



2010 ONR Naval S&T Partnership Conference

Next Generation Technologies for Today's Warfighter

Expeditionary and Irregular
Warfare

Mr. Ashley G. Johnson



O F F I C E O F N A V A L R E S E A R C H

Distributed Operations

- “Highly distributed global operations over the past several years...make manifest the importance of small teams conducting missions uniquely tailored to local conditions.”
 - The advantages of better tactical discretion, improved operational agility and reach, decentralized decision-making, and enhanced force synchronization make distributed operations an attractive strategy in fighting irregular wars.
 - Distributed operations are an effective response as part of a complete strategy for counterinsurgency and irregular warfare operations.

Programs featured at this conference include:

- Small Unit Mobility Enhancement Technologies
- Integrated Day/Night Sight
- Mental Resilience/ Cognitive Ability
- ISR Enterprise Experimentation (Green Devil II)
- Software Reconfigurable Radio
- Operational Adaptation

Other programs:

- Human Social Cultural Behavioral Sciences
- Enhanced Physical Readiness
- Precision Urban Mortar Attack
- Gunslinger for Advanced Convoy Security (GunPACS)
- Expeditionary Communications/Communications for the Disadvantaged User
- Logistics Transport Concepts in Support of Small Distributed Combat Units

Maneuver Thrust Manager



Mr. Jeff Bradel

• Small Unit Mobility Enhancement Technologies

- Low-cost information-rich perception systems are needed to operate unmanned ground platforms in complex, high clutter environments
 - Terrain classification & object recognition using multi-spectral, texture, and spatial cues
 - COTS visible spectrum cameras
- Cognitive architectures needed to incorporate commander's intent, rules of engagement and TTPs into mission execution
 - Goal-based architecture
 - Coupled with perception system to provide context-based reasoning
- Research Opportunities:
 - Improved pattern recognition & classification
 - Adaptive, affordable perception on a computationally limited platform
 - Absolute localization in sky denied environments



Fires Thrust Manager



Mr. Dan Simons

- Integrated Day/Night Sight

- IDNST will deliver lightweight compact weapons sights
 - Integrates Vis-NIR-SWIR-LWIR optics in single sight systems
 - Development will result in 2lb. Individual weapons sight and 5 lb. crew served weapons sight
 - Low power demands reduces requirements for onboard batteries
- Warfighters will benefit from advances in infrared sensors
 - Day and night sensing enhancements enable improved target detection
 - Enables threat detection through smokes and aerosols, in foliage, behind glass, and in total darkness
 - Ability to seek, acquire, track, observe, and engage targets to weapons' max effective ranges, under all light levels
- Research Opportunities:
 - Reduce focal plane array dark current to improve imaging in lower light conditions
 - Develop moving target and image fusion stabilization algorithms with reduced computing requirements
 - Create small size optical systems having superior imaging qualities



Integrated Day-Night Sight Technology (IDNST)



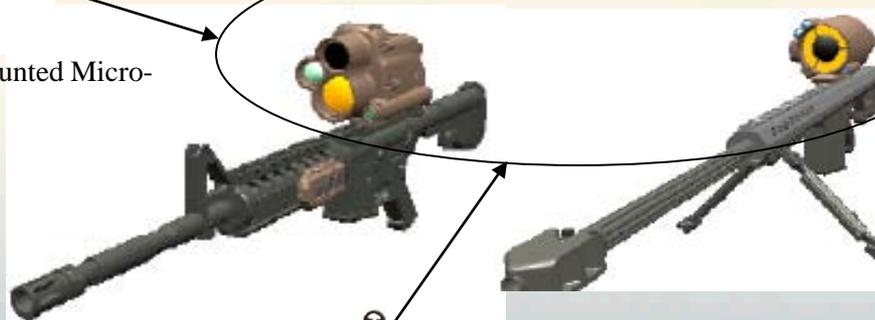
- Eye Safe Laser Rangefinder
- Visible & IR Aiming Lights
- IR Illuminator
- Digital Magnetic Compass
- 1.2 lbs, 2 DL123 batteries



