

Advanced Air Mobility for Public Services

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Aug 3-4, 2022

San Francisco International Airport

FUTURE OF
AVIATION

Advancing Aerial Mobility
through Technology, Sustainability,
and On-Demand Flight



Transformative Vertical Flight Working Groups



Transformative Vertical Flight
Working Groups



- **WG-1 Private / Recreational Vehicles**
Personal and recreational on-demand flights
- **WG-2&3 Commercial**
Urban air-taxi, local package delivery, air-crane lift, suburban and regional air transit systems.
- **WG-4 Public Services**
TVF enabled search and rescue, law enforcement, medical transport, emergency/humanitarian response, and military operations



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TVF WG-4 Public Services - 100+ team members

Mission Elements

- Search and rescue,
- Law enforcement,
- Firefighting,
- Medical transport,
- Emergency/humanitarian response,
- Military Operations

Roadmap Focuses

- ▶ Technology
- ▶ Cert & Regs
- ▶ Infrastructure
- ▶ Acceptance



Key Milestone and Target

- ▶ 2022-23 – demonstration & trial tests
- ▶ 2024-2025 - field tests and limited deployment
- ▶ Demo units able to carry one-five people with semi-autonomous capability
- ▶ 25+ miles R/T range with reserve – initial capability

Public Service AAM Applications

Firefighting

- Urban & Suburb On-demand Aerial Firefighting
- Firefighter & First Responder Transport
- High-rise Building Fire-control & Evacuation
- Wildland Fire Management
- Firefighter Extraction & Civilian Evacuation

Law Enforcement

- Rapid Local Emergency Response
- Border Patrol
- Community Support - Availability
- On-demand Prevention
- Crowd Control - Dynamic Response
- Water Patrol

Emergency/Humanitarian Response

- Hurricane/Typhoon Relief
- Earthquake Rescue & Transport
- Volcano Evacuation
- Tsunami Rescue and Relief
- Humanitarian Relief Logistics

Search and Rescue

- Air-sea Maritime Rescue
- Beach & Shoreline Water Rescue
- Mountain Rescue
- Wilderness Search & Rescue
- Flood/River Rescue
- Ice-snow Rescue

Medical Transport

- Golden-hour Patient Transport
- Care center to Hospital
- Pandemic Logistics
- Intra-Hospital Patient Transfer
- Under-served Community Care-Extension

Military Operations

- Last-mile Logistics
- Frontline Re-supply Mission
- Medivac
- On-demand Point-to-point Transport
- Ship-to-shore Logistics

TVF-4 NASA White Paper

Use-Cases:

- Fighting Wildfire
- Logistics of Natural Disasters and Humanitarian Crisis
- Medivac
- Law Enforcement and Public Safety
- Last-mile Aerial Delivery

Each Section Covers:

- Problem Description
- The Current Approach and Challenges
- Using eVTOL aircraft
- Potential Benefits
- Efforts Needed, Risks, and Mitigation Measures

Collaboration Partner
US Air Force Agility Prime

Reviewers

Mr. Charles Drew, KBR Consultant at NASA Ames Research Center
Dr. Mark P. DeAngelo, SAE International
Col. Jennifer Aupke, US National Guard Bureau
Mr. Steven O'Flarity, Pratt and Whitney
Mr. Jeff Zika, AirCO.Ai
Dr. Jim Moreland Jr., US Office of the Secretary of Defense

Download link:

<https://nari.arc.nasa.gov/wghome>

NASA Document Number 20205000636



NASA Electric Vertical Takeoff and Landing (eVTOL) Aircraft Technology for Public Services – A White Paper

NASA Transformative Vertical Flight Working Group 4 (TVF4)

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August 2021

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Public Service Missions & Operations-Tailored eVTOL Systems



