Joint Interagency Field Experimentation (JIFX) 21-4

23-27 August 2021

Experiments at the
Sea Land Air Military Research (SLAMR) Facility
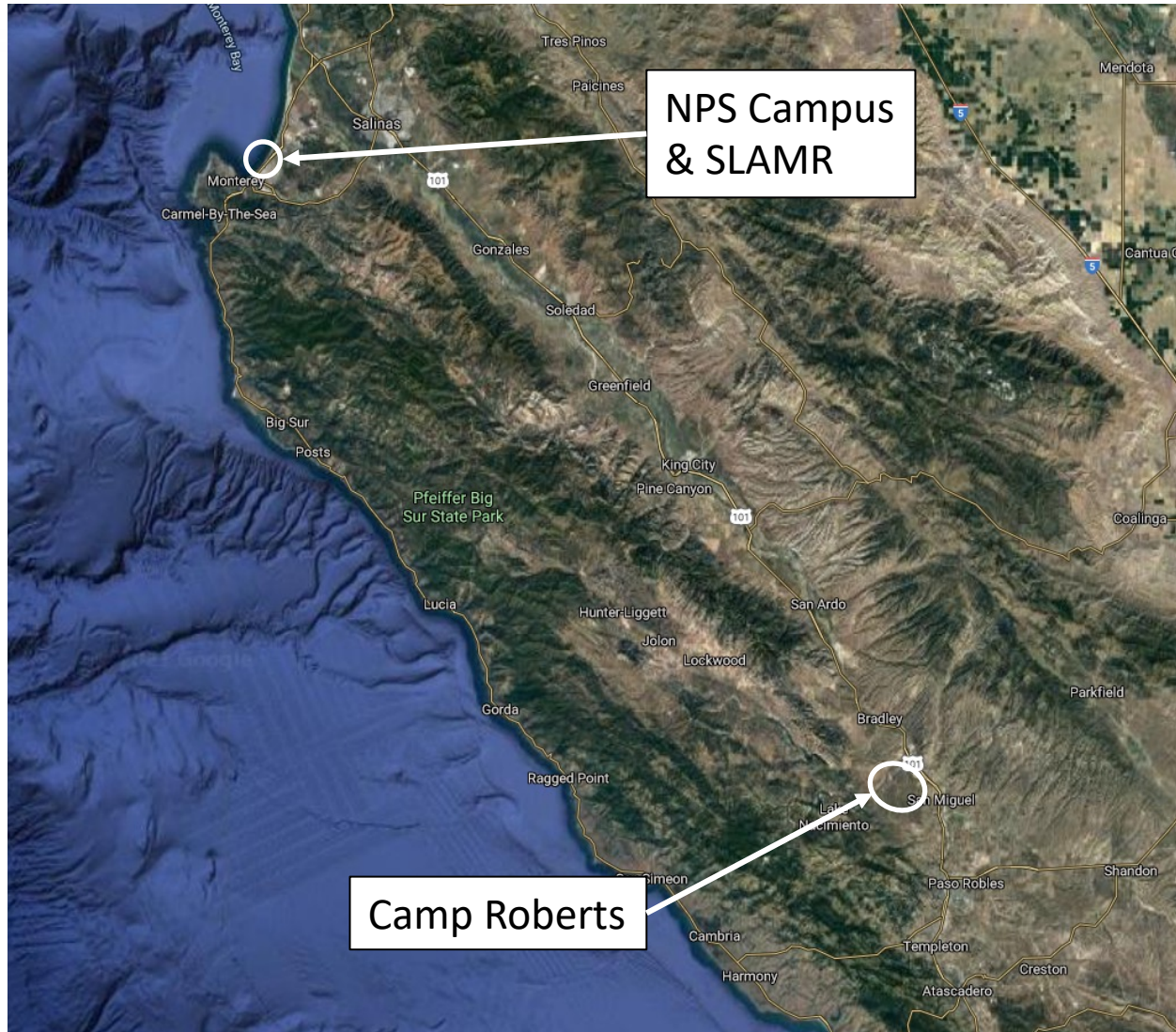
Prepared By:
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As of: 15 August 2021

