

This briefing was presented at the November 10 and November 18 Ohio Federal Research Network Round 5 Pre-Release Opportunity Announcement Info Sessions. Information pertaining to Key Dates and Volume submissions may have changed since the time of the briefing. Consult the most recent OFRN Round 5 Pre-Release Opportunity Announcement Amendment document located at <https://ohiofrn.org> for details.

OFRN Round 5 Pre-Release Opportunity Announcement Info Session

November 10 & 18, 2020

Agenda

Welcome – Introductions

OFRN Briefing

Federal Partner AOI Overview

Q&A

Teaming Connections and

Upcoming Proposal Training

Conclusion

Our Purpose

The Ohio Federal Research Network (OFRN) was established in 2015 to stimulate Ohio's innovation economy by building vibrant, statewide, university-based research collaborations that meet the requirements of Ohio's federal laboratories, partnering with the commercial sector to create new products and build workforce in Ohio.

OFRN engages a broad and active array of stakeholders, fortifying Ohio's high-tech research and workforce capabilities and expanding federal contracting opportunities in areas such as national defense, space exploration, and aeronautics.

Ultimately, OFRN builds partnerships among innovators in academia, industry and government in support of US defense and civil space missions.

Our Strategic Focus

The OFRN strategic focus is to:

- Capitalize on federal and university research assets;
- Integrate Ohio firms and industrial partners into proposed projects aligned with federal partner needs;
- Better prepare and train universities and firms in Ohio to compete for federal funding;
- Facilitate the transition of government funded technology to commercial markets;
- Help create the jobs, processes and firms of tomorrow, in Ohio; and
- Differentiate Ohio from other states relative to its commitment and support of our national defense and civil aviation and space missions.

Our Partners



OFRN builds partnerships among academia, industry and government in support of US defense and civil space missions.

Our partners include:

- Air Force Research Labs (AFRL)
- National Air and space Intelligence Center (NASIC)
- Naval Medical Research Unit-Dayton (NAMRU-D)
- National Aeronautics and Space Administration Glenn Research Center (NASA-GRC)
- State of Ohio's Adjutant General (TAG)
- Ohio Department of Transportation (ODOT)
- 12 universities
- 2 community colleges
- 90 businesses
- 8 spinout organizations

Our Impact



- \$40M OFRN Funds invested
- 28 Projects Funded
- \$194M in Project Follow-on Funding
- 905 Jobs Created and Impacted
- 12 IP Invention Disclosures
- 8 Spinout Organizations
- \$4.85M raised by project spinout organizations

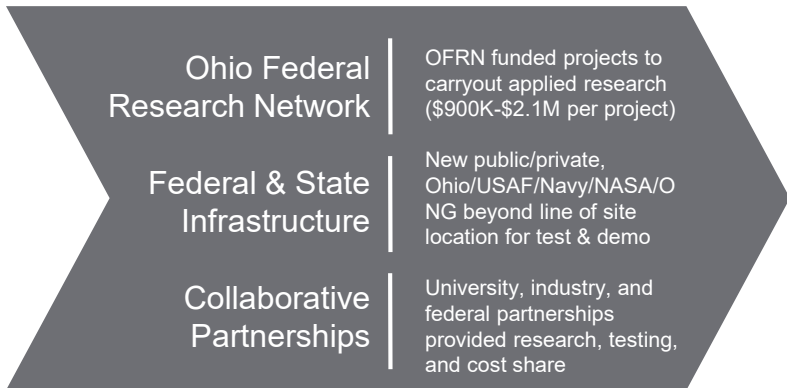
Initiated in 2017, first funded projects in 2018 | OFRN Round 3 & Round 4 Projects

Sustaining Ohio's Aeronautical Readiness and Innovation in the Next Generation

Vision: Make Ohio the nexus for unmanned air systems (UASs), personal air vehicles (PAVs), and logistics delivery air vehicles (LDAVs) testing, integration and manufacturing.

