DEPARTMENT OF THE ARMY
DoD 22.4 Small Business Innovation Research (SBIR) Annual BAA
Proposal Submission Instructions

May 12, 2022: Topics issued for pre-release
May 26, 2022: Army begins accepting proposals via DSIP
June 14, 2022: DSIP Topic Q&A closes to new questions at 12:00 p.m. ET
June 28, 2022: Deadline for receipt of proposals no later than 12:00 p.m. ET

INTRODUCTION
The future Army must be capable of conducting Multi-Domain Operations (MDO) as part of an integrated Joint Force across an array of situations in multiple theaters by 2035. The MDO concept describes how the Army will support the Joint Force in the rapid and continuous integration of all domains of warfare – land, sea, air, and cyberspace – to deter and prevail as we compete short of conflict, and fight and win if deterrence fail. The Army must provide game-changing capabilities to our Soldiers. To capitalize on small business innovation, the Army has implemented an approach to advertise SBIR funding opportunities through the Department of Defense (DoD) Annual BAA process, outside of the three pre-determined BAA cycles. This approach also strives to create a more rapid award time from solicitation to closing.

Topics released under this BAA deviate from the traditional Army SBIR period of performance, contract award guidelines, and other proposal instructions. Please take note of the contents of the DoD Program BAA instructions, supplemented herein, when preparing proposals. Proposals will only be evaluated in response to an active corresponding Army topic.

Proposers responding to a topic in this BAA must follow all general instructions provided in the DoD SBIR Program BAA. Department of the Army requirements in addition to or deviating from the DoD Program BAA are provided in the instructions below.

Specific questions pertaining to the administration of the Department of the Army SBIR Program and the proposal preparation instructions for this topic should be directed to the Point of Contact identified in the Topic announcement; general questions can be directed below:

Email: usarmy.pentagon.hqda-asa-alt.mbx.army-applied-sbir-program@mail.mil
Mailing Address:
Army Applied SBIR Office
2800 Crystal Dr; Ste 11252
Arlington, VA 22201

PHASE I PROPOSAL GUIDELINES
The Defense SBIR/STTR Innovation Portal (DSIP) is the official portal for DoD SBIR/STTR proposal submission. Proposers are required to submit proposals via DSIP; proposals submitted by any other means will be disregarded. Detailed instructions regarding registration and proposal submission via DSIP are provided in the DoD SBIR Program BAA.

Technical Volume (Volume 2)
The technical volume is not to exceed 5 pages and must follow the formatting requirements provided in the DoD SBIR Program BAA. A commercialization plan must also accompany the technical proposal and should be no more than 10 slides. The commercialization plan must be

converted to a pdf and attached to the end of the technical volume, resulting in one pdf file to be uploaded to DSIP as Volume 2. The commercialization plan does not count towards the technical volume 5-page limit. Any proposals submitted without a commercialization plan or in a format other than that provided by the BAA will not be reviewed.

Content of the Technical Volume

The Technical Volume will contain three key sections – technical approach, team qualifications and commercialization section. The technical approach section contains details on how the proposer is going to solve the problem. It should detail key elements of your approach, any risks, relevant past work and how you measure success. The team qualifications section should highlight the key personnel working on the project, and the resources that will be brought to bear on solving the problem. The commercialization plan should include:

- Company information: Focused objectives/core competencies; specialization area(s); products with significant sales; and history of previous Federal and non-Federal funding, regulatory experience, and subsequent commercialization successes.
- Customer and Competition: Clear description of key technology objectives, current competition, and advantages compared to competing products or services; description of hurdles to acceptance of the innovation.
- Market: Milestones, target dates, analyses of market size, and estimated market share after first year sales and after 5 years; explanation of plan to obtain market share.
- Intellectual Property: Patent status, technology lead, trade secrets or other demonstration of a plan to achieve sufficient protection to realize the commercialization stage and attain at least a temporal competitive advantage.
- Financing: Plans for securing necessary non-SBIR funding.
- Assistance and mentoring: Plans for securing needed technical or business assistance through mentoring, partnering, or through arrangements with government sponsored (e.g., State assistance programs, Federally-funded research laboratories, Manufacturing Extension Partnership centers), not-for-profits (e.g., SBDC), commercial accelerators, DOD Prime Contractors, or other assistance provider.

These instructions supersede those stated in section 5.3.c of the DoD Program BAA.