JIFX Sites
Camp Roberts & SLAMR

NPS Campus & SLAMR

Camp Roberts

SLAMR Facility Location

1951 Del Monte Avenue Monterey, California 93943

NPS Main Campus

JIFX 21-4 Experiment Schedule for SLAMR August 2021

- 23 August
  - ➢ 0800-1200: Experimenters Registration and Set Up
  - ➢ 1200: Inbrief
  - ➢ 1400-1700: Experimentation
  - ➢ 1600: Daily Experimenters Outbrief

- 24-26 August
  - ➢ 0800: Daily Ops Brief
  - ➢ 0900-1700: Experimentation
  - ➢ 1600: Daily Experimenters' Outbrief

- 27 August
  - ➢ 0800-1200: Site Clearance

B-04: Rapid Expeditionary Security Surveillance System (RES3) Sensor in a Box (SiaB)

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)
NPS JIFX 21-4 | 23 – 27 August 2021| SLAMR
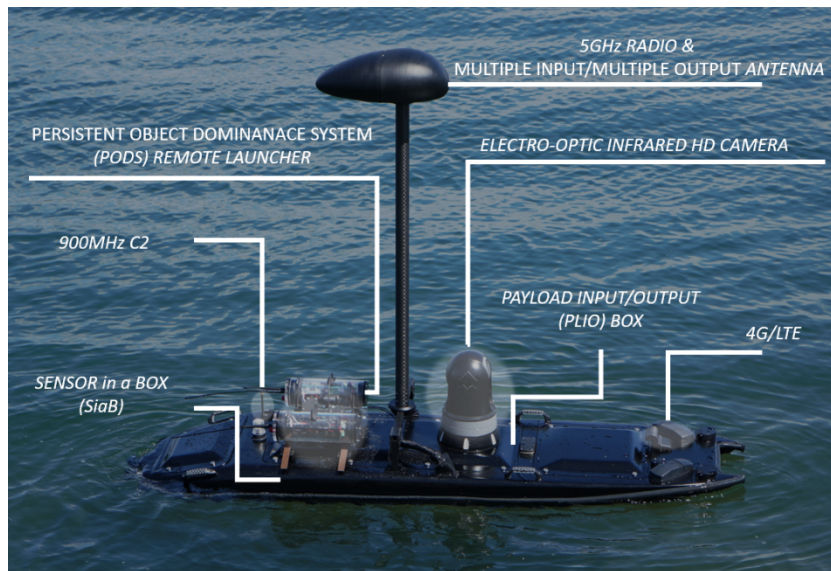
PROJECT INFORMATION

Organization Name:	Booz Allen Hamilton
Principal Investigator:	Alan Kolackovsky
Funding Source:	Internally
Research Area of Interest:	B) Unmanned Systems (UxS) Design, Deployment, Operation, Networking and Control
Capability Currently Used By:	US Military; Government First Responder Organizations (Federal, State, or Local); Private Industry

PROPOSED EXPERIMENT OVERVIEW

Booz Allen RES3 SiaB will be deployed aboard an 8ft man-portable, manually launched COTS USV conducting RF wideband (1MHz-6GHz) frequency scanning and detection along with WIFI Bluetooth sniffing to provide early warning and identification of maritime threats. USV onboard integrated EO/IR camera will provide visual confirmation and tracking of targets of interest. Potential threats will be tagged using the SiaB User Interface to support persistent surveillance and tracking. Employment of the USVs pre-programmed autonomous waypoint capability and low profile in the water will provide low probability of detection during transit operations, through minimal RF electromagnetic signature emissions. NIWC PAC TSP will provide additional surface radar and visual surveillance capabilities which will be integrated with SiaB C2/SA information for distribution using private 4G/LTE, MANET mesh and Kongsberg Maritime Broadband Radios to provide multi-spectral robust and resilient distribution of Command and Control (C2) / Situational Awareness for forces ashore and afloat.

