

DHS SCIENCE AND TECHNOLOGY

First Responders Group
Dr. David J. Alexander
Chief Geospatial Scientist



**Homeland
Security**

Science and Technology

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Presentation to:

National Geospatial Advisory Committee

Sheperdstown, WV

FRG Mission

Strengthen first responder safety and effectiveness

FRG is unique in supporting research for all first responder disciplines



**3.3 Million First Responders,
70,000 Organizations,
\$144B in Annual Operating Costs**

FRG Impact Themes

Protected, Connected and Fully Aware



**Making first responders safer
and more effective**

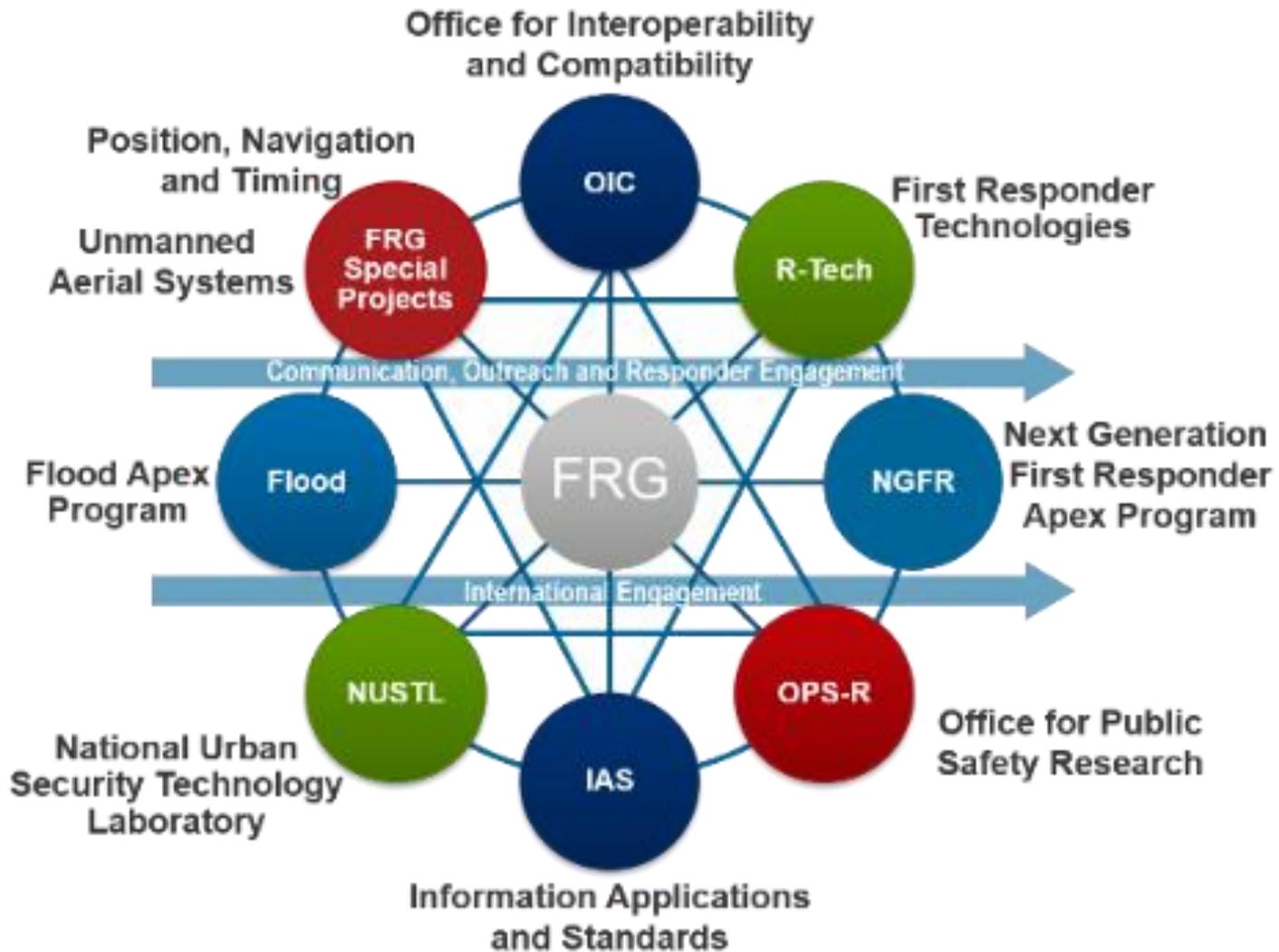


**Powering industry and
spurring innovation**



**Securing communities
across America**

FRG's Makeup: Divisions, Programs and Special Projects



Types of Stakeholders

Technology
Users

DHS
Components

Innovators

Standards
Bodies

Professional
Associations

Private Sector
CEOs, COOs

Training Officers
and Organizations

Regulators

International
Partners

Emergency
Managers

Procurement
Officials

Manufactures

Industry

NGOs

Grants Issuers

U.S. Public Safety Community

United States: 326+ Million people served daily by *first responders*
5.5 million responders, 70,000 organizations, 240 million 9-1-1 calls per year



1,100,000
State/ Local Law
Enforcement Officers



6,000
Emergency
Operations Centers



250,000
911 Operators



850,000
EMS Professionals



1,100,000
Firefighters



2,200,000
Security Officers

FRG Outcomes

Commercial
Products Sold by
Industry

Knowledge
Products

Standards

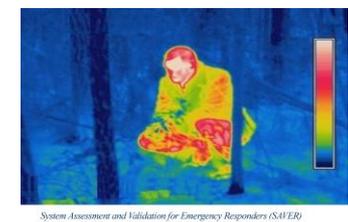
Government-off-the-
Shelf Software

Training and Testing

Field Experiment
After Action Reports
and Technical
Assessments

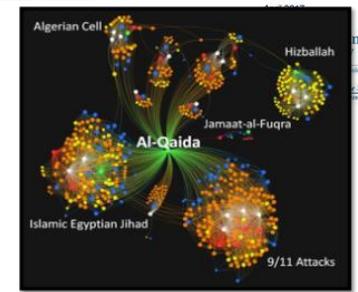
FRG – New and Emerging Research & Development

- Internet of Things – Sensors and Alerting
- Smarter Remote Sensing and Situational Awareness
- High Performance Computing and Artificial Intelligence
- Behavioral and Risk Analysis for enhanced decision-making
- Advanced manufacturing and Wearable Technology