Public/private challenge problem:

Overcome technological barriers to enable more widespread adoption of UAVs, PAVs and LDVs into the national airspace



Remoted Piloted Airplane
New PAV testbed that can be used for air space integration testing and new autonomy systems

Electric Motor
Foundational brushless motor enabling next generation power systems with 30% weigh reduction

Unjammable Radar
New sense and avoid technologies integrated on UAV and integrated Air Traffic Control system

Universal Flight Data Translator
Telemetry and data integration into national air traffic control systems

Computer-Human Interaction for Rapid Program Analysis through Cognitive Collaboration

Multi-purpose Mast/Aerial 360 radar/optical fused sensors for Perimeter Monitoring and Aerial Detect and Avoid

Geometrically-Complex 3D Printed Antennas for

Resilient and Secure UAS Flight Control

Interoperability, Resiliency, and Contingency Management for Ohio UAS Operations

A Hybrid Fuel Cell-Battery-Capacitor Power Source for UAS

Round 5 Process Overview

Project Teams Must Include:

- At least 1 industry member
 - Role can be as lead applicant or collaborator
- At least 2 Ohio colleges/universities
 - Role can be as lead applicant or collaborator
 - AFIT is eligible
- At least 1 federal partner/sponsor
 - AFRL, NASA-GRC, NAMRU-D, and/or NASIC
 - Financial commitment from federal partner is NOT necessary

Round 5 Process Overview

Proposals consist of:

- Technical Proposal (due Jan. 29, 2021):
 - Volume 2 (Technical) – 15 pages,
 - 2A (Supplemental) – 3 pages, and
 - 2B (Slide Deck) – 15 slides
- Cost proposal (due Mar. 17, 2021)

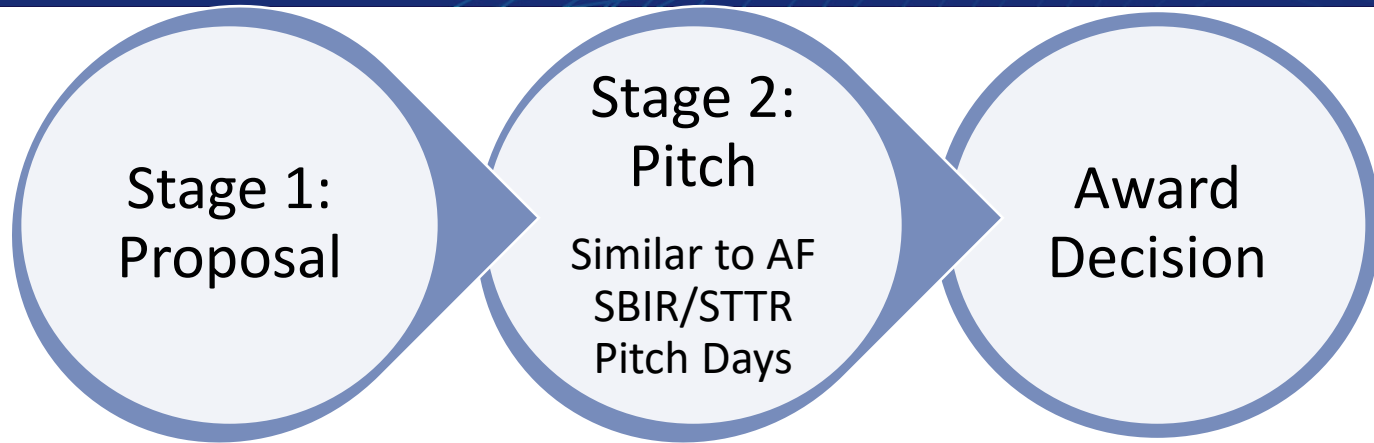
Round 5 Process Overview

- Round 5 includes a requirement for a Student Experience and Engagement Initiative (SEE) which is to be designed by the proposing team based on the guidelines within the Appendix 6
- Team Matchmaking Assistance
- Training
 - Dec. 2nd – Proposal training (mandatory)
 - Pitch deck and presentation training (for proposals selected to pitch) - Group session - 90 minutes (mandatory)
 - Pitch training – 1-1 sessions - 2 sessions, 1 hour each (optional)