SYSTEM DESCRIPTION

Booz Allen Hamilton, Inc. developed a platform agnostic patent pending capability addressing research priorities and additional areas of interest: Command, Control and Communications, Maritime Domain Awareness, Maritime Common Operating Picture (COP), MANET UxS Control, Persistent ISR, Remote Sensing. Our Rapid Expeditionary Security Surveillance System (RES3) Sensor-in-a-Box" (SiaB) TRL-7 capability participated in Naval Integration In Contested Environments/Advanced Naval Technology Exercise 2021 at Camp Lejeune. The SiaB is a modular multi-platform capability, configured for stand-alone, vehicular, fixed site, or aboard an all-weather, sea state 3 man-portable Unmanned Surface Vessel (USV). RES3 SiaB previously integrated with NIWC PAC Code 567 Trailer Sensor Platform (TSP) under our CRADA, extending TSPs radar and visual search Beyond Line Of Sight, Over The Horizon via RES3's 4G/LTE and MANET communications providing Command and Control, Situational Awareness and remote USV control of the USV through NIWC PACs Near Shore Unified Tactical Response tablets to ashore and afloat forces.
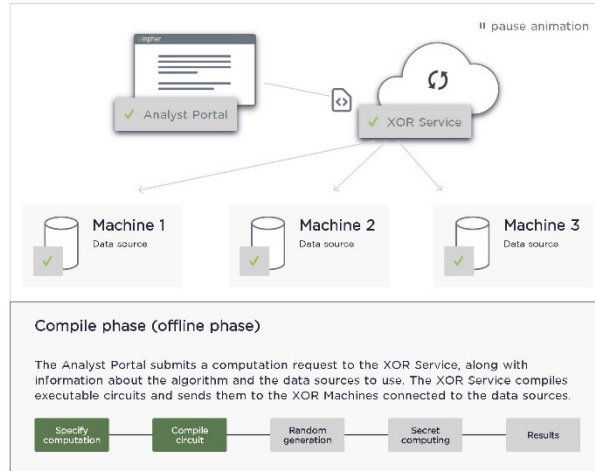
E-03: Privacy-Preserving Machine Learning

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)
NPS JIFX 21-4 | 23 – 27 August 2021| Camp Roberts & SLAMR

Components & Requirements

Product Architecture

Compile phase (offline phase)

The Analyst Portal submits a computation request to the XOR Service, along with information about the algorithm and the data sources to use. The XOR Service compiles executable circuits and sends them to the XOR Machines connected to the data sources.

PROJECT INFORMATION

Organization Name:	Inpher, Inc.
Principal Investigator:	Conor Moran
Funding Source:	Industry and VC.
Research Area of Interest:	E) Cyber, Cyber Security, Electronic Warfare
Capability Currently Used By:	Private Industry, International Non-Governmental Organizations (INGOs)

PROPOSED EXPERIMENT OVERVIEW

The experiment we would plan to conduct would be tackling a machine learning problem submitted by the organizers where they want to protect sensitive data inputs while keeping data local and only revealing the output.

SYSTEM DESCRIPTION

Inpher has pioneered cryptographic Secret Computing® technology for secure, privacy-preserving analytics and machine learning. Their platform allows for ML/AI model training across data silos, ensuring that the privacy and security of data is maintained while delivering the benefit of more precise models from that data.
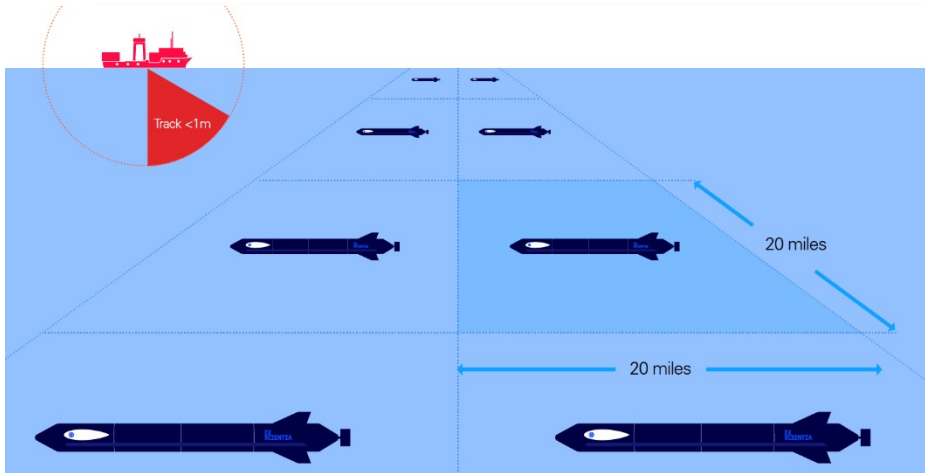
G-01: Maritime Situational Awareness

