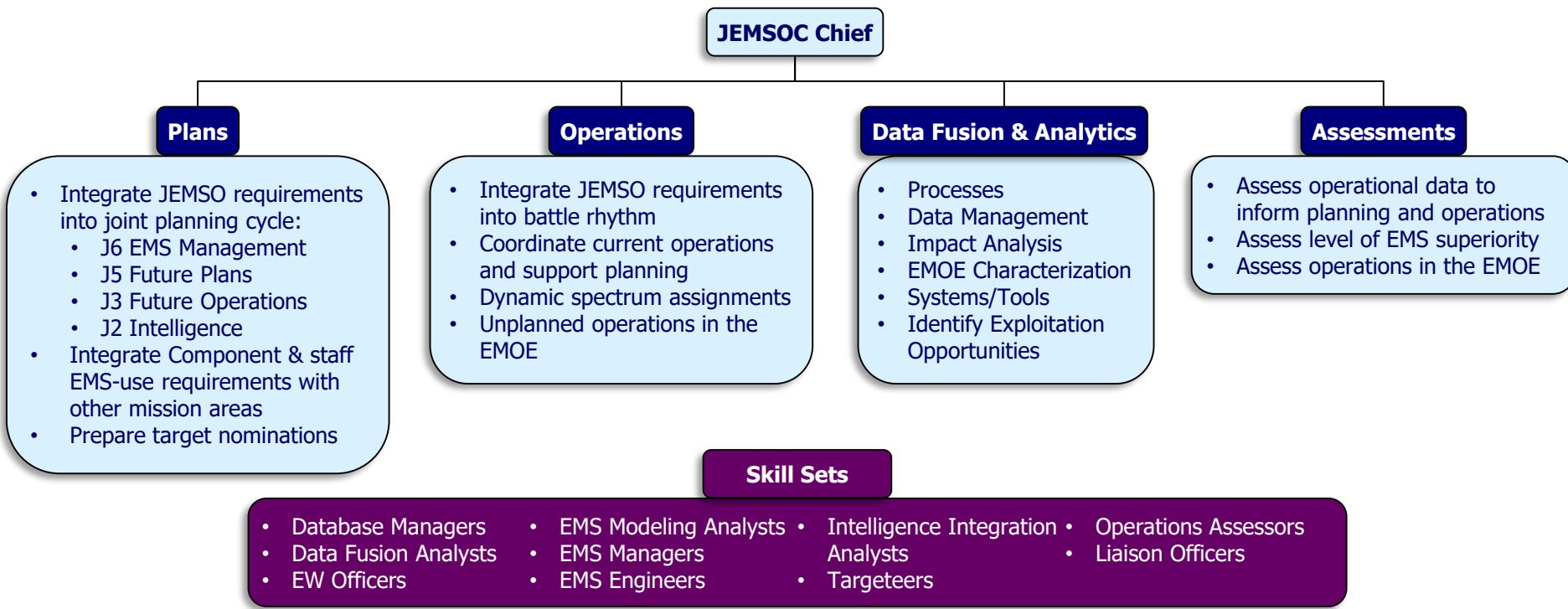


USEUCOM JEMSOC Organization

"[The JEMSOC is] the primary staff element to plan, coordinate, execute and assess JEMSO to achieve and maintain EMS superiority."

Joint Publication 3-85, 22 May 2020

- USEUCOM JEMSOC initiated during Exercise AUSTERE CHALLENGE 2019 (3 permanent staff + augmentees)
- JEMSOC has doubled in size since AC19...and continues to grow and integrate at the Joint level



- The JEMSOC can't do it all...Component EMSO Cells and tactical units all must play their part

