October 30, 2017

NOTICE OF FUNDING OPPORTUNITY (NOFO)
NIST Public Safety Innovation Accelerator Program – User Interface (PSIAP-UI)

EXECUTIVE SUMMARY

- **Federal Agency Name:** National Institute of Standards and Technology (NIST), United States Department of Commerce (DoC)

- **Funding Opportunity Title:** NIST Public Safety Innovation Accelerator Program – User Interface

- **Announcement Type:** Initial

- **Funding Opportunity Number**: 2018-NIST-PSIAP-UI

- **Catalog of Federal Domestic Assistance (CFDA) Number:** 11.609, Measurement and Engineering Research and Standards

- **Dates:** Required Pre-Applications must be received electronically through Grants.gov no later than 11:59 p.m. Eastern Time, Friday, December 29, 2017. Pre-Applications received after this date will not be reviewed or considered. NIST will consider the date and time recorded by www.grants.gov as the official submission time. Assessment of Pre-Applications, selection, and notification to applicants is expected to be complete on or about January 26, 2018. Selected applicants will then be invited to submit a Full Application. Full Applications must be received electronically through Grants.gov no later than 11:59 p.m. Eastern Time, Tuesday, March 27, 2018. Applications received after this deadline will not be reviewed or considered.

  Applicants should be aware, and factor in their application submission planning for both Pre- and Full Applications, that **the Grants.gov system is expected to be closed for routine maintenance** from 12:01 a.m. Eastern Time, Saturday, November 18, 2017 until Monday, November 20, 2017 at 6:00 a.m. Eastern Time; and from 12:01 a.m. Eastern Time, Saturday, December 16, 2017 until Monday, December 18, 2017 at 6:00 a.m. Eastern Time; and again from 12:01 a.m. Eastern Time, Saturday, February 17, 2018 until Tuesday, February 20, 2018 at 6:00 a.m. Eastern Time; and also from 12:01 a.m. Eastern Time, Saturday, March 17, 2018 until Monday, March 19, 2018 at 6:00 a.m. Eastern Time. **Pre- and Full Applications cannot be submitted when Grants.gov is closed.**

NIST expects to complete its review, selection of successful Full Applicants, and award processing by May 2018. NIST expects the earliest start date for awards under this NOFO to be June 1, 2018.

Applicants are strongly urged to read Section IV.2.b. and IV.3.b. Attachment of Required Documents for Pre-Applications and Full Applications of this NOFO with great attention. Applicants should carefully follow the instructions and recommendations regarding attachments and use the Download Submitted Applications feature on www.grants.gov to check that all required attachments were contained in their submission. Pre-Applications and Full Applications submitted without the required documents will not pass the Initial Administrative Review, described in Section V.4.a.(1) of this NOFO for Pre-Applications and Section V.4.b.(1) of this NOFO for Full Applications.

When developing the submission timeline, please keep in mind that: (1) all applicants are required to have a current registration in the electronic System for Award Management (SAM.gov); (2) the free annual registration process in the SAM.gov (*see* Section IV.4. and Section IV.8.a.(1).(b) of this NOFO) often takes between three and five business days and may take as long as two weeks; (3) electronic applicants are required to have a current registration in Grants.gov; and (4) applicants using Grants.gov will receive e-mail notifications over a period of up to two business days as the application moves through intermediate systems before the applicant learns via a validation or rejection notification whether NIST has received the application. (*See* www.grants.gov for full information on application and notification through Grants.gov). Please note that a federal assistance award cannot be issued if the designated recipient's registration in the System for Award Management (SAM.gov) is not current at the time of the award.

- **Application Submission Address:** Applications must be submitted using Grants.gov.

- **Funding Opportunity Description:** The NIST Public Safety Innovation Accelerator Program – User Interface seeks applications from eligible applicants for activities to accelerate research, development, production, and testing of user interface technologies and capabilities through the use of virtual reality (VR) and augmented reality (AR) for first responders as described in Section I. of this NOFO.