Cost Volume (Volume 3)

Unless otherwise noted in the topic, the Phase I Base amount must not exceed $250,000 for a 6-month period of performance. Phase I Options are not anticipated at this time. If an option is identified in the topic posting, costs for the Base and Option must be separated and clearly identified on the Proposal Cover Sheet (Volume 1) and in Volume 3. Awards for these topics will be in the form of a firm fixed price contract.

For pricing purposes, offerors should assume a contract or agreement start date of approximately ninety (90) days after submission of the proposal. For this BAA, adequate price competition (APC), as defined in FAR 15.403-1(c), is anticipated. In the event that adequate price competition is not realized (i.e. only one proposal is received for a given topic), the Government may choose to conduct additional proposal analysis, in accordance with the techniques identified at FAR 15.404-1. Additionally, offerors are to provide any current Forward Pricing Rate Agreements (FPRA) in effect at time of proposal submission.

Content of the Cost Volume (Volume 3)

ALL proposed costs should be accompanied by documentation to substantiate how the cost was derived. For example, if you proposed travel costs to attend a project-related meeting or conference, and used a travel website to compare flight costs, include a screenshot of the

comparison. Similarly, if you proposed to purchase materials or equipment, and used the internet to search for the best source, include your market research for those items. You do not necessarily have to propose the cheapest item or supplier, but you should explain your decision to choose one item or supplier over another. It's important to provide enough information to allow contracting personnel to understand how the proposer plans to use the requested funds.

If a DCAA Audit has been conducted within the last five (5) years, include the audit compliance documentation in the cost proposal documents. The documentation should also include the offeror's DCAA Point of Contact (if applicable).

If selected for award, failure to include the documentation with your proposal will delay contract negotiation, and the proposer will be asked to submit the necessary documentation to the Contracting Officer to substantiate costs (e.g., cost estimates for equipment, materials, and consultants or subcontractors). It is important to respond as quickly as possible to the Contracting Officer's request for documentation.

Company Commercialization Report (CCR) (Volume 4)
Completion of the CCR as Volume 4 of the proposal submission in DSIP is required. Please refer to the DoD SBIR Program BAA for full details on this requirement. Information contained in the CCR will be considered by the Department of the Army during proposal evaluations.

Supporting Documents (Volume 5)
Volume 5 is provided for proposers to submit additional documentation to support the Cover Sheet (Volume 1), Technical Volume (Volume 2), and the Cost Volume (Volume 3). In addition to the Volume 5 requirements outlined in the DoD Program BAA, the Department of the Army may accept the following documents in Volume 5:

- Additional Cost Information
- Funding Agreement Certification
- Technical Data Rights (Assertions)
- Lifecycle Certification
- Allocation of Rights
- Other (only as specified in the topic)

Please only submit documents that are identified in the topic instructions. All other submissions will be disregarded.

PHASE II PROPOSAL GUIDELINES

Phase II proposals may only be submitted by Phase I awardees. Phase II proposal submission window, notification process, expected budget/duration structure and additional instructions will be provided in the Phase I contract or by subsequent notification.

DISCRETIONARY TECHNICAL AND BUSINESS ASSISTANCE (TABA)

The Army, at its discretion, may provide Technical and Business Assistance (TABA). The Army will select a preferred vendor(s) for the Army SBIR TABA program through a competitive process. Alternately, a small business concern may, by contract or otherwise, select one or more vendors to assist the firm in meeting the TABA goals. The Applicant must request the authority to select its own TABA provider in the Army SBIR proposal, demonstrating that the vendor is uniquely postured to provide the specific technical and business services required.

Participation in the Army SBIR TABA program is voluntary for each Army SBIR awardee. Services provided to Army SBIR firms under the auspices of the TABA program may include, but are not limited to:

1. Access to a network of scientists, engineers, and technologists focused on commercialization and transition considerations such as protected supply chain management, advanced manufacturing, process/product/production scaling, etc;
2. Assistance with intellectual property protections, such as legal considerations, intellectual property rights, patent filing, patent fees, licensing considerations, etc;
3. Commercialization and technology transition support such as market research, market validation, development of regulatory or manufacturing plans, brand development;
4. Regulatory support such as product domain regulatory considerations, regulatory planning, and regulatory strategy development.