Trijicon
AN/PVQ-31
Rifle Combat Optic
1 lb, no batteries



Insight
AN/PVS-24
Image Intensified Night Sight
1.8 lbs, 1 AA or DL 123 battery



Insight
AN/PSQ-18QA
M203 Grenade Launcher
Day-Night Sight
1.1 lb, 1 AA battery



Raytheon, DRS, BAe
AN/PAS-13
Thermal Weapon Sight II
Uncooled LWIR
MTWS is 2.9 lbs, 6 AA batteries
HTWS is 3.9 lbs, 6 AA batteries



Dr. Roy Stripling

• Mental Resilience/Cognitive Agility

- Warfighters must conduct operations in extreme environments, while sleep deprived and physically depleted, in and amongst locals who may switch allegiances daily.
 - Acute stress can cloud judgment, negatively impact combat performance, and lead to chronic stress
 - Chronic stress can lead to debilitating anxiety, depression, and long lasting emotional disorders
- Warfighters must achieve mental control of fear and stress to enable heightened tactical proficiency in combat.
- Greater mental control can help prevent mental disorders later.
- Research Opportunities:
 - Understanding the nature of, and developing methods for, building stress resistance, mental resilience, and cognitive flexibility
 - Scientifically valid behavioral stress coping strategies



Warfighter as a System

Tech Investment Area:

Expertise Development

Perceive → Think → Act

Knowledge, Skills, Abilities

Complexity of Landscape,
OPFOR Covertness,
Socio-cultural/Language Barriers,...

Develop advanced training technologies and methods that enable rapid skill acquisition and development to the expert level in both individual and team tactics, techniques, and procedures for conventional and asymmetric warfare.

Tech Investment Area:

Mental Resilience & Cognitive Agility

Perceive → Think → Act

Adaptiveness, Emotional Fortitude

Info Overload, Time Pressure
Rules of Engagement,
Moral and Ethical Challenges

Improve the cognitive agility, flexibility, and capacity of EWs by making them mentally tough, resilient to stress, and well adapted to chaotic, irregular environments

Tech Investment Area:

Enhanced Physical Readiness

Perceive → Think → Act

Nutrition, Physiology, Strength,
Endurance, Agility

Heat, Cold, Altitude, Terrain,
Humidity, Mission Duration...

Deliver strategies that optimize physical performance and injury resistance in Expeditionary Warfighters (EWs) deployed to austere environments of all types for extended periods of time.



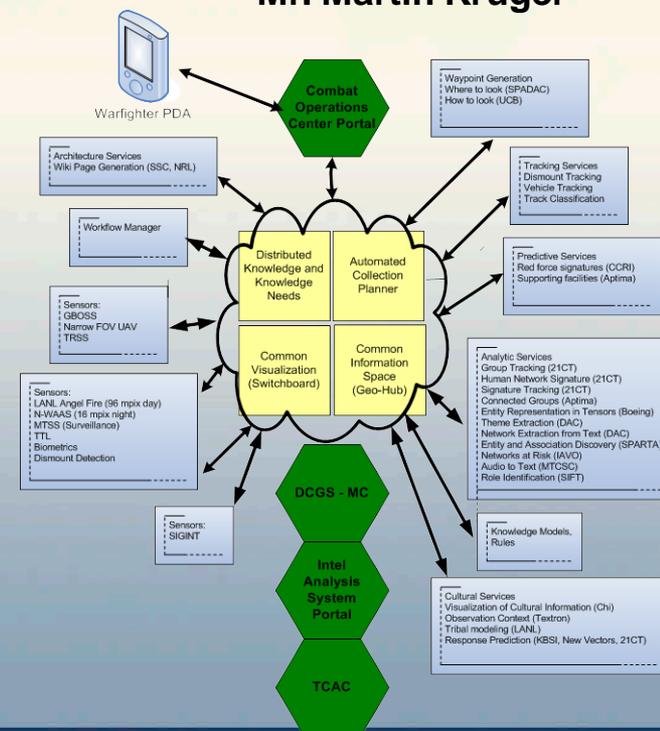
Expeditionary and Irregular Warfare

- **ISR Enterprise Experimentation (Green Devil II)**
 - 50 S&T projects integrated with 7 MC programs of record
 - Free play exercise, 250+ participants
 - Integration of PISR, Analysis and ISR to C2
 - Related atomic observables to behaviors
 - Integrated experimentation enables the visualization of new capabilities
 - The full capability of sensors and analytics must remain aligned to support the warfighter
 - Stovepipes are the enemy of acted upon intelligence. Integrated demonstrations are the enemy of stovepipes.
 - Research Opportunities:
 - Tactical sensors
 - Inferring the intent of low level entities
 - Information dissemination