Key Dates

Event	Key Date
Opportunity Announcement Pre- Release	Oct. 29, 2020
Opportunity Announcement Informational Session and Q&A with Federal SMEs (2 virtual sessions)	Nov. 10, 2020 (10:00am– 12:00pm ET)* Nov. 18, 2020 (1:00pm-3:00pm ET)*
Opportunity Announcement Formal Release	Nov. 20, 2020
Proposal Training	Dec. 2, 2020*
Proposal Questions Accepted Through	Jan. 6, 2021
Due date for Volume 2 (Technical), 2A (Supplemental), and 2B (Slide Deck)	Jan. 29, 2021, by 5:00pm ET
Notification of Selection for Final Pitch Day	Feb.17, 2021
Due date for Volume 1 (Business and Cost Proposal)	March 17, 2021
Pitch Day	March 23- 24, 2021
Proposal Review	Apr. 2, 2021
Awards Announced	Apr. 7, 2021
Projects Start	Apr. 22, 2021
Student Intern Orientation	Apr. 29, 2021

Round 5 Project Review Process



1. Proposals are reviewed by the OFRN Technical Review Council (TRC). Most meritorious proposals are invited to pitch
2. Pitch Day: Selected teams pitch to the TRC w/Q&A (pitch audience is restricted to just TRC and OFRN staff)
3. TRC recommends award selection to the OFRN Executive Review Board (ERB) (~ 1 Week)

1. Vertical Take-Off & Landing (VTOL)
2. Situational Awareness & Proliferated Surveillance Systems
3. Patient care in austere and contested environments
4. Personal Exposure Devices
5. Acceleration effects
6. Enabling Human-Machine Teaming Using Brain-Machine Interfaces
7. Advanced Power Systems Applicable to Aviation Propulsion, Micro-Grids, and Lunar Surface Operations
8. Quantum Communications
9. Applications of commercial satellites to humanitarian, disaster, and defense topics
10. Large Data Set Triage
11. Journal Article Warning and Correlation
12. Other

Federal Partner Areas of Interest AOIs

AOI #1 Vertical Take-off & Landing (VTOL)

There has been an explosion of interest in the ‘flying car’ concept to the Air Force due to the lack of need for runway. The ability to land wherever, whenever greatly eases the logistic burden of resupply and minimizes trends in terms of operational footprints. Building off the extensive commercial drone market, a number of key technologies are needed to enable such concepts at an order of magnitude larger in scale in order to address the areas and challenges for military / civil VTOL systems. These include for large VTOL capabilities:

- **Battery Energy Storage**

- Battery/recharging designs, which facilitate safe, rapidly recharge systems without overheating or degrade longevity and reliability, to provide high-rate recharge (5-10 min) for multiple cycles (50-100 per day), and to support the demands of the appropriate lift/weight ratios (*Note: This is not about developing a new battery chemistries but enabling battery consistency in government / commercial sectors (e.g. Lithium/Ion/Polymer types)*).
- Power supply – recharging stations which should be able to run safely and effectively off commercially available circuits/wattage/ampereage in a residential or office building

- **Propulsion sources to provide the appropriate lift/weight ratio and decrease ambient noise**

- **Sensing hardware/software and platform designs to enable both manned and unmanned flight operations addressing**

- Reliable, Controllable Flight in Three-Dimensional Flow Fields
 - Design objectives accounting for wind turbulences (e.g., up, down, cross drafts) in congested urban settings, and maintaining reliable flight control
 - Air data sensors to detect and avoid “clear day” wind shears (e.g., updrafts, downdrafts, crosswinds)
 - MS&A of air currents will lead to enhancements to stability controls of aircraft to ensure safety, security, and reliability in these settings. This is essential for Air Worthiness certification
- Human Factors / Human-Machine Interfaces
 - On-board passenger interaction with “virtual pilot” for situational awareness of impending maneuvers and phases of flight. Dealing with onboard passenger emergencies (e.g., sickness, etc.) and ability to reroute to emergency care; activation of 911 system at destination or alternate land sites, etc.
 - External interface with passengers while on ground – awareness and communication with passengers and non-passengers in proximity to the vehicle, and maintenance personnel
- Modeling and Simulation of air traffic management system for airspace deconfliction, route planning and approval, protocols for degraded visibility, weather / darkness