The Army SBIR program sponsors participation in the TABA program. The resource limitation for each firm is:

- Phase I Firms: Up to $6,500 per project per year (in addition to the base SBIR award amount);
- Phase II Firms: Up to $50,000 per project;
    - Army-Preferred Vendor: In addition to the base SBIR award amount;
    - Firm-Selected Vendor: Included in the base SBIR award amount and must be included in Phase II proposal.

EVALUATION AND SELECTION

All proposals will be evaluated in accordance with the evaluation criteria listed in the DoD Program BAA. It is the policy of the Army to ensure equitable and comprehensive proposal evaluations based on the evaluation criteria listed above and to select the source (or sources) whose offer meets the Government's technical, policy, and programmatic goals.

All proposal evaluations will be based solely on the above evaluation criteria. The Army will conduct an evaluation of each conforming proposal. Proposals that do not comply with the requirements detailed in this BAA and the research objective(s) of the corresponding opportunity are considered non-conforming and therefore will not evaluated nor considered for award.

Using the evaluation criteria, the Government will evaluate each proposal in its entirety, documenting the strengths and weaknesses relative to each evaluation criterion, and, based on these identified strengths and weaknesses, make a determination of the proposal's overall selectability. Proposals will not be evaluated against each other during the evaluation process, but rather evaluated on their own individual merit to determine how well the proposal meets the criteria stated in this BAA and the corresponding opportunity.

Awards will be made to proposers whose proposals are determined to be the most advantageous to the Government, consistent with instructions and evaluation criteria specified in the BAA herein, subsequent opportunities issued, and availability of funding. Given the limited funding available for each opportunity, not all proposals considered selectable will be necessarily selected for funding.

For the purposes of this proposal evaluation process, a selectable proposal is defined as follows:
<u>Selectable</u>: A selectable proposal is a proposal that has been evaluated by the Government against the evaluation criteria listed in the DoD Program BAA, and the strengths of the overall proposal outweighs its weaknesses. Additionally, there are no accumulated weaknesses that would require extensive negotiations and/or a revised proposal.

For the purposes of this proposal evaluation process, a non-selectable proposal is defined as follows:
Non-Selectable: A proposal is considered non-selectable when the proposal has been evaluated by the Government against the evaluation criteria listed in the DoD Program BAA and the strengths of the overall proposal do not outweigh its weaknesses.

Proposing firms will be notified via email of selection or non-selection status for a Phase I or direct to Phase II award within 90 days of the closing date of the Topic. The notification will come from the Army SBIR Program Office PoC mailbox sent to the Corporate Official listed on the proposal cover sheet. The Army promotes transparency regarding the technical evaluation for all Army SBIR proposals. The Army will provide a technical evaluation narrative to the proposer in accordance with the SBA Policy Directive, Appendix I, paragraph 4. The selection decision notice contains instructions for retrieving the technical evaluation narrative.

A Contracting Officer (KO) may contact applicants, when the Army SBIR Office has recommended a proposal for award, in order to discuss additional information required for award. This may include representations and certifications, revised budgets or budget explanations, certificate of current cost or pricing data, subcontracting plan for small businesses, and/or other information as applicable to the proposed award. The anticipated start date will be determined at that time.

Proposers must not regard the notification email as an authorization to commit or expend funds. Until a Government KO signs the award document (i.e. contract), no obligations to provide funding are made. The award document signed by the Government KO is the official and authorizing award instrument (i.e. contract). The KO will email the signed, authorizing award instrument to the principal investigator (PI) and/or an authorized organization representative.

Refer to the DoD SBIR Program BAA for procedures to protest the Announcement.

As further prescribed in FAR 33.106(b), FAR 52.233-3, Protests after Award should be submitted to the Point of Contract identified in the topic solicitation:

Email: usarmy.pentagon.hqda-asa-alt.mbx.army-applied-sbir-program@mail.mil
Mailing Address:
Army Applied SBIR Office
2800 Crystal Dr; Ste 11252
Arlington, VA 22201