- **Anticipated Amounts:** In FY 2018, NIST anticipates funding up to $5,000,000 in new awards. For awards covering Goal 1 - AR/VR Technology Development and Prototyping, funds are expected to range from $200,000 to $500,000 per year per project. For awards covering Goal 2 – Research on the Effectiveness and

Transferability of AR/VR Simulations, funds are expected to range from $100,000 to $200,000 per year per project. If applicants submit one proposal covering both goals, the combined awards range is expected to be $200,000 to $600,000 per year. Project performance periods may be up to two (2) years, with the exception of proposals submitted by institutions of higher education for the purposes of supporting research by graduate students as part of a doctoral program, for which the period of performance may be up to three (3) years. All awards will be consistent with the multi-year funding policy (*see* Section II.2. of this NOFO).

- **Funding Instrument:** Grant or cooperative agreement, as appropriate.

- **Eligibility:** All programs listed in this NOFO are open to all non-Federal entities. Eligible applicants include institutions of higher education, non-profit organizations, for-profit organizations, state and local governments, Indian tribes, hospitals, foreign public entities, and foreign governments. Please note that individuals and unincorporated sole proprietors are not considered "non-Federal entities" and are not eligible to apply under this NOFO. Although Federal entities are not eligible to receive funding under this NOFO, they may participate as unfunded collaborators.

  NIST will consider multiple Pre-Applications and Full Applications per applicant; however, an individual researcher may only be listed as the principal investigator on one Pre-Application and Full Application. In addition, applicants should refrain from submitting multiple Pre-Applications with related subject matter.

- **Cost Sharing Requirements:** Matching funds are not required for this NOFO.

- **Public Website, Frequently Asked Questions (FAQs) and Webinar:** NIST has a public website (www.nist.gov/ctl/pscr or www.pscr.gov) that provides information pertaining to this Funding Opportunity[1]. NIST anticipates that a "Frequently Asked Questions" section or other resource materials will be maintained and updated on the website as needed to provide additional guidance and clarifying information that may arise related to this Funding Opportunity. Any amendments to this NOFO will be announced through Grants.gov.

  Applicants must submit all questions pertaining to this funding opportunity in writing to pscr@nist.gov with "PSIAP-UI" in the subject line. Questions submitted to NIST may be posted on www.nist.gov/ctl/pscr. Alternatively, applicants may ask questions during the informational public webinar as described in the next paragraph.

[1] Refer to Section VII. of this NOFO, Federal Awarding Agency Contacts, Programmatic and Technical Questions, if this link is no longer working or more information is needed.

NIST will host a webinar to provide general information regarding this NOFO, offer general guidance on preparing applications, and answer questions. Scheduling details about the webinar will be available at www.nist.gov/ctl/pscr. Proprietary technical discussions about specific project ideas will not be permitted and NIST staff will not critique or provide feedback on specific project ideas while the competition is in progress. However, questions about the PSIAP-UI, eligibility requirements, evaluation and award criteria, selection process, and the general characteristics of a competitive application can be addressed at the webinar and by e-mail to pscr@nist.gov as described in the previous paragraph. There is no cost to attend the webinar, but participants must register in advance. Participation in the webinar is not required, and will not be considered in the application review and selection process. Additional information on the PSIAP-UI and webinar is available at www.nist.gov/ctl/pscr.

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FULL ANNOUNCEMENT TEXT

I. Program Description

The statutory authority for the NIST Public Safety Innovation Accelerator Program is 15 U.S.C. § 3706 and 47 U.S.C. § 1443.

The NIST Public Safety Innovation Accelerator Program – User Interface (PSIAP-UI) is seeking applications to accelerate research and development (R&D) around the use of augmented reality (AR) and virtual reality (VR) for improving public safety user interfaces.

Specifically, PSIAP-UI is seeking applications within two goal areas: (1) **AR/VR Technology Development and Prototyping** and (2) **Research on the Effectiveness and Transferability of AR/VR Simulations**. These goals, and specific technical areas of research in the PSIAP-UI program, are discussed in detail in Section I.D. of this NOFO.

A. PSCR Background

The Public Safety Communications Research (PSCR) division, housed within NIST's Communications Technology Laboratory, conducts research for the first responder community.

The PSIAP-UI is one of several initiatives within PSCR. The goal of the PSIAP-UI is to accelerate R&D in AR/VR that directly impacts first responder operations through improved user interfaces.

