FRG Overview for DHS S&T DCOS

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First Responders Group
Science and Technology Directorate
S&T MISSION

To deliver effective and innovative insight, methods and solutions for the critical needs of the Homeland Security Enterprise.

DHS FIVE MISSION AREAS

1. PREVENT TERRORISM AND ENHANCING SECURITY

2. SECURE AND MANAGE OUR BORDERS

3. ENFORCE AND ADMINISTER OUR IMMIGRATION LAWS

4. SAFEGUARD AND SECURE CYBERSPACE

5. ENSURE RESILIENCE TO DISASTERS
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
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
Evolving Response Environment

First Responders Face Diverse and *Evolving* Threats

Terror tactics continue to evolve, requiring responders to adapt their training, plans, procedures and equipment. After their van plows into a crowd, terrorists engage in a stabbing attack in London, England.

The frequency and severity of natural disasters are increasing. Hurricane Harvey resulted in extensive flooding that displaced tens of thousands in the area of Houston, Texas.

Responders face multiple threats to their health and safety. Firefighters encountered chemical toxins while battling an industrial fire in Moerdijk, Netherlands.

Civil unrest is increasing in many countries, endangering the safety of responders as they attempt to maintain the peace and separate opposing factions.
Impacts on the Response Environment

Threats and Hazards
Increased frequency and severity of violent incidents and natural disasters

Human Behavior and Perception
Human activities and threat perceptions affect how people act during incidents

Traditional and Social Media
Incident details are disseminated at an accelerated pace and distance, often in real time and from victims and bystanders

Advances in Technology
Ever greater access to new technologies that improve responder capabilities
• Incidence and severity of natural disasters rising globally
• Behavior of civilians and potential victims endangers emergency responders (e.g., rescue of those that refuse to evacuate in advance of hurricane landfall)

• Bystanders now rush towards the area of greatest danger to capture images and video of ongoing incidents

• Responders must now try to protect additional members of the public, while trying to neutralize threats

• Growth of disaster-scene video hobbyists
• Accessibility of data provides responders and commanders with greater awareness of incident-related information

• Smartphone apps provide navigation, information and decision support

• Potential for some technology to provide significant advances in situational awareness (e.g., unmanned aircraft systems)
FRG’s Stakeholder Driven Solution Development Process

- Gather First Responder Needs
- Prioritize Requirements
- Solicit and Award Contracts
- Manage and Complete Projects
- Conduct Operational Field Assessment
- Transition Solutions Into Use
- Identify Stakeholder Requirements
Stakeholders and Collaborations

FRG Stakeholder Groups
- First Responder Resource Group (FRRG)
- New York Area Science and Technology (NYAST) Forum
- Project 25 Compliance Assessment Program (P25 CAP) Advisory Panel
- Social Media for Emergency Services and Disaster Management Advisory Committee (SMESDMAC)
- Video Quality in Public Safety (VQiPS) Working Group

Government-Sponsored Groups
- Integrated Justice Information Systems (IJIS) Institute
- InterAgency Board (IAB)
- National Academy of Sciences
- National Geospatial Advisory Committee (DOI FACA)
- National Public Safety Telecommunications Council
- Open Geospatial Consortium (OGC)
- SAFECOM
- Emergency Communications Preparedness Council (ECPC)

Associations & Public Safety Engagements
- American Public Television Stations
- Armed Forces Communications and Electronics Association (AFCEA)
- Association of Public-Safety Communications Officials – International (APCO)
- Central United States Earthquake Consortium
- International Association of Chiefs of Police (IACP)
- International Association of Emergency Managers (IAEM)
- International Association of Fire Chiefs (IAFC)
- International Wireless Communications Expo (IWCE)
- National Bomb Squad Commanders Advisory Board (NBSCAB)
- National Emergency Managers Association
- Public Safety Communications Research (PSCR) Broadband Stakeholders Meeting
- U.S. Geospatial Intelligence Foundation

Training and Exercises
- Mutual Aid / Social Media Exercise, New Orleans, LA (January 2017)
- NATO / SPS Advanced Regional Civil Emergency Coordination Pilot (January 2017)
- NGFR Technology Experiment (TechEx), Grant County, WA, (June 2017)
- National Mutual Aid Technology Exercise (June 2017)
- 2017 First Responder Electronic Jamming Exercise (JamX 17), Idaho National Laboratory, ID (July 2017)
- Urban Operational Experimentation (OpEx), New York, NY (scheduled for August 2017)
- Harris County, TX, ICAM / Trustmark FirstNet Interoperability Experiment, Houston, TX (September 2017)
- Canada-U.S. Enhanced Resiliency Experiment (CAUSE) (Annual, October 2017)
- NUSTL Rad/Nuc Training (ongoing)
## Commercially Transitioned Technologies Examples

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<tr>
<th>Project Name</th>
<th>Transition Partner / Manufacturer</th>
<th>Purchase Information / Support</th>
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FRG Outcomes

Commercial Products Sold by Industry

Knowledge Products

Government-off-the-Shelf Software

Training and Testing

Standards

Field Experiment After Action Reports and Technical Assessments
First Responder Technologies

R-Tech Division Description

- Identify and prioritize high priority technology capability gaps facing the nation’s first responders.