Appendix A

Phase I Evaluation Criteria

Army Applied SBIR Phase I (v1) Evaluation Criteria Defined

		DEFINITION
TECHNICAL FEASIBILITY	SCIENTIFIC FEASIBILITY	Is the science behind the solution sound? Convince readers who don't have deep expertise in your field that your innovation is built atop sound scientific and engineering principles.
	ENABLING TECHNOLOGIES	Point to the foundational technologies that you rely on to deliver your solution. Do the required enabling technologies introduce added risk? Using proven (and ideally Army-fielded) underlying technologies and techniques helps to lower technical risk.
	SOLUTION'S UNIQUENESS	From a warfighter's perspective, why is your proposed solution the best choice for the Army? Refute the substitutes for your solution that warfighters are either using currently or considering adopting. Why will soldiers prefer your solution?
	OPERATIONAL IMPACT	Looking only at the soldiers who will be impacted by your solution, argue that their jobs or lives will be significantly improved if your solution is adopted. What is the impact of your solution for a soldier vs. today's solutions?
weight 50%	MILESTONE SCHEDULE	Please share with us a thoughtful execution plan. Strike a balance between giving us a sense of the detailed thinking behind the scenes and the need for your contracting officer to manage a reasonably small number of milestones during your period of performance.
COMMERCIALIZATION AND POTENTIAL	COMMERCIALIZATION POTENTIAL	Through the Applied SBIR program, the Army wants to take advantage of the speed and scale of the commercial sector. Our organization funds projects that do not rely solely on DoD funding. A key indicator of this the potential for your product / solution to create sustained profitability in the commercial sector. Make your best case that your product is or will be commercially profitable. If you have more than one product, please focus your argument on the product / solution presented for this SBIR program.
	FINANCIAL SUSTAINABILITY	Make the case that private dollars will continue to fund improvements to your solution from which the Army will benefit in the future. Companies who cannot demonstrate non-DoD funding sources for future solution enhancements are less attractive to the Applied SBIR program.
weight 30%	TRANSITION AND COMMERCIALIZATION INFORMATION	Whatever your stage in terms of technology maturity and engagement with the Army, demonstrate that you have an appropriate goal for your next step in "transitioning" with the Army (and/or DoD more broadly.) What is that next goal for you in terms of your next contracting or collaboration opportunity with the Army? Beyond this SBIR opportunity, describe the next type of deal you aim to make with the Army, e.g. a CRADA, a different SBIR contract, a CSO, etc. Briefly make the case that you know how to accomplish that mission.
TEAM ABILITY	TECHNICAL PERSONNEL	Briefly list and describe your core scientific and technical team. Do you have the people and technical capabilities you need to successfully complete your proposed project? If not, convince the reader you have a credible recruiting plan and can fill personnel gaps.
	BUSINESS PERSONNEL	Briefly list and describe your business team. Do you have the people and capabilities you need to successfully position your company for DoD Transition? If not, convince the reader you have a credible recruiting plan and can fill personnel gaps.
	PAST EXECUTION	Prove your team has executed well as a group. What milestones have you accomplished as a group in this company?
	SUMMARY	Write a clear, concise description of what your innovation does or will do, and how it will impact the Army. Readers should "get it" after reading this. Please re-use your content in both the SBIR application web form and this section of the application document itself.
weight 20%	DATA QUALITY & ATTRIBUTION	Support your arguments with relevant, properly attributed data to enhance your credibility.

© 2011 - 2021 Valid Evaluation, Inc. All rights reserved.

