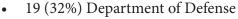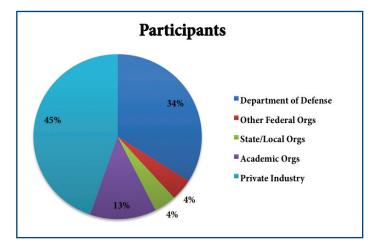# JIFX 15-3 Quicklook

By the Numbers

The JIFX 15-3 (11-15 May 2015) event was held at the Naval Postgraduate School's Field Laboratory at McMillan Airfield, Camp Roberts, California. The event was attended by 162 registered participants from 59 unique organizations.

- 19 (32%) Department of Defense
- 4 (7%) Other Federal Organizations
- 4 (7%) State/Local Organizations
- 7 (12%) Academic Organizations
- 25 (42%) Private Industry
- 1 (>1%) Foreign Government

Participants

- Department of Defense — 34%
- Other Federal Orgs — 4%
- State/Local Orgs — 4%
- Academic Orgs — 13%
- Private Industry — 45%

The end users/evaluators were represented by military personnel from USASOC, I MEF, and NSW Command.

http://my.nps.edu/web/fx

Experimentation

Experiments at JIFX 15-3 once again spanned a wide range of technologies and mission sets. Unmanned systems experiments included the use of UAVs to geo-locate GPS interference and navigate in GPS-denied environments; UAVs to rapidly map communication signal strength in difficult terrain; and the design and deployment of multi-UAV, autonomous swarms (see page 3). Several social media and analytic experiments explored the potential for the use of big data analytics at the tactical edge and in bandwidth limited environments, while others experimented with technology to improve mesh networking, wide-area hand-free voice communication and connectivity between voice, data and video networks. A third line of intense experimentation looked at small, deployable systems to support Blue-Force Tracking at the individual level, man-portable water purification and tactically deployable Traumatic Brain Injury diagnosis. Most of these technologies are in the early stage of development and feedback from End Users Evaluators, Government Stakeholders and Vulnerability Assessment Teams will allow industry, academia and government to define better requirements and more rapidly build effective solutions.

Experiment Evaluations

The end users/evaluators were represented by military personnel from US Army Special Operations Command (USASOC), US Marine Corps 1st Marine Expeditionary Force (1 MEF), and US Naval Special Warfare (NSW) Command. These evaluators, along with evaluations from the COCOM stakeholders, produced 93 individual evaluations currently with additional ones being finalized:

- 26 Stakeholder Evaluations
- 34 Uniformed End-user Evaluations
- 33 Naval Postgraduate School Evaluations

Next Event

10-14 Aug 2015 at Camp Roberts, CA

Participation by Organization

CiscoTacticalOperations
JointVulnerabilityAssessmentBranch
StanfordUniversity RovingBlue
SPAWARSystemsCenterPacific
TheAerospaceCorporation Arcturus LockheedMartin
USCENTCOM USSOCOM
GeorgiaTechResearchInstitute NavalSpecialWarfare
SAPNationalSecurityServices CarnegieMellonUniversity MiddleburyInstituteofInternationalStudies
SignatureScience SASFederal NASA
NavalPostgraduateSchool USMarineCorps
HarrisCorporation
USNavy MicrowaveMonolithics
SacramentoCountyOES OrionLabs
NORAD-USNORTHCOM CodanRadioCommunications

http://my.nps.edu/web/fx

The Naval Postgraduate School's Advanced Robotics Systems Engineering Laboratory (ARSENL) was able to successfully launch, fly, and land 20 UAVs autonomously, deployed in two "sub-swarms" (10 UAVs each) and "operated" using ARSENL-developed swarm operator interfaces. The UAVs were able to perform basic leader-following cooperative behaviors, exchanging information amongst themselves via wireless links. This shattered the previous best (12) and ARSENL thinks it is the largest swarm of autonomous fixed wing UAVs flown outside of laboratory to date anywhere in the world. With one human on the loop and no human control of the UAVs ARSENL may have another first, the entire team is less than the number of platforms flown so ARSENL is finally seeing the always claimed but never achieved reduction in manpower associated with UAVs!