ISR Thrust Manager



Mr. Martin Kruger



- **Software Reprogrammable Payload**

- Multi-function RF Package

- Communications relay with router and interference avoidance; RF sensing (passive and active); electronic attack
 - Reprogrammable “on-the-fly”
 - Mission-adaptable in a single package

- Government-owned software radio architecture

- Compatible with JTRS waveform library
 - Software development kit
 - Iterative architecture refinement between Government and Industry

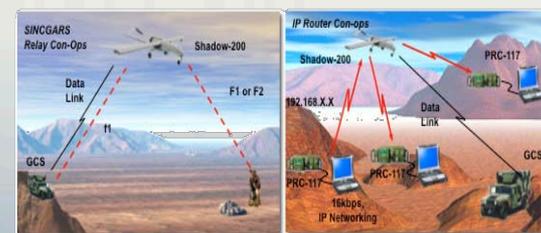
- Research Opportunities:

- New software waveforms: omni and directional
 - Broadband apertures
 - Broadband high dynamic range power electronics

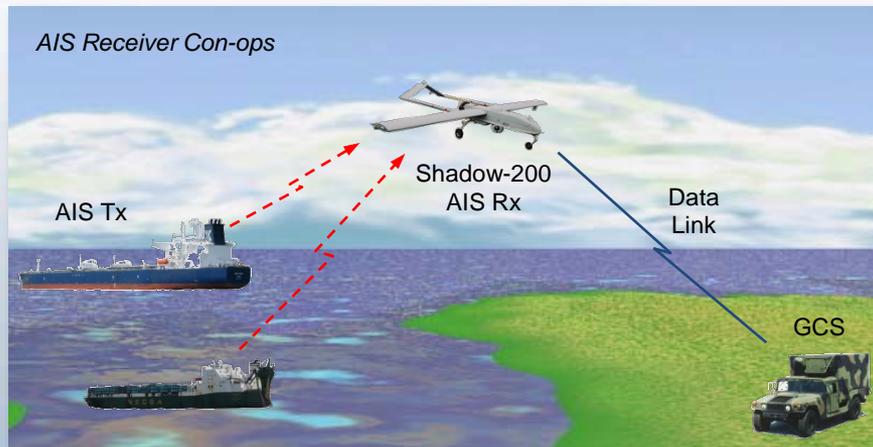
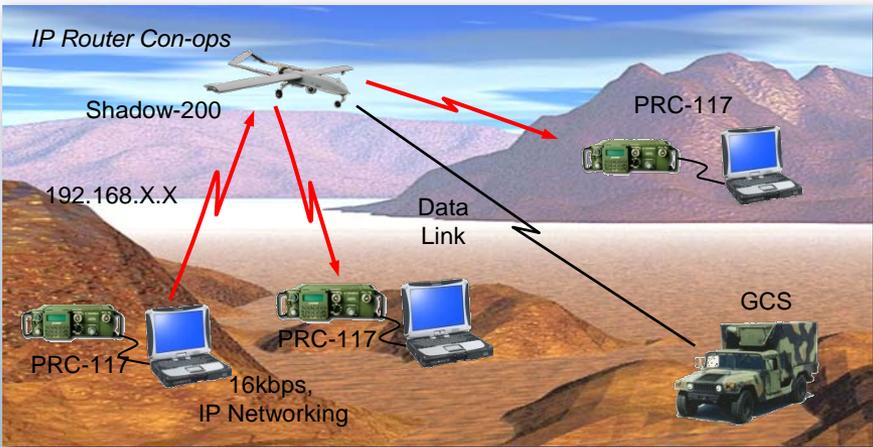
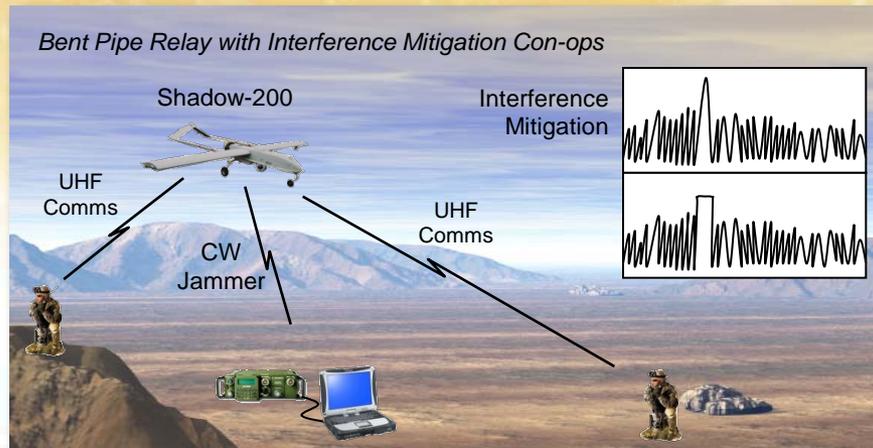
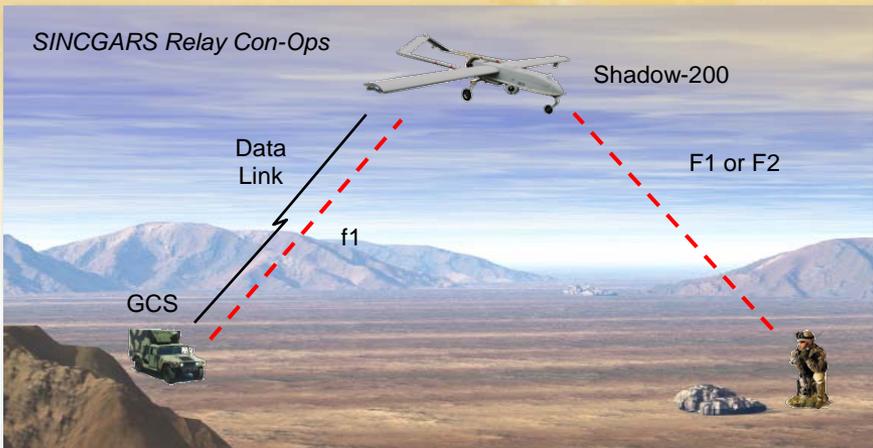
C4 Thrust Manager