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)
NPS JIFX 21-4 | 23 – 27 August 2021| SLAMR

PROJECT INFORMATION

Organization Name:	Ex Scientia
Principal Investigator:	Matthew Gialich
Funding Source:	Internally
Research Area of Interest:	G) Situational Awareness
Capability Currently Used By:	US Military, Government First Responder Organizations ,Other Federal Entities, Private Industry, Nonprofit Organizations, Non-Governmental Organizations, Other

PROPOSED EXPERIMENT OVERVIEW

We would like to test a series of still station-keeping maneuvers. These would include the following:

- Surface Pogo with 2ft of above water for 10 minutes

- Station keeping for 1 hour at a depth of 2ft

- Station keeping for 1 hour at a depth of 10ft

SYSTEM DESCRIPTION

Ex Scientia would like to test the capability of our modified commercial off the shelf autopilot technology. This would include the integrations with our control laws, and the ability to maintain navigation at different depths.
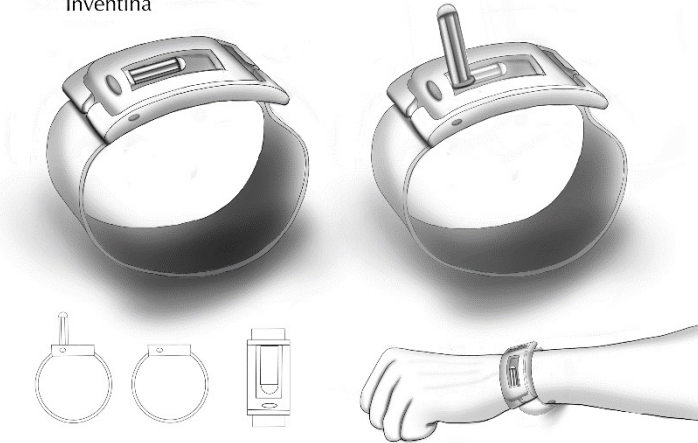
G-02: Sans Hands

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)
NPS JIFX 21-4 | 23 – 27 August 2021| Camp Roberts & SLAMR

Sans Hands
Inventina

PROJECT INFORMATION

Organization Name:	Inventina
Principal Investigator:	Tina Provost
Funding Source:	Internally
Research Area of Interest:	G) Situational Awareness
Capability Currently Used By:	The capabilities being explored are not yet fielded

PROPOSED EXPERIMENT OVERVIEW

I intend to test my two prototypes with individuals who use touch screen technology to execute tasks in their day to day. I would also like to target those who may have hand coverings or operate in environments that make the hands dirty or covered.

SYSTEM DESCRIPTION

Pilots, First Responders, HazMat teams, and other operators in the DoD are put at risk by the need to use touch screen devices in environments where skin exposure could result in injury or death. As such technology becomes more common, operators that must be continuously gloved are faced with disruptions in productivity, the need for ineffective work-arounds, or worst-case bodily harm. Inventina allows gloved users to work without disruptions by providing Sans Hands, a device that allows touch screen technology use, even when hands are covered or occupied.