The purpose of this NOFO is to implement technology that will enable researchers to test user interfaces to enhance public safety. Award recipients will help achieve this by creating new technology or applying current technology to a specific public safety use case. Recipients will also conduct research to support testing user interfaces within the AV/VR environment and ensure the results are transferable to real-world implementations. PSCR intends to build an AR/VR test bed for the public safety communications research community. The R&D produced from the awards made under this NOFO will aide in the future development of this test bed.

In 2013, PSCR initiated a strategy planning effort to identify potential R&D focus areas[2]. First responders, government officials, industry leaders and academics who participated in that effort identified Enhanced User Interface/User Experience (UI/UX) as one of three key portfolios for R&D investment.

A UI/UX working group was formed and their inputs along with industry forecasts were incorporated into a 20-year technology roadmap to benefit the entire public safety community[3]. As a follow-up, a UI/UX R&D Summit was held to further discuss and prioritize the scope of work identified in the technology roadmap, focusing on twelve operational objectives that included AR interfaces and VR systems. Attendees were instructed to identify the most pressing technology gaps currently limiting the use of

[2] Location-Based Services R&D Roadmap; NIST Technical Note 1883; http://nvlpubs.nist.gov/nistpubs/TechnicalNotes/NIST.TN.1883.pdf

[3] Public Safety User Interface R&D Roadmap; NIST Technical Note 1961; http://nvlpubs.nist.gov/nistpubs/TechnicalNotes/NIST.TN.1961.pdf

UI/UX in the public safety arena, and then to prioritize these challenges based on five investment criteria – leverage, feasibility, impact on public safety processes, rewards/results, and uniqueness to public safety.

More information about PSCR, as well as technology roadmaps and summit reports, may be found at www.nist.gov/ctl/pscr.

AR/VR and Public Safety

Simulation systems have been used for years to train personnel in a variety of industries. Pilots have clocked hours in flight simulators, the military have trained personnel through war games, and teachers have inspired students through immersive experiences. Similar systems have recently emerged that leveraged VR to provide training for fire fighters (e.g., FLAIM) and law enforcement personnel (e.g., UCF E2i Creative Studio). These systems are beneficial tools for developing skills for new recruits and veterans alike and afford the opportunity to test new technologies before they are implemented in the real world.

AR/VR offer new opportunities to develop and test technology for public safety operations and communications, and the user interface is an ideal technology to test within an AR/VR environment. While AR/VR do not replace the need for real-life training, they allow for repeatable and measurable testing in a safe and controlled environment. Developing a new product for first responders requires complex and resource-intensive testing. AR/VR shifts this paradigm by leveraging realistic simulations within a VR/AR environment, reducing the time to bring a product to market and helping ensure that new public safety devices have a positive impact on first responder operations.

First responders will have a greater dependency on user interfaces as new technology and systems are developed to support their operations. An AR/VR environment that offers public safety-specific content, including scenarios, equipment, and tasks, will provide a safe and effective means for testing and developing these enhanced user interfaces.

B. Research Opportunities under this NOFO

Awardees will create VR/AR content including: the design and development of virtual environments (e.g., subway, roadway), programming tasks (e.g., extinguish fire, medical assessment), and implementing user interfaces (e.g., heads-up display). Awardees may also conduct research to enhance traditional AR/VR systems to become more modular and adaptable to various scenarios, create objects to be used as tools or equipment,

develop additional user interfaces through haptic feedback (e.g., sound, tactile), and prototype innovative technology that may be used when interacting within an AR/VR experience.

Awardees may also address specific research areas around the effectiveness and transferability of testing within an AR/VR environment. Potential areas of research include cognitive load, physical strain, content, user interface attributes and delivery, measurement capabilities, and testing methodologies.

C. Basic Competition Information

Applicants may address both goals described below in Section I.D. of this NOFO within one application or focus on one of the two goals. Applicants also have the option of submitting multiple applications provided that the subject matter and principal investigator are not listed in another application under this NOFO.

PSCR is requiring Pre-Applications for the PSIAP-UI NOFO. The Pre-Application will contain an abbreviated narrative, resumes of key personnel, a quad chart and a budget estimate for the proposed project.

Successful pre-applicants will be invited to submit a Full Application. Applicants will be limited to submitting Full Applications for the goals specified in their successful Pre-Applications.

Applicants are required to develop partnerships with PSOs. Potential applicants are responsible for contacting the organizations and arranging partnerships. NIST will not assist potential applicants with finding partners. For purposes of this NOFO, PSOs include U.S. federal, state, and local emergency medical services (EMS), fire services, law enforcement, and public safety communications/911 centers.