Appendix B

Direct to Phase II Evaluation Criteria

Army Applied SBIR Direct to Phase II (v2) Evaluation Criteria Defined

		DEFINITION
TECHNICAL FEASIBILITY	SCIENTIFIC FEASIBILITY	Is the science behind the solution sound? Convince readers who don't have deep expertise in your field that your innovation is built atop sound scientific and engineering principles.
	ENABLING TECHNOLOGIES	Point to the foundational technologies that you rely on to deliver your solution. Do the required enabling technologies introduce added risk? Using proven (and ideally Army-fielded) underlying technologies and techniques helps to lower technical risk.
	SOLUTION'S UNIQUENESS	From a warfighter's perspective, why is your proposed solution the best choice for the Army? Refute the substitutes for your solution that warfighters are either using currently or considering adopting. Why will soldiers prefer your solution?
	OPERATIONAL IMPACT	Looking only at the soldiers who will be impacted by your solution, argue that their jobs or lives will be significantly improved if your solution is adopted. What is the impact of your solution for a soldier vs. today's solutions?
weight 50%	MILESTONE SCHEDULE	Please share with us a thoughtful execution plan. Strike a balance between giving us a sense of the detailed thinking behind the scenes and the need for contracting to manage a reasonably small number of milestones during your period of performance.
COMMERCIALIZATION AND POTENTIAL	COMMERCIALIZATION POTENTIAL	Through the Applied SBIR Program, the Army wants to take advantage of the speed and scale of the commercial sector. Our organization funds projects that do not rely solely on DoD funding. A key indicator of this the potential for your product / solution to create sustained profitability in the commercial sector. Make your best case that your product is or will be commercially profitable. If you have more than one product, please focus your argument on the product / solution presented for this application.
	FINANCIAL SUSTAINABILITY	Make the case that private dollars will continue to fund improvements to your solution from which the Army will benefit in the future. Companies who cannot demonstrate non-DoD funding sources for future solution enhancements are less attractive to our program.
weight 30%	TRANSITION AND COMMERCIALIZATION INFORMATION	Whatever your stage in terms of technology maturity and engagement with the Army, demonstrate that you have an appropriate goal for your next step in "transitioning" with the Army (and/or DoD more broadly.) What is that next goal for you in terms of your next contracting or collaboration opportunity with the Army? Beyond the program, describe the next type of deal you aim to make with the Army, e.g. a CRADA, a Phase I SBIR, a Phase II, a CSO, etc. Briefly make the case that you know how to accomplish that mission.
TEAM ABILITY	TECHNICAL PERSONNEL	Briefly list and describe your core scientific and technical team. Do you have the people and technical capabilities you need to successfully complete your proposed project? If not, convince the reader you have a credible recruiting plan and can fill personnel gaps.
	BUSINESS PERSONNEL	Briefly list and describe your business team. Do you have the people and capabilities you need to successfully position your company for DoD Transition? If not, convince the reader you have a credible recruiting plan and can fill personnel gaps.
	PAST EXECUTION	Prove your team has executed well as a group. What milestones have you accomplished as a group in this company?
	QUALITY OF PROSE	Prove you write clearly and argue convincingly.
weight 20%	DATA QUALITY & ATTRIBUTION	Support your arguments with relevant, properly attributed data to enhance your credibility.

© 2011 - 2021 Valid Evaluation, Inc. All rights reserved.

Appendix C

Phase II Evaluation Criteria

Army Applied SBIR Phase II (v1) Evaluation Criteria Defined

		DEFINITION
TECHNICAL FEASIBILITY	SCIENTIFIC FEASIBILITY	Is the science behind the solution sound? Convince readers who don't have deep expertise in your field that your innovation is built atop sound scientific and engineering principles.
	ENABLING TECHNOLOGIES	Point to the foundational technologies that you rely on to deliver your solution. Do the required enabling technologies introduce added risk? Using proven (and ideally Army-fielded) underlying technologies and techniques helps to lower technical risk.
	SOLUTION'S UNIQUENESS	From a warfighter's perspective, why is your proposed solution the best choice for the Army? Refute the substitutes for your solution that warfighters are either using currently or considering adopting. Why will soldiers prefer your solution?
	OPERATIONAL IMPACT	Looking only at the soldiers who will be impacted by your solution, argue that their jobs or lives will be significantly improved if your solution is adopted. What is the impact of your solution for a soldier vs. today's solutions?
weight 40%	MILESTONE SCHEDULE	Please share with us a thoughtful execution plan. Strike a balance between giving us a sense of the detailed thinking behind the scenes and the need for contracting to manage a reasonably small number of milestones during your period of performance.
COMMERCIALIZATION AND POTENTIAL	COMMERCIALIZATION POTENTIAL	Through this program, the Army wants to take advantage of the speed and scale of the commercial sector. Our organization funds projects that do not rely solely on DoD funding. A key indicator of this the potential for your product / solution to create sustained profitability in the commercial sector. Make your best case that your product is or will be commercially profitable. If you have more than one product, please focus your argument on the product / solution presented for this program.
	FINANCIAL SUSTAINABILITY	Make the case that private dollars will continue to fund improvements to your solution from which the Army will benefit in the future. Companies who cannot demonstrate non-DoD funding sources for future solution enhancements are less attractive to this program.
weight 30%	TRANSITION AND COMMERCIALIZATION INFORMATION	Whatever your stage in terms of technology maturity and engagement with the Army, demonstrate that you have an appropriate goal for your next step in "transitioning" with the Army (and/or DoD more broadly.) What is that next goal for you in terms of your next contracting or collaboration opportunity with the Army? Beyond this program, describe the next type of deal you aim to make with the Army, e.g. a CRADA, a Phase I SBIR, a Phase II, a CSO, etc. Briefly make the case that you know how to accomplish that mission.
TEAM ABILITY	TECHNICAL PERSONNEL	Briefly list and describe your core scientific and technical team. Do you have the people and technical capabilities you need to successfully complete your proposed project? If not, convince the reader you have a credible recruiting plan and can fill personnel gaps.
	BUSINESS PERSONNEL	Briefly list and describe your business team. Do you have the people and capabilities you need to successfully position your company for DoD Transition? If not, convince the reader you have a credible recruiting plan and can fill personnel gaps.
	PAST EXECUTION	Prove your team has executed well as a group. What milestones have you accomplished as a group in this company?
	QUALITY OF PROSE	Prove you write clearly. Prove you argue convincingly.
weight 30%	DATA QUALITY & ATTRIBUTION	Support your arguments with relevant, properly attributed data to enhance your credibility.