G-03: Enabling Real-Time Artificial Intelligence & Machine Learning Through Mobile Connected High-Performance Compute at the Tactical Edge

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)

NPS JIFX 21-4 | 23 – 27 August 2021| NPS Campus // SLAMR

PROJECT INFORMATION

Organization Name:	TMGcore LLC
Principal Investigator:	Seamus Egan
Funding Source:	Internally
Research Area of Interest:	G) Situational Awareness
Capability Currently Used By:	Private Industry

PROPOSED EXPERIMENT OVERVIEW

At JIFX 21-3 TMGcore successfully tested the portability and mobility of our EdgeBox HPC platform. For 21-4 TMGcore is building a ISU 90 expeditionary containerized version of our HPC platform while materially increasing the compute deployed from our EdgeBox 4.5kW platform to our EdgeBox 30kW system. The system will be fully contained with its own generator, chiller, UPS, HPC compute platform and network connectivity. We will test for compute performance, operating and environmental temperatures and any related impacts, remote network management, and continual system health while deployed. If feasible we will test for a rapid redeployment scenario.

SYSTEM DESCRIPTION

The TMGcore OTTO platform has been designed from the ground up to provide groundbreaking improvements in equipment densities, ease of use, reliability, and resiliency. Offering substantial saving in both CapEx and OpEx, TMGcore's High Performance Compute platform provides the tools to simplify, centralize, and automate the administration of all aspects of the platform, while maintaining compatibility with existing commercially available computing, power distribution, and networking technologies. For JIFX 21-4 our system will deliver a mix of high-performance CPU and GPU architectures designed to support taxing AI and ML workloads enabling to ability to deliver real-time decisioning to the Operator at the Tactical Edge.

J-02: Craitor Portable, Ruggedized, Intelligent, 3D Printer

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)
NPS JIFX 21-4 | 23 – 27 August 2021| Camp Roberts & SLAMR

PROJECT INFORMATION

Organization Name:	Craitor, Inc.
Principal Investigator:	Eric Shnell
Funding Source:	Internally
Research Area of Interest:	J) Expeditionary Operations
Capability Currently Used By:	US Military; Government First Responder Organizations (Federal, State, or Local)

PROPOSED EXPERIMENT OVERVIEW

The primary goal of this experiment it to engage in contact testing in a realistic transportation conditions and field environmental conditions to refine the expeditionary nature of the system. This experiment also allows for the opportunity to test field manufactured parts (built on Craitor systems) on deployed equipment. The secondary objectives include model generation based on environmental data collected during the demonstration to improve the machine learning models aboard the 3D printer, along with information gathering from the present concerned parties. The core reason for Craitor's participation within our CRADA with the USMC is to refine expeditionary printing technology to the end state user's needs, namely, our service members. By receiving feedback at these demonstrations, Craitor will be able to refine the system further for more use-cases.

SYSTEM DESCRIPTION

Additive manufacturing/3D Printing, can/will revolutionize the DoD Supply-chain. While an immense selection of commercial off the shelf 3D printers exist, such printers are limited to desktop or laboratory use, and lack the ruggedization and hardening required for reliable expeditionary use and distributed operations. It is with this in mind that a CRADA was formed between the USMC, NIWC Pacific, and Craitor to enable the development of the first truly expeditionary 3D printing systems that meets the needs of the military in the field, by designing it in the field with military users.

Craitor is capable of being used in harsh environments and can print all forms of FDM polymer filament, including advanced materials like composites, nylon, polycarbonate, flexibles, and even PEEK and ULTEM. Craitor is resistant to water, dust, extreme temperatures, temperature cycling, humidity, and can take abuse like drops, shocks, and vibration without taking damage.