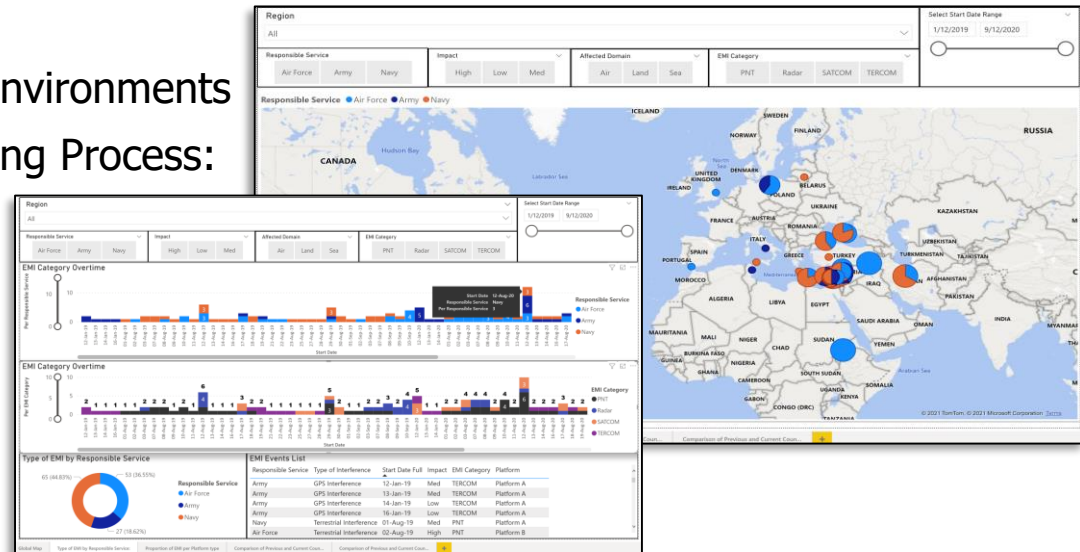


UNCLASSIFIED

JEMSOC Tasks and Products

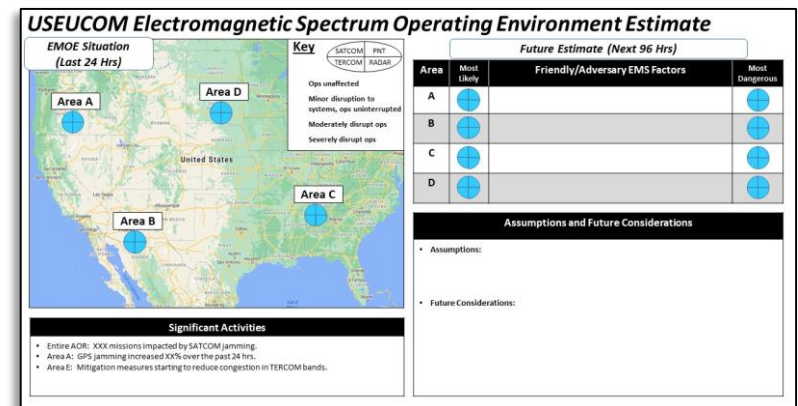
• Tasks:

- Enhance the Command's "EMS IQ" – regular updates on EMS issues/activities to inform decisions
- Implement realistic exercise EMS environments
- Provide EMS input into Joint Planning Process:
 - EMS threats
 - Friendly EMS usage needs
 - EMS impacts on Courses of Action
 - EMS assessment plan



• Products:

- EMOE Estimate
- Senior Leader EMI and JEMSO update
- JEMSO Staff Estimate
- JEMSO Appendix to Operation Order
- JEMSO Directives and Orders



UNCLASSIFIED



UNCLASSIFIED

USEUCOM JEMSOC Successes

- Increased deployment of JEMSO capabilities to Europe:
 - JEMSOC driving realistic EMOEs in exercises
 - 3x EC-130H Compass Call aircraft in 2021
 - Other assets planned for FY22 and beyond
- Monthly JEMSO update to senior staff:
 - Electromagnetic Interference overview
 - Current and future JEMSO activities
 - Assessment/recommendations for actions
- USEUCOM JEMSOC products and processes viewed as “best practices” across DOD
 - U.S Joint Electromagnetic Warfare Center assessment based on AC21 exercise
- MITRE Capstone research funding to accelerate JEMSO automation/visualization:
 - Spectrum Consumption Models (SCMs): standards-based (IEEE 1900.5.2) modeling of EMS usage at operational scale – formations (100+ systems), constraints etc.
 - Built SCMs using SMADEF and SFAF data – interoperability designed in from the start
 - Analytics to evaluate potential EMI sources during planning phase