- Resilient Communications and Interoperability



System Assessment and Validation for Emergency Responders (SAVER)

Handheld The Law Enforcement Assessment R



FRG Video Spotlights

Finding Individuals for Disaster and Emergency Response (FINDER) tool



Precision Outdoor and Indoor Navigation and Tracking for Emergency Responders (POINTER)

Enhanced Dynamic Geo-Social Environment (EDGE) Virtual Training tool



Flood Apex – Rethinking America's costliest disaster

Datacasting – Increasing public safety communications resiliency



Backup Slides

Commercially Transitioned Technologies Examples

Project Name	Transition Partner / Manufacturer	Purchase Information / Support
Fire Ground Compass®	Halcyon Products, Inc.	http://www.halcyonproducts.com/fgc/
Board Armor™	Board Armor®	http://www.board-armor.com/
Low Light TPZ Camera	Industrial Video and Control Co.	http://www.ivcco.com/
Flex-Tuff HS Glove (Improved Structure Firefighting Glove)	Shelby Specialty Gloves	http://www.shelbyglove.com/flextuff/flex-tuff-hs.html
First Responder Support Tools (FiRST) App	Applied Research Associates, Inc.	https://www.firstsupporttools.com/
Pipe Bomb Cutter	RE2, Inc.	http://www.resquared.com/products/eod-tools/
Virtual Training: Enhanced Dynamic Geo-Social Environment (EDGE)	California Fire & Rescue Training Authority	http://www.fireandrescuetraining.ca.gov/
Radio Internet-Protocol Communications Module (RIC-M)	Christine Wireless, Inc. Avtec, Inc.	http://christinewireless.com/purchase/ http://www.avtecinc.com/scout/integration/ric-m
Wildland Firefighter Advanced Personal Protective System (WLFF APPS)	Workrite Uniform Company Crew Boss PPE	http://www.workrite.com/ https://crewbossppe.com/
High Definition (HD) Video Encoder (HD-S600)	Digital Barriers	https://www.digitalbarriers.com/tvi-encoders
Finding Individuals for Disaster and Emergency Response (FINDER)	R4, Inc. SpecOps Group Inc.	http://www.r4-inc.com http://www.specops-group.com/
Prepaid Card Reader	ERAD Group	https://www.erad-group.com/erad-prepaid
ViSi Mobile® System (Wireless Patient Vital Signs Monitoring)	Sotera Wireless, Inc.	http://www.soterawireless.com/