M-02: Emotion AI to Measure, Predict, and Shape Decision Making

Naval Postgraduate School Joint Interagency Field Experimentation (JIFX)
NPS JIFX 21-4 | 23 – 27 August 2021| Virtual Accessibility at Camp Roberts & SLAMR

PROJECT INFORMATION

Organization Name:	Cognovi Labs
Principal Investigator:	Zach Levy
Funding Source:	Internal, Federal (SBIR/STTR), and Venture funding
Research Area of Interest:	M) Precision strike, Non-Lethal Weapons, Information Operations
Capability Currently Used By:	US Military; Government First Responder Organizations (Federal, State, or Local); Other Federal Entities (Non-Military and Non–First Responder); Private Industry

PROPOSED EXPERIMENT OVERVIEW

Within the provided exercise and operational environment, we seek to use our Emotion AI technology to measure, predict, and shape human decision making and resulting behaviors. We will build a tailored use case and dashboard to ensure both proper demonstration and measurement of our experiment within the provided operational environment. To achieve optimal results, Cognovi will need access to SMEs within the represented organizations in order to focus the technology for maximum effect. We need to know the specific problems the client is trying to address, and which data sources would be most likely to provide an effective point of reference. Performance can be measured anecdotally, based on running the system vs known outcomes, or statistically based on correlations or predictive power to specific KPIs.

SYSTEM DESCRIPTION

Over 50 years of research in behavioral psychology tells us that as much as 70-90% of decisions are made based on emotions. Cognovi's advanced psychological Artificial Intelligence (AI) technology, called Emotion AI, is situated at the intersection of behavioral psychology and machine learning. Cognovi Emotion AI measures & interprets the emotional signatures extracted from textual/transcribable data, at scale & in real-time. This patented technology provides a unique advantage in the tasks of isolating narratives in large text datasets, measuring the emotional responses by different individuals/groups, predicting their behavior, & shaping outcomes.
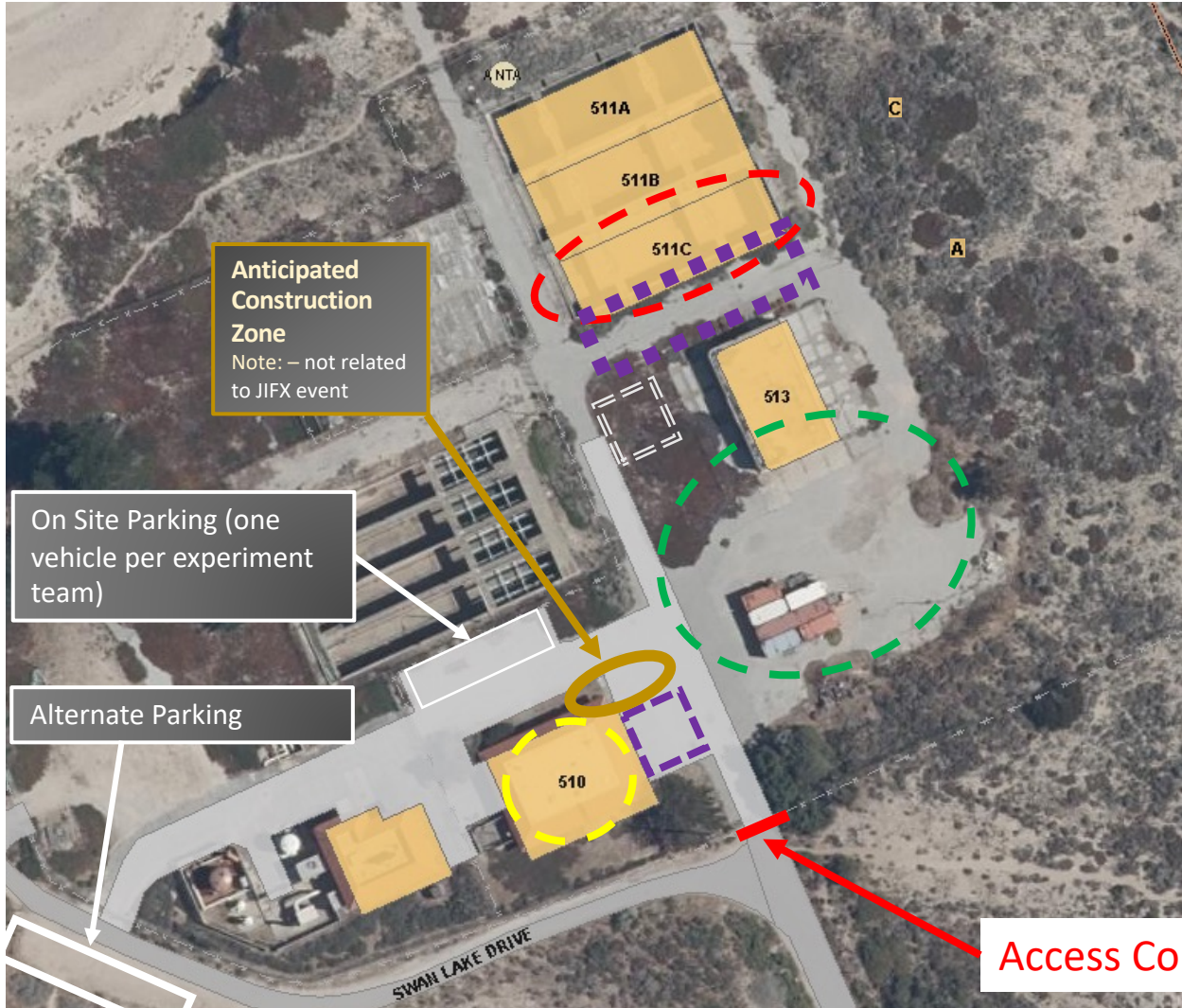
Where It's Happening On Site