© 2011 - 2021 Valid Evaluation, Inc. All rights reserved.

Army SBIR 224 Topic Index
Release 7

A224-013	AI/ML for Visual Processing of Energetic Defects
A224-014	Engineered Domestic Hardwood Replacement for Critically Endangered Species Hardwood
A224-015	Power Management for Energy Resiliency

A224-013 AI/ML for Visual Processing of Energetic Defects

OUSD (R&E) MODERNIZATION PRIORITY: AI/ML

TECHNOLOGY AREA(S): Materials; Electronics

OBJECTIVE: The purpose of this topic is to utilize Artificial Intelligence and Machine Learning (AI/ML) in conjunction with an in-line process control systems in order to identify defects in energetic fills of munitions including, but not limited to: cracks, voids, gaps, foreign material and chemical agent leakage. Proposal should leverage existing vision and process control system technology and energetic defect characterization studies to detect, define and decide in real time to eliminate defective parts leaving a production floor. The objective is to develop a high accuracy vision system capable of being scaled to images ranging from primers to small caliber to artillery sized energetic billets, with adaptable power to penetrate various packaging materials.

DESCRIPTION:
In current times, energetic filled parts are inspected for defects during manufacturing processes utilizing x-ray equipment. Critical defects are inspected 100%, especially for items such as Excalibur, in support of the LRPF CFT using a pass/fail criteria. Each load plant has at least basic x ray capability, and Armaments Center has lab scale X ray and CT capability but neither meet the required need to find, identify and mark for culling any critical defects.

AI/ML paired with a visual processing system will allow for efficient, correct identification of defects in energetic fills and assembly. AI/ML which builds upon energetic defect modeling will allow production plants to properly identify critical defects which cannot be sent to the field. Rejected parts will be culled from manufactured lots, reducing potential for incidents in the field due to undetected defects

Overall, a Visual system paired with a trained AI/ML model can be inserted as an in-line step in all energetic manufacturing without adding significant delay to manufacturing. Proposal should integrate a scalable visual processing control system, capable of correctly and repeatedly identifying defects in energetic fills, ranging in size from primers up to a 155mm energetic billet, with an AI/ML algorithm which identifies defect type and severity for culling from production lots. Defects presently include, but are not limited to: cracks, voids, gaps, foreign material and chemical agent leakage.

PHASE I:
Provide feasibility study to ensure all safety and material handling requirements have been addressed for utilizing a vision system in conjunction with energetic materials.

PHASE II:
Develop lab scale visual processing system capable of consistent and repeatable energetic defect detection at correct position to adequately capture defect (up to 50 mm energetic fills); Develop database of defects correlated to imaging data for several energetic items; Create and train lab scale models to identify defects for several end items.

PHASE III DUAL USE APPLICATIONS: Scale up lab scale system to pilot (up to 105mm) and then production scale (up to 155mm) for in-line defect detection in manufacturing scale processes while maintaining high resolution at necessary speed and scale.

While the explosive nature of this topic makes it niche, the visual inspection of primers allows for applications in mining, food packaging, and microelectronics.