On Thursday of JIFX weeks many of the experimenters, along with our NPS team and End User Evaluators participated in a scenario-based experiment to explore the technologies in a more operational setting and to facilitate the integration of and data-sharing between the various technologies. In all, over fifteen different technologies were integrated into a scenario supporting a response to a simulated hostage-event. Information available from in-place sensors and rapidly deployed systems was (mostly) successfully integrated with social media and big data analytics and overhead surveillance to provide better situational awareness both the "On-Scene Commander" and the "Headquarters." Several techniques (with varying success) were used to bridge multiple, disparate voice, data and video networks to facilitate better communication between the various participating groups. This type of experimentation highlights the need and potential of "designing-in" interoperability and using openstandard architectures. It also allows for government stakeholder to better envision what individual technologies might become part of a larger end-to-end solution.

UAV Defense Innovation Initiative chart (top of next page)

Experiments at JIFX span a wide range of technologies and Stakeholder interest Areas. Experiment proposals are submitted to NPS in response to the quarterly Call For Experiments RFI available on our website. At JIFX 15-3, as in most JIFX events, many of the selected experiments also relate to key areas of interest for the Department of Defense such Unmanned Aerial Systems, Defense Innovation Initiative or were assessed for network and communication vulnerabilities.
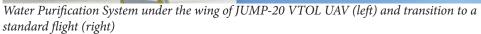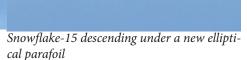
http://my.nps.edu/web/fx

Experiment Number	Experiment Title	UAS Related	Defense Innovation Inititave	Assessed for Cyber Vulnerabilities
A-1	Humanitarian Emergency Response Organization Tactical Operations Center (HERO-TOC) joint unmanned autonomous system integration/UX Fleet Management combined tabletop planning/field exercise – Strategic Mobility 21	YES		
A-2	Analytics to detect underwater mines and IEDs – SAS Federal LLC		YES	
A-5	Unmanned Aerial Vehicles for Studying Atmospheric Physics – Naval Postgraduate School	YES		
B-1	RF Combat Identification Patch (RF Patch) – Microwave Monolithics	YES		YES
B-2	Solar-powered Line-of-Sight Rapid Response point-to-point network – Cisco Systems, Tactical Operations		YES	YES
B-3	Agile Experimentation for Assessing Open-Source UAV Technologies – Naval Postgraduate School	YES	YES	
B-4	The SAS Intelligence Framework Helps Keep your Networks Secure – SAS Federal LLC		YES	YES
B-5	Carrier Agnostic Over-The-Top Group Communications Wearables – Orion			YES
B-6	JAGER: UAVs to Locate GPS Jammers – Stanford University	YES		
B-7	Austere Satellite and land wireless based voice, video and data connectivity – Naval Postgraduate School and Inmarsat			
B-8	Non-Line of Sight Communications – Lockheed Martin, Harris Corporation & Codan Radio Communications			
B-9	Analytical and Visualization Platform for Multi-Source Intelligence to the Tactical Edge – SAP National Security Services (NS2)		YES	
B-10	Innovative Approach for Local Curation of Multi-INT Intelligence Products – SAP National Security Services (NS2)		YES	
B-12	Digital Communications/Social Media Analysis: Down Range Capability - Zuess		YES	YES
C-1	Modeling and Measurement for Rapidly-Deployed Multi-Transmitter Networks–Carnegie Mellon University	YES	YES	
E-1	Roving Blue Lightweight Water Purification System – Roving Blue, Inc.			YES
K-2	Rapid virus testing in "field" or deployed conditions – Signature Science			
O-2	Enhancing Detached Units Mobility via Aerial Resupply – Naval Postgraduate School	YES	YES	
O-4	Field Assessment of Brain Health – San Jose State University, NASA Ames			

Water Purification System under the wing of JUMP-20 VTOL UAV (left) and transition to a standard flight (right)

Snowflake-15 descending under a new elliptical parafoil

http://my.nps.edu/web/fx