- Rapidly develop technology solutions (over 12 to 18 months) for first responders that strengthen first responder safety, improve performance and enhance their ability to protect the homeland.

- REDOPS develops capabilities to detect and neutralize improvised explosive devices (IEDs).
Office for Interoperability and Compatibility

OIC Division Description
• Enable interoperable communications and information sharing (voice, video and data) among state, local, tribal, territorial and federal first responders by researching, developing, testing and commercializing standards-based technologies and knowledge products.
• Promote interoperable communications, tools, technologies and capabilities to improve the effectiveness and safety of first responders.

NGFR Apex Program Description
• NGFR is a five-year program to develop and integrate innovative tech to make responders better protected, connected and fully aware.
Communications & PNT Resiliency

Program Description

• The Communications & Position, Navigation and Timing (PNT) Resiliency for Critical Infrastructure portfolio focuses on spectrum-based threats.

• Communications Resiliency, led by Sridhar Kowdley (OIC), focuses on defining and mitigating jamming vulnerabilities to first responder communications and mission response.

• PNT Resiliency, led by Sarah Mahmood (OPS-R), focuses on enhancing the security and resiliency of PNT-dependent critical infrastructure via development of more robust and diverse solutions and user equipment.
First Responder Unmanned Aerial Systems Applications

Program Description
• Identify first responder capability gaps that can be filled with Unmanned Aerial Systems and provide objective information to assist in their purchasing decisions.

Core Activities
• Identify the primary use cases for UAS and counter-UAS operations for first responders.
• Define requirements for UAS operations, including tech specs, legal & policy issues, standard operating procedures, training needs and funding implications.
• Test and evaluate available COTS and GOTS products.
• Help provide technical reports and knowledge products to the first responder community.
• Develop operations model to enable first response agencies to bring in private entities to help support damage assessment and EM operations.
Information Applications and Systems

IAS Division Description

- Provide integrated solutions to enable first responders to exchange useful, actionable information in time to make a difference.

- Lead the integration of Internet of Things (IoT) sensor open standards with Smart Cities for incident management.

- Provide leadership in the advance of wireless emergency alerting (WEA) technology and communications.

- Demonstrate Identity Credential and Access Management (ICAM) interoperable solutions and guidance for secure access of first responder information and services with FirstNet.
Program Description

- **Goal:** Reduce fatalities and property losses from floods.

- **R&D:** Sensors, alerts & warnings; remote sensing & SA; new HPC and AI products; new standards, mitigation incentives & risk analysis.

- **Near term:** Provide FEMA with improved capabilities and solutions for response, recovery and mitigation.

- ** Longer term:** Comprehensive strategy for growing market capacity and public sector capabilities in flood risk management and technology.
OPS-R Division Description

• Core values – Scientific Quality, Mission Relevance, Independence.

• Apply multidisciplinary research to complement technology development activities and improve operations.


• Portfolio areas include: Human Identity & Digital Forensics; Decision Support for Disaster Response; Human Performance to Enhance Security; and Social, Behavioral & Economic Sciences.
NUSTL Division Description

• Ensure effectiveness, performance and suitability of technology for operational deployment by first responders.
• Act as a national resource to bridge technology developers and end users.
• Conduct R&D to save lives, minimize economic impacts and enhance resiliency following a radiological/nuclear emergency.
• FRG works with its 13 bilateral partners to ensure the rapid development of technologies for first responders
  • Overarching goal: to make first responders safer, more efficient, and more effective through technology

Forum Program Description
• Directly supports FRG’s overarching goal on both national and international levels
• Identifies opportunities, such as the U.S. – Israeli Binational Industrial Research & Development Foundation (BIRD) or Horizon 2020, to realize returns on investment.
• Established a technical understanding of, and work towards interoperability between existing NATO solutions for civil emergency coordination and the Next Generation Incident Command System (NICS) technology.

Transitions & Successes
• Capability Gaps “Deep Dive” Analysis Synopsis
• First Responder Market Overview Synopsis
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 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.
Knowledge Products

• Response and Defeat Operations Support (REDOPS)
  • Special Technicians Bulletins and Assessment Reports
• SAVER – over 1,000 reports published
• Video Quality in Public Safety (VQiPS)
  • Policy Considerations for the Use of Video in Public Safety
  • Digital Video Quality Handbook
  • Advanced Communications Video Over LTE: Efficient Network Utilization Research
  • Advanced Communications Video Over LTE: Video Design Improvement Process
• 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 Language (EDXL)
- Ambulance Standards
- LTE Video Standards
GOTS Solutions Transitioned

- Enhanced Dynamic Geo-Social Environment (EDGE) Virtual Training Software
- Next Generation Incident Command System (NICS)
- Virtual USA
- Personnel Post Tracking System (PTS)
- Non-cooperative Biometrics
- Screener’s Auto-Diagnostic Adaptive Precision Training System (ScreenADAPT® / Eye-identify)
- Expert Tracker Training
Engage With Us!

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