REFERENCES:

1. Engel, W., Herrmann, M., 2001. Lattice Imperfections of Energetic Materials Measured by X Ray Diffraction. Defense Technical Information Center Technical Report from Fraunhofer Institut fur Chemische Technologie

2. Baker, E., Sharp, M., 2018. Gun Launch and Setback Actuators, 2018 Insensitive Munitions & Energetic Materials Technology Symposium Portland, OR; Munitions Safety Information Analysis Center (NATO), Brussels, Belgium

3. Trujillo, D., Guziewski, M, Coleman, S., 2019. Machine Learning for Predicting Properties of Silicon Carbide Grain Boundaries; Defense Technical Information Center Technical Report from Army Research Laboratory

KEYWORDS: Energy; Defects; AI/ML; Assembly

A224-014 Engineered Domestic Hardwood Replacement for Critically Endangered Species Hardwood

OUSD (R&E) MODERNIZATION PRIORITY: Biotechnology, Space

TECHNOLOGY AREA(S): Materials

OBJECTIVE: The purpose of this topic is to demonstrate engineered hardwoods capability to replace critically endangered Asian Apitong species that are currently being utilized as trailer decking. This prototype/testing effort will proactively manage the obsolescence of Apitong as it nears extinction, by;

- Exploring sustainable engineered domestic hardwood product sourcing
- Revitalizing American small business forest industries/workforce
- Resulting in trailer fleet lifecycle cost savings.

The replacement shall be capable of providing the same or improved benefits over the existing decking in terms of life, service, structural properties, durability and reliability.

Further objectives for this project include: utilizing industry established American Wood Protection Assoc. (AWPA) lab and environmental field exposure test protocols; conducting Truck Trailer Manufacturers Association (TTMA) based cyclic load testing on test beds at set accelerated environmental exposure intervals; and avoiding obsolescence of Apitong decking due to it becoming extinct (classified as critically-endangered by IUCN 1998). In the end, success in this project will provide a domestic alternative and monetary cost savings.

DESCRIPTION: Currently, Apitong decking requires replacement up to 5 times over a 40 year lifecycle, resulting in downtime, steel structural damage, and an estimated lifecycle cost of $20,000 per trailer (in today's dollars, at $4,000 each to re-deck every 8 years). Today's alternatives to Apitong are being researched. Upon testing, a replacement can be developed that will be capable of providing equivalent or better performance over Apitong.

This prototype effort will proactively manage the obsolescence of Apitong as it nears extinction, by: exploring sustainable panelized laminated/engineered domestic hardwood product sourcing, revitalizing American small business forest industries/workforce, and result in trailer fleet lifecycle cost savings.

Among all currently available options for Tactical Trailer decking, including metals/plastics, US hardwood products are the most: environmentally friendly (negative carbon footprint), sustainable, robust, tractive, and cost-effective material that can perform well in a wide range of; temperature, relative humidity, anti-spark, and salinity conditions.

Vehicle readiness will increase by avoiding future potential non-mission-capable dead-line situations. Additionally, 'Buy American' and Trade Agreements Act compliance achieved. The project will result in an increased understanding of materials and potential industrial base production-implementation challenges.

PHASE I: Design, Develop, and Evaluate Domestic Hardwood Replacement prototypes, in scaled form, IAW the following protocols:

a. Industry established American Wood Protection Assoc. (AWPA) lab and environmental field exposure test protocols.

b. Truck Trailer Manufacturers Association (TTMA) based cyclic load testing will be conducted on test beds at set accelerated environmental exposure intervals.

c. The offeror shall demonstrate the capabilities of the prototype in simulated operational environments that demonstrate loading, unloading, cribbing, and abuse (examples: track vehicle turning, tracked vehicle sudden stop, overloading events, and other events consistent with trailer usage).

In addition to technical merit, feasibility, commercial potential and performance quality will be determined at this time based on the results.

PHASE II: Offeror shall demonstrate the down selected Domestic Hardwood Replacement on a military trailer platform IAW the following protocols:

a. Industry established American Wood Protection Assoc. (AWPA) lab and environmental field exposure test protocols.

b. Truck Trailer Manufacturers Association (TTMA) based cyclic load testing will be conducted on test beds at set accelerated environmental exposure intervals.

c. The offeror shall demonstrate the capabilities in an operational environment that demonstrates loading, unloading, cribbing, and abuse (examples: track vehicle turning, tracked vehicle sudden stop, overloading events, and other events consistent with trailer usage).

Upon successful completion and review by ESAs/SMEs the offer shall have created detailed drawings, manufacturing plans, to support Phase III implementation

PHASE III DUAL USE APPLICATIONS: Pursue small business commercialization objectives from the above efforts, including supply chain establishment and formalization of competitive DoD decking specification.