UNCLASSIFIED



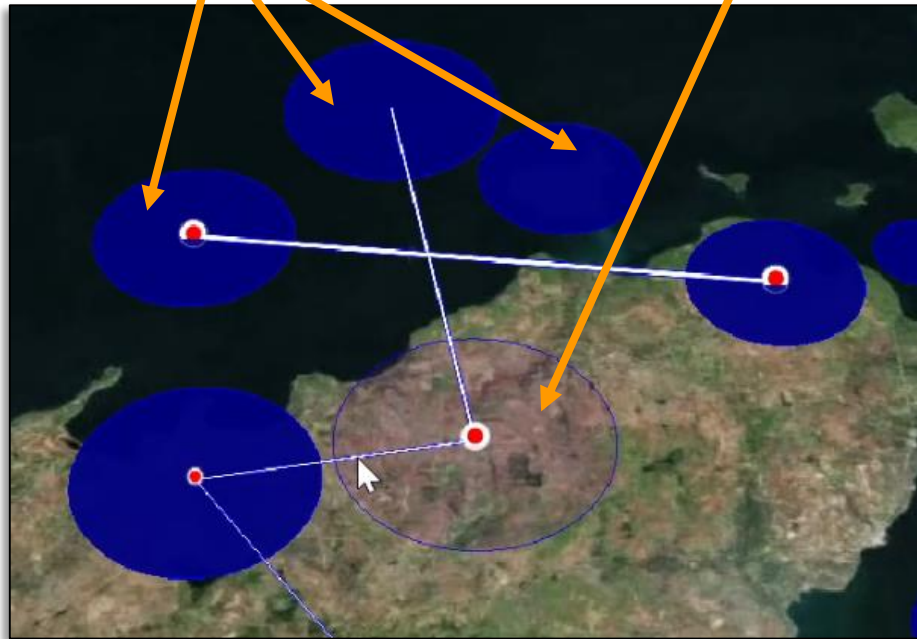
UNCLASSIFIED

MITRE Capstone Research

- Assessing digital EMOE Estimates at operational scale and with uncertainty
- Leverages existing SFAF and SMADEF data to model large-scale formations

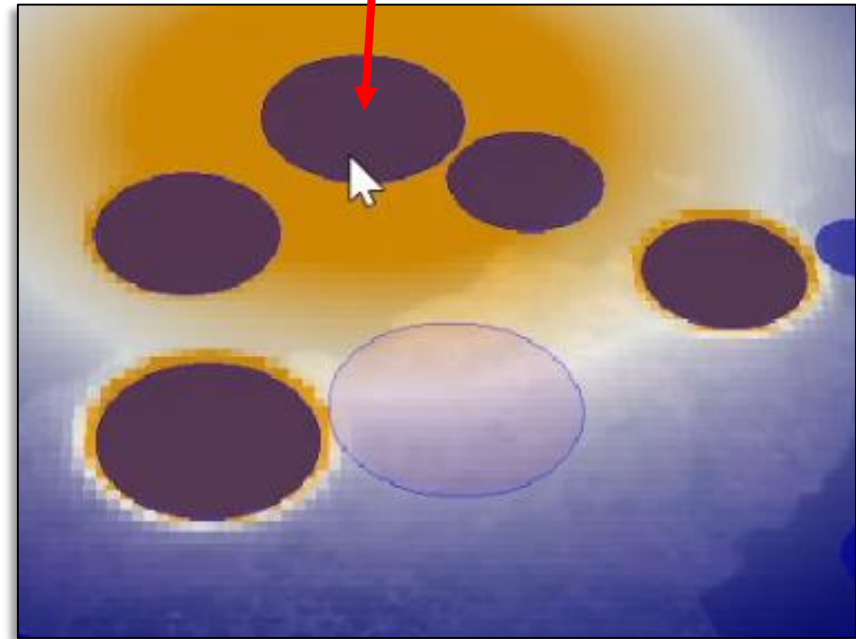
SCMs of Systems or Formations

SCM of Constraint (e.g. Joint Restricted Frequency List (JRFL))



EMI Analytic identifies possible sources of EMI
Red Dots = Interference Detections
White Lines = Interfering SCMs

Most likely source of EMI against JRFL system



Power Spectral Flux Density tool provides additional insights on EMI (tuned to JRFL model)

UNCLASSIFIED



UNCLASSIFIED

USEUCOM Vision

UNCLASSIFIED

POC: Jared Duckworth, ECJ39, Phone 324-412-3900



USEUCOM JEMSO Vision

- U.S. and NATO EMS doctrine and strategy align well; let's make them routine in operations
 - EMS is "key terrain" in any modern operations
 - Senior military and civilian leaders need help understanding the EMS and EW
- Allies/national partners: How can we better integrate EMS operations/understanding?
 - USEUCOM entirely depends on you to conduct JEMSO
 - We are your guests and operate with your permission
 - BUT...EMS doesn't abide by geographic boundaries
 - How can we improve our abilities to:
 - Operate in congested/contested EMOEs?
 - Integrate EW capabilities across the NATO Alliance?
 - Share data on unit/formation EMS usage requirements?
 - Evaluate EMS aspects of Joint/Allied schemes of maneuver?
 - Develop and disseminate EMS constraints (e.g. JRFL)
- Industry partners: How can technology help programs:
 - Enhance EMS situational awareness?
 - Operate under conditions of uncertainty?
 - Scale up to joint echelon / operational level of war?
 - Apply standards to enable data sharing while complying with security rules?





UNCLASSIFIED

Questions

UNCLASSIFIED

POC: Jared Duckworth, ECJ39, Phone 324-412-3900