FY16 Transitioned Prototypes



Wildland Firefighter Advanced PPE (WLFF APPS): National Fire Protection Association-certified suite of personal protective equipment, WLFF APPS reduces wildland firefighter heat stress injuries. The garment system improves radiant thermal protection and has increased form, fit, and function



Mechanical Shooter (formerly Virtual Shooter): Developed via the Small Business Innovation Research Program in partnership with the U.S. Immigration and Customs Enforcement Office of Firearms and Tactical Programs, the Mechanical Shooter mimics exact movements of a human shooting a handgun in order to reduce injuries and prevent strain from repetitive firing during firearm testing.



NEON-P® (formerly Firefighter Accountability and Proximity): The technology leverages existing time-of-flight tracking to allow first responders to quickly hone in on a colleague in distress.



X-Ray Scanning Rover (XSR): Improvised explosive device (IED) threats pose great danger to the bomb technicians charged with disarming them. To counter this threat, the XSR was developed as a diagnostic tool allowing responders to quickly determine whether suspicious objects contain explosives without putting their own (and bystanders') lives at risk.

FY16 Transitioned Prototypes (continued)



Power Hawk: REDOPS has been working with Federal, state, and local bomb technicians to understand and validate the Power Hawk, which has proved to be extremely reliable from a characterization perspective. As a result, the FBI has accepted the use of the Power Hawk to defeat pipe bombs and will begin training bomb technicians across the country. On September 18, when pipe bombs were discovered in Elizabeth, NJ, the NJ State Police Bomb Squad used the Power Hawk to mechanically defeat the devices.



Laminated Window Portal Charge: The window portal charge is a robotically delivered means of opening a hole into laminated vehicle windows. The tool was developed and documented for bomb squad use.



Special Purpose Low Impact Rupture System (SPLITR): During the development phase, the SPLITR was used operationally in several locations in the United States. Based on successful use, the SPLITR was formally adopted into the training curriculum at the FBI Hazardous Devices School into their regular bomb technician certification and recertification course to train current and future bomb techs.



Nitro-Turkey: RAPID developed a new more effective method for defeating traditional pipe bomb threats. RAPID identified a new projectile based round to more reliably defeat pipe threats. The research effort determined that the properties of this shell are ideally suited to reliably render safe pipe bombs. The Nitro-Turkey replaces a more complicated and less reliable procedure. The shell, known as the Nitro-Turkey, was also integrated in the FBI HDS training curriculum in 2016.

Knowledge Products

- Response and Defeat Operations Support (REDOPS)
 - Special Technicians Bulletins and Assessment Reports
- SAVER – over 1,000 reports published
- P25 Compliance Assessment Program (CAP) - over a dozen resources
- 2016 First Responder Electronic Jamming Exercise
 - DHS-FCC Joint Jammer Infographic
 - DHS-FCC Joint Jammer Bulletin for First Responders and Public Safety
 - 2016 After Action Report
- Video Quality in Public Safety (VQiPS)
 - Policy Considerations for the Use of Video in Public Safety
 - Digital Video Quality Handbook
- LTE/Land Mobile Radio (LMR) Integration
 - A Case Study of Interference Between Public Safety LTE and Public Safety 700MHz Land Mobile Radio
- Project One Pagers
- 100-Second Videos
- Snapshots, Articles, Webinars, Round Tables

Standards Focus Areas

- National Information Exchange Model (NIEM) Emergency Management (EM) Domain
- Identity, Credential and Assess Management (ICAM)
- P25 Land Mobile Radio
- Emergency Data Exchange Exchange Language (EDXL)
- Ambulance Standards