This topic is mainly geared towards truck and trailer decking, which will have a significant impact on both military and commercial use cases. As this species of hardwood nears extinction, this engineered hardwood could also be used in more applications that currently utilize Apitong.

REFERENCES:

Hardwood Review Weekly; 2020, October 2; Volume 36, Issue 2; Hardwood Publishing, Charlotte, NC.

Hardwood Review eGlobal Asia; 2020, September; Hardwood Publishing, Charlotte, NC.

Kukachka, B. F. 1970. Properties of imported tropical woods. Conference of Tropical Hardwoods held at the State University College of Forestry, Syracuse University, August 18-21, 1969. U.S. Dep. Agric. For. Serv. Res. Pap. FPL 125. For. Prod. Lab., Madison, Wis.

National Hardwood Lumber Association (NHLA). 2019. RULES FOR THE MEASUREMENT & INSPECTION OF HARDWOOD & CYPRESS. Memphis, Tennessee.

USDA Forest Service. Forest Products Laboratory. Tropical timbers of the world, by Martin Chudnoff. Madison, Wis., Forest Prod. Lab., For. Serv., USDA, 1979. 831 p.

USDA Forest Service. Forest Products Laboratory. 2010. Wood handbook—Wood as an engineering material. General Technical Report FPL-GTR-190. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory. 508 p.

USDA Forest Service. 2020. Forests of New York, 2019. Resource Update FS-250. Madison, WI: U.S. Department of Agriculture Forest Service, Northern Research Station. 2 p. https://doi.org/10.2737/FS-RU-250

KEYWORDS: Sustainability; Materials; Hardwood; Decking; Truck/Trailer

A224-015 Power Management for Energy Resiliency

OUSD (R&E) MODERNIZATION PRIORITY: General Warfighting Requirements

TECHNOLOGY AREA(S): Electronics; Air Platform

OBJECTIVE:
Future fleet and hybrid propulsion aircraft will need advanced power management systems that can monitor and adjust loads throughout the power system to accommodate mission requirements. Such a system must be capable of rapid load shed for emergency operations. This topic is considered an open source/publicly available model basis. Please follow GPR rights to optimized architecture using MOSA and FACE standards.

DESCRIPTION:
Currently, power management on board rotorcraft is basic with loads controlled by individual breakers in series. These limitations prevent optimal use of the available power and have limited capacity for robust control algorithms. These inefficiencies result in wasted fuel and increased emissions.

The purpose of this topic is to develop advanced power management technology applicable to future fleet and hybrid/electric propulsion aircraft resulting in significant fuel savings. A 1% increase in fuel efficiency can result in millions of gallons of fuel savings for the fleet over the course of a year.

Proposer must be able to demonstrate the following:

- Develop advanced power management modeling capability
- Develop an optimized power management system architecture for the UH-60 platform with scalable architecture for FVL platform applications
- Build and validate component level hardware & software in laboratory testing
- Demonstrate power management system in systems integration laboratory and vehicle integration demonstration

Upon success, electrical power systems will become more efficient and lightweight reducing the fuel burn needed to supply them while providing increased electrical power capability. Success will be measured through efficiency improvements (fuel burn, electrical efficiency), weight reductions, and reduced pilot workload (Bedford Scale) through power system automation.

PHASE I: Develop power management architecture framework for UH-60 to form basis for further electrical power system advancements.

PHASE II: Conceptual design of advanced architecture(s) for UH-60 that is applicable to FVL. Architecture(s) will include advanced components and software concepts culminating in a down-select to an optimized architecture. Advanced software development to FACE standards based on optimized architecture design;

Software and hardware integration compatibility bench demonstration, leading to UH-60 architecture software and component integration for validation testing in a systems integration laboratory.

PHASE III DUAL USE APPLICATIONS: Integration of software/hardware into UH-60 platform for limited ground and flight demonstration

While this topic was originally geared towards aviation use cases, this technology can be strongly applicable to electric vehicle use cases. With the proliferation of this tech, there is a higher chance of commercial EV adoption.

REFERENCES:

Ali AM, Söffker D. Towards Optimal Power Management of Hybrid Electric Vehicles in Real-Time: A Review on Methods, Challenges, and State-Of-The-Art Solutions. Energies. 2018; 11(3):476. https://doi.org/10.3390/en11030476

KEYWORDS: Power management; Energy efficiency; Software Integration; Power system