AE1
B-04, RES3 SiaB, *BAH*
G-01, MSA, *Ex Scentia*

Aquatic Environment 1

Adjacent to Bldg 513
G-02, Sans Hands, *Inventina*
Wed & Thu
E-02, PPML, *Inpher*
J-02, 3D Printing, *Craitor*

Distributed
COPERS, *AFRL + NPS*
G-03, HPC, *TMGCore*
M-02, Emotion AI, *Cognovi*

JIFX at SLAMR Site Plan

JIFX Ops and Support

JIFX Registration & Site Ops

Temp Latrine & Hand Wash Station

JIFX Experiment Support Site

510 Alt Site for Virtual Briefings with Camp Roberts Experimenters

513 Garage

Experimenters

511C — *BAH*: RES3 Sensor in a Box
Ex Scientia: Maritime Situational Awareness

513 Asphalt Pad — *Inventina*: Sans Hands
inpher: Privacy-Preserving Machine Learning
TMGCore: Mobile, High-Performance Computing
Craitor: Portable, Ruggedized, Intelligent, 3D Printer

Anticipated Construction Zone
Note: – not related to JIFX event

On Site Parking (one vehicle per experiment team)

Alternate Parking

511A

511B

511C

513

510

Access Control

SWAN LAKE DRIVE

JIFX at SLAMR Site Plan

Legend:
- 🟥 Power Outlet
- 🟩 TOC (Tent)
- 🟦 Generator
- 🟧 Porta-John
- 🟨 Platform & Alt Launch
- ⬜ Stairs

Launch Area

511C

511B

511A

513

A NTA

SLAMR Site Orientation

Entry

Aquatic Environment (AQE)

To NPS

SLAMR Facility Location
1951 Del Monte Avenue Monterey, California 93943

Directions To the SLAMR Facility

- Most direct approach from HWY 1 is to exit on Casa Verde Way and turn to the West (towards the water) towards Del Monte Avenue, then left onto Del Monte Avenue at the light.

- Facility is only approachable from the North on Del Monte Avenue

- It will be a right turn (road 1951) as you are opposite Del Monte Lake (on the left) just past the Naval Postgraduate School facility sign on the left.

- Immediately after turn there is a STOP sign for the Monterey Peninsula Recreation Trail – Please exercise caution as pedestrian/bike traffic can be inattentive to vehicles.

- After STOP continue straight and the SLAMR gate will be in front of you. Proceed in and park in designated space. If no space available park in alternate lot as directed by JIFX site representative. Do not block the gate, driveway through site or any doors.

- If gate locked, contact your JIFX POC for access.