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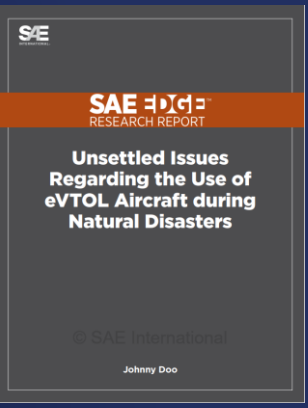
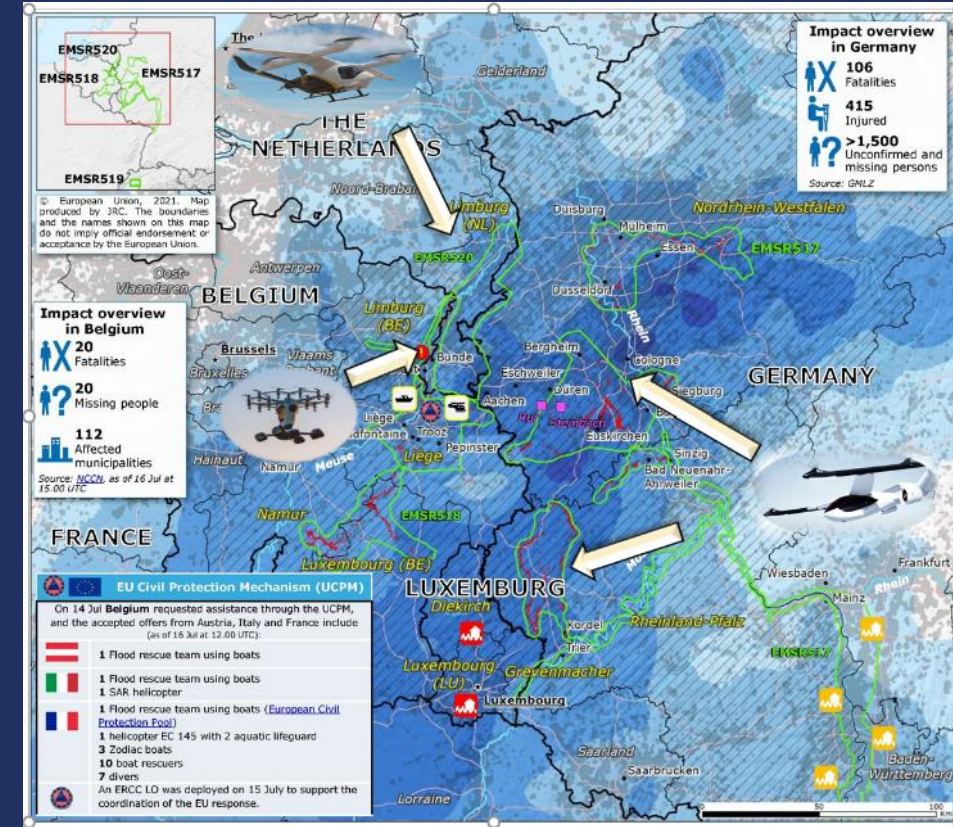
Challenges and Development Needed

Mission Specific Capabilities

- **Autonomy, Training, and Air Space Management**
- **Operations, Logistics, and Support**
- **Infrastructures & Deployment**
- **Unconventional Operating Mode Evaluation**
- **Funding, Acquisition, and Acceptance**

Distributed On-demand AAM

Emergency Response & Disaster Relief network



eVTOL Natural Disaster & Emergency Response Logistics and Infrastructure

Logistics

- **Mission material & supply**
 - Fire retardant / water - firefighting
 - Food, water, medicine – disaster relief
 - Medical kit and equipment (medivac)
- **Mobile charging**
 - Generator on board aircraft –removable or park & charge
 - Truck – medium to large capacity
- **Mid to long-distance deployment**
 - Transportation (move by truck)
 - Relay deployment
- **Service, repair and spare parts**
 - Technician on-site support
 - On-demand logistics – parts by eVTOL

Infrastructure

- **Charging/energy supply**
 - eVTOL charging system - standards
 - Compatible EV charging
 - Fueling stations
 - Urban, suburb, remote locations
- **Landing site/fwd operating base**
 - Parking lot
 - School yard
 - eTruck stop
 - GA airport

