SSC Pacific
C4ISR for Unmanned Systems

Mike Tall
UxS Capability Portfolio Manager
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 SSC Pacific: Organization (as of 1 Oct 17)

* SSTM: Senior Scientific and Technical Manager
SSC Pacific UxS History

- UGVs – 1980s
- Triton UAV - 2001
- Free Swimmer AUV - 1985
- MK18 UUV – Early 2000s
Unmanned Systems at SSC Pacific

▼ UxS C4ISR for all 4 domains of
- 40+ active robotic projects
  - Advanced Autonomy
  - Human Machine Teaming
  - Sensor Fusion
  - Communications
  - Payloads
  - Operational T&E
  - S&T Research

▼ Location allows us to leverage test ranges in all domains.

▼ Expert Personnel
- 500+ government scientists and engineers
- 50+ years in unmanned systems
UxS Facilities
“Fundamentally, the world has become dramatically more globalized, and this trend is accelerating.”

“The pace at which potential competitors are moving demands that we, in turn, increase The speed at which we act. Our advantage is shrinking – we must start today and we must improve faster.”

“We need a new, faster way to align, allocate and accelerate scientific discoveries to naval programs of record and deployment as new capabilities.”

ALIGN – ALLOCATE - ACCELERATE
SPAWAR Strategic Objectives

- Accelerate and Streamline Delivery
- Drive Cyber Resiliency
- Optimize our Organization, Operations, and Workforce
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- Accelerate and Streamline Delivery
- Drive Cyber Resiliency
- Optimize our Organization, Operations, and Workforce
Inform Model through Experimentation

**Reference Implementation**
- Validates and informs the architecture through demonstration

**Tool Development**
- UCS-MDE model and Neya’s UxSDK
- Generate DDS IDL to generate source code for backbone
- Generate LaTeX files to produce IDD
SPAWAR Strategic Objectives

Accelerate and Streamline Delivery

Drive Cyber Resiliency

Optimize our Organization, Operations, and Workforce
Sharing and processing data

▼ Networked Attached Storage Solution (NAS)
  ▪ Facilitates the sharing of large amounts of data.

▼ NVIDIA DGX-1
  ▪ Processing for large amounts of data
SSC Pacific

UXS TECHNOLOGY
Software Defined Acoustic Modem

▼ Implement and test new and advanced ACOMMS algorithms

▼ Hardware and Software Patent
  ▪ U.S. Navy Case No. 103087

Stationary ambient acoustic noise

▼ Allows the communicator to freely choose signal band to meet range requirements

▼ Does not permit intercept detection performance beyond that of in-band energy detection.

▼ Solves very near-range interceptor problem

Dusan Radosevic
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EgoMotion
Background – Motion Detection

Dr. Josh Harguess
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Industry teaming (S2ME2)
Human-Autonomy Teaming

- To team with an autonomous agent, a human must influence the agent’s goal-based decision-making (planning) process.
- Analyze and evaluate state of the art planning algorithms, modeling methods as applied to naval-relevant scenarios.
- Relax an assumption and reevaluate algorithms.
- Improve algorithm performance by incorporating human intelligence into the planning algorithm.

Dr. Leah Kelley
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MK18 UUV Autonomy

Previous VIP/COIN .RMF Planning

Neptune Mission Planning
Summary

▼ Expertise to Develop, Integrate, Test, and Evaluate Unmanned Systems technologies from Basic Research to Operations.

▼ Currently implementing common themes from UxS Roadmaps and 3rd offset strategy.

- Basic and applied research with Machine Learning & Human Machine Teaming
- Contested environment work with advanced algorithms, payloads, and perception.
- Cross domain C4 + Cyber ISR UxS work
We make Unmanned Vehicles smarter

Questions?