AOI #2 Situational Awareness and Proliferated Surveillance Systems

- Building upon technological advances in sensors and sensor suites, DoD is looking for unique affordable solutions for surveillance on the ground, in the air, and in space. Proposals may include but are not limited to, a complete surveillance system for ground, air, and/or space; affordable sensor suites, data visualization tools to display complex data simply and quickly; and the ability to analyze images. Technical approaches should focus on the “find, fix, and track” part of the kill chain. Electro-optical (EO) and radio frequency (RF) sensing strategies such as:
 - Advanced EO and IR sensing systems that balance cost and performance are needed for new expendable and attritable air systems, and replenish space
 - Technologies that address flexible high resolution, long range EO/IR imaging along with multi-mode LIDAR (3D shape, vibration sensing, and synthetic aperture imaging) for stand-off and penetrating ISR.
 - Technologies for a compact hyperspectral imaging (HIS) system and staring infrared search and track for attritable platforms for use in highly contested environments.
 - Technology that addresses the need for low cost, size, weight, and power (C-SWaP) RF sensors for attritable and expendable platforms. This would include such things as additive manufacturing techniques to reduce cost over traditional fabrication techniques, as well as the use of commercial off-the-shelf components, including transmit/receive modules, RF system-on-chip, FPGAs, and software-defined radio (SDR) technology to build low-cost RF sensors.
 - RF sensing concepts that take advantage of the diversity (spatial, temporal, power, frequency and polarization) made possible via wideband, dual-polarized and software-defined RF systems to enhance sensor capability to find, fix and track targets of interest and improve situational awareness. Techniques that use multiple, proliferated RF systems to improve performance via geometric diversity are also of interest.
- Solutions/concepts addressing these technical needs are preferred, but others will also be considered.

AOI #3 Patient care in austere and contested environments

Technologies to enhance patient recovery, transport, and care to include autonomous recovery of injured service members in contested environments, UAV-based casualty evacuation (CASEVAC). Operations and enabling technologies may include autonomous/remotely commanded robotic casualty recovery and stabilization in contested environments, casualty monitoring, integrated smart medical equipment, autonomous and/or remote care en route, secure data streaming to receiving facility, medical sensor fusion and diagnostics, robotics, artificial intelligence, and other technologies.

AOI #4 Personal Exposure Devices

Development of personal exposure monitoring devices, such as personal dosimeters, to measure and report exposure to biological and toxic industrial chemicals and compounds. Devices should report exposure levels in real-time.

AOI #5 Acceleration Effects

Military operations including ground, sea, air, and space-based missions expose service members to various unusual or extreme accelerative forces, presenting threats to health, safety, readiness, and mission performance. There is broad interest and need for better understanding and mitigation of such accelerative threats as whole-body vibration, impact acceleration (i.e., crash), high-g acceleration, and dynamic acceleration. Mitigations for fatigue, neck and back pain and injury, impact injury, g-loss of consciousness, spatial disorientation, and motion sickness are of particular interest.

AOI #6 Improving Human-Machine Teaming Performance Using Brain-Machine Interface (BMI) Technologies

Intelligent autonomous systems can provide valuable tactical information to the warfighter. However, this has also led an overabundance of information the warfighter/operator has to sift through to identify potential threats and make effective decisions. We seek proposals that can design, develop, and validate a multi-modal brain-machine interface (BMI)-enabled technology platform that operates for active and/or reactive control for enabling decision making in information dense environments, and facilitating human-machine cooperative intelligence. Proposers may consider ‘hybrid’ BMI architectures that facilitate the integration with other physiological and behavioral (e.g., eye tracking) technologies to inform the BMI if necessary to achieve the multi-modal interface.

AOI #7 Advanced Power Systems Applicable to Aviation Propulsion, Micro-Grids, and Lunar Surface Operations

There is an increasing demand for electrical power to be available independent of the current Electrical Power Grid(s) found on Earth. This includes critical aviation, space, and terrestrial applications where crew well-being, productivity, critical infrastructure (data servers, etc.), and security are involved. These applications require high efficiency power management and distribution systems delivering highly reliable power (>0.999999) and includes diverse power source and energy storage integration strategy to meet the needs of the consumer. These future systems require development of key technologies and capabilities:

- System control – Solutions that can integrate regulators and interface converters and result in a collaborative system instead of a competitive system. For example, being able to integrate and equally consume power from different types of power sources without having the two regulators fight each other and having to switch between the sources.
- System Protection – Methods enabling robust specification and assurance of safety critical functions, despite mission and fault transients, within and beyond the electrical power system. Develop system protection approaches using regulators to reduce fault energy and provide fast detection, isolation, and reconfiguration of electrical network elements.
- System Stability - A solution to reduce the influence and destabilizing effects of nonlinearities such as constant power, change to constant current, fold back, pulsed loads, and system bifurcation modes.
- Thermal - An integrated power and thermal management system which can be used to provide enhanced monitoring, diagnostic, and prognostic understanding of power system states and avoid thermal constraints by restricting power to avoid exceeding thermal limits. The intended solution would provide superior power management capability including predictive thermal operational issues and provide time to change power management directions.
- Energy Storage – Understanding usage of distributed energy storage (batteries, capacitors, inductors, supercapacitors, flywheels, etc.) and hybrid energy storage and control methods to enable advanced power system control approaches. This can include power architectures that enable advanced methods of control and integration of energy storage.

AOI #8 Quantum Communications

NASA seeks highly secure communications technologies for mission and safety critical aviation and spacecraft applications. Quantum communications use entangled photons for transmissions, enabling highly secure communication systems. NASA is interested in the development and demonstration of quantum communications technologies such as high-efficiency photon entangled sources, quantum repeaters, high-efficiency quantum detectors, and quantum cryptography. Advances in these technologies will enable quantum communication networks with unlimited security.

AOI #9 Applications of commercial satellites to humanitarian, disaster, and defense topics

With recent growth in commercial satellite availability the DoD is interested in tools and data management processes using these commercially available sensors. How might these resources be rapidly tasked and exploited in a time sensitive crisis to support humanitarian, disaster relief, and defensive efforts.

AOI #10 Large Data Set Triage

With the advent of large file storage systems, the DoD is interested in tools and techniques aimed at the timely triage of large computer file collections (i.e. potentially terabytes of data). The need to determine the most useful files (e.g. relevancy) to be examined by analysts is critical for managing resources to allow for timely translation and analysis of the data.

AOI #11 Journal Article Warning and Correlation

In trying to determine the most disruptive and critical emerging technologies the DoD is interested in tools that can read, and correlate people, places, and technologies that will allow us to set alerts for breaking or new technologies (i.e. a sudden 50% increase in a specific area could be one example of an alert), and capable of reading and processing in multiple languages (i.e., structured data, multiple databases).

AOI #12 Other Topics

Proposers may suggest any relevant topic(s) not listed but that have clear application and utility for SOARING focus areas. Proposers will be expected to provide the same level state of the art context, metrics, description of an emergency demonstration, federal alignment, and long-term benefits.

Round 5 Training Overview

December 2nd – **MANDATORY** Proposal Group Training

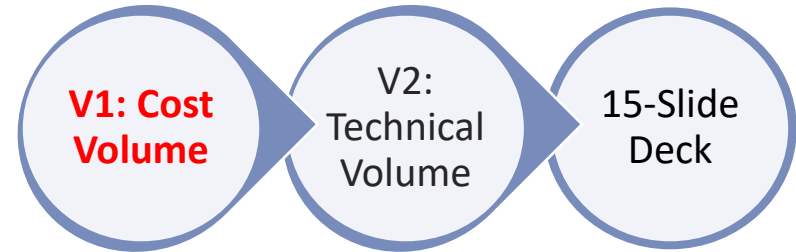
After Down Select – **MANDATORY** Pitch and Pitch Deck Group Training

After Pitch Training – **OPTIONAL** 1:1 Pitch Reviews and Feedback

Round 5 Training Overview (Dec. 2)

Training Topics – Volume 1

- Requirements for Business Proposal
- Requirements for Cost Proposal
- Changes from Round 4



Volume	Presenter
Volume 1: Cost Volume	Chris Lockhart
Volume 2: Technical Volume	Burr Zimmerman
Volume 2a: Supplemental	Burr Zimmerman
Volume 2b: Pitch Deck	Chris Mather