Applicants should propose projects that include active and sustained engagement with first responders. This engagement ensures that the R&D outputs of each PSIAP-UI project are highly relevant and will have a meaningful impact on the public safety community. Applicants are encouraged to include funding in their proposed budget for non-federal first responders and public safety personnel to actively participate within their projects, and to budget significant time and sufficient travel for this interaction. Federal entities are not eligible to receive funding under this NOFO, though they may participate as unfunded collaborators. Potential applicants who are proposing work that would benefit from the involvement of public safety personnel, but who have not yet identified suitable partners, are encouraged to submit Pre-Applications. Pre-applicants invited to submit Full Application will be required to have letters of commitment from PSOs as part of their Full Applications.

Applicants should also ensure that their R&D projects are tailored to disseminate their ideas and technology to the public safety stakeholder community. Dissemination may be achieved through publications and technology transfer including: commercialization, training, or the release of tools, designs, and/or data sets. Applicants may include costs to support the dissemination of the results and lessons of their PSIAP-UI R&D efforts to the public safety stakeholder community in their project budgets.

D. Technical Program Goals

Recipients will rapidly accelerate the objectives of the PSIAP-UI through innovative R&D projects addressing one or both program goals: **Goal 1 - AR/VR Technology Development and Prototyping** and **Goal 2 - Research on the Effectiveness and Transferability of AR/VR Simulations.**

1. Goal 1 - AR/VR Technology Development and Prototyping

The wide array of public safety operations present a development opportunity within the user interface technology area. First responders are seeing an increase in both the amount and types of data presented to them (e.g., location-based sensors, video streaming content). To benefit from these data sources, user interfaces need to be developed that allow first responders to interact effectively with the systems, without inducing cognitive overload. AR/VR afford the unique opportunity to develop, test, and measure the effectiveness of these user interfaces in a controlled environment without putting a public safety user in danger.

AR/VR is a rapidly growing technology. Despite this momentum, currently the products in the AR/VR marketplace that meet the requirements of public safety users are limited. Accordingly, PSCR seeks applications under this NOFO for R&D projects to stimulate commercial and technical organizations to create and support a market for public safety user interfaces. This market would improve the current state of AR/VR technologies specifically for fire fighter, EMS, and law enforcement operations and tasks. PSCR intends to use the technology developed from these grants to create a testbed environment in AR/VR for testing, measuring and developing future user interfaces. Applicants have the opportunity to develop key components of this testbed, as well as user interfaces that will potentially be used by PSOs.

a. Scenarios from NISTIR 8181 - Incident Scenarios Collection for Public Safety Communications Research: Framing the Context of Use:

Multiple vendors now offer unique hardware and software platforms that support several graphic engines and development tools. To obtain the greatest benefit for public safety, PSCR strives to have open solutions that allow for future integration. Developers should take into consideration the ease of access, development and integration for the hardware, software, and engines selected for their solutions. PSCR has not identified specific AR/VR hardware (e.g., HTC Vive, Microsoft HoloLens) or software solutions (i.e., Unreal, Unity graphic engines) for development, but is requiring that the technology selected be unmodified (i.e., default versions). Applicants must clearly identify in their proposals any additional dependencies (e.g., plug-ins) their solution will require.

Due to this variety of hardware and software platforms available, PSCR is requiring applicants to develop at least one incident scenario. This provides a comparative baseline across the solutions and minimizes the resources necessary for integrating additional technologies (e.g., prototypes, user interfaces). Three scenarios have been selected from the NISTIR 8181 - Incident Scenarios Collection for Public Safety Communications Research: Framing the Context of Use and are listed below in I.1.a.i-iii. Applicants must use at least one of the following scenarios in their proposals, but may use more than one scenario and may also develop additional scenarios as part of their proposal.