GOTS Solutions Transitioned

- Enhanced Dynamic Geo-Social Environment (EDGE) Virtual Training Software
- Next Generation Incident Command System (NICS)
- Virtual USA
- Datacasting
 - Houston Fire and Houston PD are using Datacasting on a regular basis as well as to augment their video sharing capabilities during special events.
- Personnel Post Tracking System (PTS)
- Non-cooperative Biometrics
- Screener's Auto-Diagnostic Adaptive Precision Training System (ScreenADAPT® / Eye-identify)
- Expert Tracker Training

Training and Testing

- EDGE
- Virtual Fire
- Project 25 (P25) Compliance assessment program
- NUSTL conducted over **50 testing and evaluation events** such as operational experimentations and lab and field assessments on a wide variety of first responder technologies.
- NUSTL tested **18,415 radiation detectors** for first responder use as part of DHS Securing the Cities initiative
- NUSTL provided technical support to radiation detection training and exercises for nearly **2,000 state and local law enforcement officers**.
- NUSTL hosted **40 science and technology forums** on emerging technology topics for the homeland security community: includes **500 members** from **110 federal, state and local** first responder agencies, academia, and private sector institutions.

Field Experiment After Action Reports and Technical Assessments

- 2016 First Responder Electronic Jamming Exercise After Action Report
- System Assessment and Validation for Emergency Responders (SAVER): over 1,000 publications available for first responder download (more than 16,000 downloads last year)
- NUSTL has developed and published over 100 technical reports to help first responders with their technology and equipment purchasing decisions.
- Ambulance Patient Compartment Design Standards
 - Human Factors Design Guidebook
 - Improving Communication between Ambulances and the Hearing-Impaired
 - Research Study of Ambulance Operations and Best Practice Considerations for Emergency Medical Services Personnel
- Backboard Cover Operational Field Assessment Post Assessment Report
- First Responder Big Data Analytics: Roadmap Recommendations
- Broadband Demonstration Network -- Assessment of Deployable Systems
- Canada-U.S. Enhanced Resiliency Experiment (CAUSE)
 - CAUSE II Joint Report
 - CAUSE III Northeastern Scenario After Action Report
 - CAUSE IV Binational After Action Report
- Chicago Long Term Evolution (LTE) Video Pilot Final Lessons Learned and Test Report
- Datacasting After Action Reports
 - Chicago Pilot
 - Houston Pilot
 - Houston Integration Pilot
 - NCAA Deployment in Houston
- Enhanced Dynamic Geo-Social Environment (EDGE) Virtual Training Evaluation and Transition Report
- FIND Lost Person Locator Operational Field Assessment
- Firefighter Accountability and Proximity (FFAP) System Operational Field Assessment
- FireGround Compass: Operational Test and Evaluation Performance Report
- First Responder Support Tools (FiRST) Sharing Service (FSS) Operational Field Assessment
- FIT-EAR™ MPD and VS-1 Earpiece Operational Field Assessment Report

Field Experiment After Action Reports and Technical Assessments

- Flood Apex: New Orleans Flood Resilience Experiment After Action Report
- Heads-Up Display (HUD): Test Report for the Internal/External Temperature Heads-Up Display
 - International Forum to Advance First Responder Innovation
 - The International Forum Capability Gap 1 “Deep Dive” Analysis Synopsis
 - The International Forum First Responder Market Overview Synopsis
- Internet of Things (IoT) Engineering Reports
 - IMIS IoT Architecture
 - IMIS IoT Extension
 - IMIS IoT Protocol Mapping
 - IMIS IoT Profile Recommendations for OGC Web Services
- Multi-Band Radio Pilot Report and Procurement Guide
- Mutual Aid Support System (MASS)
 - MASS Instructor Guide
 - MASS User Manual
 - MASS Training Slide Presentation
- Next-Generation Incident Command System (NICS)
 - A Review of Satellite Communications and Complementary Approaches to Support Distributed Disaster Response
 - Best Practices Fire & Rescue Operations - User Guide
 - Concept of Operations (CONOPS)
- Multi-Band Radio Pilot Report and Procurement Guide
- Mutual Aid Support System (MASS)
 - MASS Instructor Guide
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 - A Review of Satellite Communications and Complementary Approaches to Support Distributed Disaster Response
 - Best Practices Fire & Rescue Operations - User Guide
 - Concept of Operations (CONOPS)
- Research on Personal Area Network (PAN) Interference and Compatibility Issues for Public Safety Personal Protective Equipment Final Report