Mr. John Moniz



SRP Applications



• Operational Adaptation

- Integrated sensor data to produce actionable information for warfighters
 - Includes demanding operational environment consistent with non-traditional challenges Warfighters confront.
 - Operate within relevant scenarios & rigorous evaluation criteria
- Demo a technology-enabled man-machine team
 - Free operators from tedious bookkeeping (sensing, memory, fast processing)
 - Enable operators to do what they do best (discriminate, discern & intuitively act)
 - *Endstate* – expand opportunities to assess hostile intent, anticipate actions & seize advantage
- Test & Demonstration Focus:
 - Warfighter input – up-front, early & continuous
 - Operationally relevant testing ,setting, scenario and assessment
 - Turn-key operation with correct blend of scientific rigor and warfighter input

Test & Demonstration Manager



Mr. John Garvin





Other Program Officers You Should Meet

Name	Program	ONR Code	Room
Maj Billy Short, USMC	Force Protection	30	Arlington
Dr. Ivy Estabrooke	Human, Social, Cultural, Behavioral Sciences	30	Arlington
Ms. Lisa Albuquerque	Expeditionary Dog Programs	30	Arlington
Dr. Dan Prono, CAPT Mark Stoffel, USNR	Sciences Addressing Asymmetric Explosive Threats (SAAET)	30	Arlington
Mr. Jim McMains	Combating Terrorism	30	Arlington
Mr. Cliff Anderson	Expeditionary Logistics	30	EMW Info Booth
Mr. John Keenan	Joint Non-Lethal Weapons Directorate	JNLWD/30	Exhibit Hall
Dr. Roy Stripling	Marksmanship Training	30	Exhibit Hall

Questions?