About the Presenter: Chris Lockhart

- Parallax Director of Contracts
- Former DOE Senior Contracting Officer (Los Alamos)
- Certified Professional Contracts Manager/FAC-C Level III

Round 5 Training Overview (Dec. 2)

Training Topics – Volume 2

- **Summarize OFRN Round 5 RFP:**
 - Technical Volume components and formatting
 - Supplemental Volume metrics, demo
 - Merit review criteria
- **Outcomes:**
 - Effectively frame your project
 - Ensure completeness of your technical narrative
 - Align better with OFRN vision and goals



Volume	Presenter
Volume 1: Cost Volume	Chris Lockhart
Volume 2: Technical Volume	Burr Zimmerman
Volume 2a: Supplemental	Burr Zimmerman
Volume 2b: Pitch Deck	Chris Mather

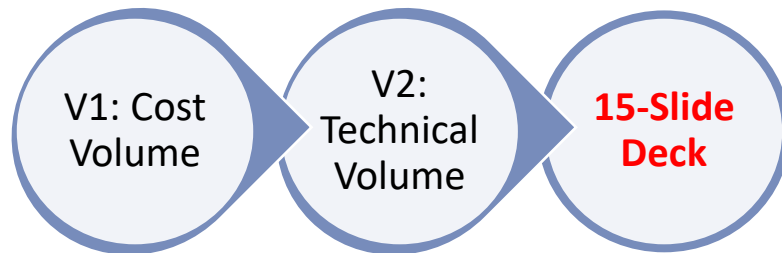
About the Presenter: Dr. Burr Zimmerman

- Founder and principal of Urban Venture Group, Inc.
- PhD Chemical Engineering
- Over \$750 million in proposal wins
- OFRN Proposal Trainer since 2016

Round 5 Training Overview (Dec 2)

Training Topics – Slide Deck

- Slide decks vs. presentation decks
- Advantages of the slide deck format
- OFRN Round 5 slide deck requirements
- “Telling your story” through your deck
 - Consistent with your technical writeup
 - Leads to a consistent finalist presentation
- Slide design tips
 - Compelling, complete and clear decks
 - Avoiding a crowded and cluttered slide deck
 - The “little things that make a huge difference
- Examples of winning presentation deck slides



Volume	Presenter
Volume 1: Cost Volume	Chris Lockhart
Volume 2: Technical Volume	Burr Zimmerman
Volume 2a: Supplemental	Burr Zimmerman
Volume 2b: Pitch Deck	Chris Mather

About the Presenter: Chris Mather

- 14 Years Sales, Marketing Management
- 11 Years Technology CEO/ GM
- 16 Years Entrepreneurial Development
- Specialist in Venture Pitch Training

Round 5 Team Matchmaking

Round 5 Matchmaking Service

OFRN is providing this partnering and matchmaking service to help those that need to find a required partner for a Round 5 Proposal Submission. To assist in providing introductions, we need to know more about you, your organization, and your requirements of a partner or sub. Please thoroughly complete the form below.

First Name *

Short answer text

Last Name *

Short answer text

Email Address *

Short answer text

Round 5 Requires

- Two Universities
- One Industry Partner
- A Federal Partner

IF YOU NEED A PARTNER

- To Satisfy Requirements
- To Fill a Technical Gap

GoTo [OhioFRN.org](https://ohiofrn.org)

- Link to “Team Matchmaking” Form
- Advertise Your Need
- Automatically Populates Sheet
- Sheet Link Distributed to OFRN ListServ

Round 5 Team Matchmaking



Please select the type of partner you are looking for: *

Research partner from another Ohio university

In-house partner from your organization
Please provide a brief explanation of your technology and/or capabilities brought into the proposal (do not list company name): *

Business partner
Long answer text

Workforce partner

Other partner
Please provide a brief explanation of the technology and/or capabilities sought in a partner or subcontractor (again, do not list company name): *

Long answer text

To which Area of Interest are you planning to submit? Check all that apply: *

AOI #1: Vertical Take-Off & Landing (VTOL)

AOI #2: Situational Awareness and Proliferated Surveillance Systems

Brain-Machine Interface (BMI) Technologi...

on, Micro-Grids, and Lunar Surface Opera...

aster, and Defense Topics

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