Field Experiment After Action Reports and Technical Assessments

- Project Responder 4 - 2014 National Technology Plan for Emergency Response to Catastrophic Incidents
- Conventional Fixed Station Interface for Legacy Base Station Equipment Operational Field Assessment
- Operational Field Assessment Report: Remote Access Firefighting Assistance Vehicle
- Social Media Working Group for Emergency Services and Disaster Management (SMWG)
 - Best Practices for Incorporating Social Media into Exercises
 - Community Engagement Guidance and Best Practices
 - From Concept to Reality: Operationalizing Social Media for Preparedness, Response and Recovery
 - Lessons Learned: Social Media and Hurricane Sandy
 - Next Steps: Social Media for Emergency Response
 - Social Media Strategy
 - Using Social Media for Enhanced Situational Awareness and Decision Support
- Improved Structural Firefighting Glove: Operational Field Assessment Report
- Objective Speech Quality Estimates for Project 25/Voice over Long Term Evolution Interconnections
- Video Quality in Public Safety (VQiPS)
 - Advanced Communications Video Over LTE: Efficient Network Utilization Research
 - Advanced Communications Video Over LTE: Video Design Improvement Process
 - Assessing Video Quality for Public Safety Applications Using Visual Acuity
 - Case Study of Interference Between Public Safety Long Term Evolution (LTE) And Public Safety 700 MHz Land Mobile Radio
 - Defining Video Quality Requirements
 - Digital Video Quality Handbook
 - First Workshop on Video Analytics in Public Safety
 - Optimizing Network Resources for Transmitting Video on Public Safety LTE Networks
 - Policy Considerations for the Use of Video in Public Safety
 - Task-Based Video Quality Assessment of High-efficiency Video Coding
 - Video Quality in Public Safety (VQiPS) Workshop 2015 After Action Report
 - Video Quality in Public Safety (VQiPS) Workshop 2014 After Action Report
- Virtual Training Operational Field Assessment
- Advanced Personal Protection System (APPS), Wildland Firefighter Personal Protection Equipment (WLFF PPE) Clothing System Program, Final Report

Field Experiment After Action Reports and Technical Assessments

- Wireless Emergency Alerts (WEA)
 - Accessible Common Alerting Protocol Radio Data System Demonstration: Gulf Coast States
 - Arbitrary-Size Location-Aware Targeting
 - Best Practices in Wireless Emergency Alerts
 - Cell Radio Frequency (RF) Propagation Algorithm Operational Assessment
 - CMSP Cybersecurity Guidelines
 - Comprehensive Testing of Imminent Threat Public Messages for Mobile Devices
 - Comprehensive Testing of Imminent Threat Public Messages for Mobile Devices: Updated Findings
 - Computer Model Simulation and Results
 - Cybersecurity Risk Management Strategy for Alert Originators
 - Exploring the Effect of the Diffusion of Geo-Targeted Emergency Alerts
 - Final Report: An Integrated Approach to Geo-Target At-Risk Communities and Deploy Effective Crisis Communication Approaches
 - Final Report: Opportunities, Options and Enhancements for the Wireless Emergency Alerting Service
 - Final Report: Training Data Sets of Risk Communication and Perception
 - Geo-Targeting Performance of Wireless Emergency Alerts in Imminent Threat Scenarios
 - Geo-Targeting Using Cell Radio Frequency (RF) Propagation Algorithm
 - Impact on Physiological, Emotional, Cognitive and Behavioral Responses
 - Integrated Public Alert and Warning System Wireless Emergency Alerts Understand and Respond to Public Sentiment
 - Maximizing Trust in the Wireless Emergency Alerts (WEA) Service
 - Mobile Penetration Strategy
 - Modeling Cognitive Response to Wireless Emergency Alerts to Inform Emergency Response Interventions
 - New York City Demonstration Lessons Learned Report
 - Optimizing Ability of Message Receipt by People with Disabilities
 - System Enhancement Recommendations
 - Study of Integration Strategy Considerations for Wireless Emergency Alerts
 - WEA Frequently Asked Questions
- Wireless Patient Vital Signs Monitoring Device Operational Field Assessment