These scenarios were selected to provide PSCR with a broad range of public safety operations and to supplement current AR/VR environments PSCR has already developed. Developers should reference the NISTIR 8181 - Incident Scenarios Collection for Public Safety Communications Research: Framing the Context of Use for additional details related to each scenario, including the consideration factors for each, and other example incident scenarios. Applicants are encouraged to go beyond these descriptions and add specific tasks or operations that would benefit testing of user interfaces.

i. NISTIR 8181 – Scenario 3, Subway Fire - At 15:14, an Office of Unified Communications (OUC) operator received a call from a subway supervisor about a debris fire on the tracks near a major subway station. Additional 9-1-1 calls were received reporting heavy smoke at and near the station. A train stopped after encountering an accumulation of heavy smoke while traveling southbound in a subway tunnel. After stopping, the rear car of the train was about 386 feet from the south end of the subway station platform. Ten minutes later, the OUC operator received a call for medics at the station because people could barely breathe due to the smoke. OUC dispatched a Rail Station Box Alarm to the subway station.

ii. NISTIR 8181 – Incident Scenario 22, Traffic Stop –– At 18:17, while on routine traffic patrol, an officer observed a car that ran through a red light at an intersection. No wants/warrants were associated with the vehicle. The officer approached the pulled-over vehicle and the officer's on-person video camera scanned the driver's face. The driver did not provide documentation, but the facial recognition results showed that

the driver did not match the registered owner and had a record with previous drug possession and assault charges. Backup officers arrived and a vehicle search was conducted after officers noticed marijuana remains in the ashtray. Several bags of a white substance that appeared to be cocaine were found and the driver was placed under arrest.

iii. NISTIR 8181 – Incident Scenario 24, EMS-Heart Attack - At 16:19, dispatch received a 9-1-1 call from the relative of a man who returned home from playing tennis and reported having chest pains. At 16:23, paramedics entered the home to find the patient barely conscious on the living room couch. Paramedics performed a preliminary medical assessment and transferred the patient to the ambulance. The cardiologist at the nearest hospital recommended transport to a different hospital for cardiac catheterization.

VR/AR users sometimes experience negative effects due to poor framerate, framerate drops, removing control of movement (e.g., cut scenes, cinematics), intense light and imagery, poor calibration, and non-voluntary movement (e.g., falling). The developed scenarios should limit these effects to minimize the potential for motion sickness, disorientation, and confusion by AR/VR participants. In addition to the scenario development described above, PSCR encourages applicants to produce additional capabilities that support the use of AR/VR for improved user interface testing and development.

b. Anticipated PSIAP-UI R&D Projects for Goal 1:

The following are possible R&D projects that the PSCR hopes to fund through this NOFO.

i. Develop modular capabilities for AR and/or VR platforms that offer ease of manipulation when creating new environments or scenarios. Examples include, but are not limited to, movable foam blocks with sensors that create virtual objects, physical dummies depicting virtual humans, or environmental elements that induce heat that are associated with a virtual fire.

ii. Develop user interfaces for public safety tasks that are able to present data to the user in an intuitive and non-invasive manner. Examples of potential user interfaces include, but are not limited to, physical gestures, heads-up display, audio cues, visual cues, vocal commands, eye-tracking, or vibration. The user interface should inform the user of data important to their task, such as waypoint or map indicators, utility information, temperature readings, etc. User Interfaces should integrate with sensors, mobile devices, or other peripherals used by the participant.

iii. Create public safety equipment prototypes that offer ideal interaction for use within an AR/VR environment. Examples of equipment include, but are not limited to, a handgun, fire hose, or defibrillator. Feedback should address any of these four human senses; touch (vibrations, texture, temperature, etc.), smell (e.g., smoke), sight, and hearing. Prototypes should also include objects that induce physiological effects such as increases in stress, adrenaline, heart rate, blood pressure, etc.

iv. Develop methods beyond traditional wands or controllers to improve interactions within an AR/VR. Examples include, but are not limited to, the physical touch of an object and visualizing the participant's hands to enhance the scenario and tasks being assessed.

Research areas beyond those described above in Section I.D.1.b. may be beneficial. Applicants may propose additional projects they believe useful in achieving Goal 1.

2. Goal 2 - Research on the Effectiveness and Transferability of AR/VR Simulations

AR/VR will enable new ways of testing and developing technology. For public safety to benefit from these innovations, research must be conducted around the effectiveness and transferability of testing user interfaces in an AR/VR environment to real world implementations.

The PSCR-UI anticipates funding proposals in the following R&D areas for researching the effectiveness and the transferability of AR/VR user interface testing. Applicants are encouraged to identify additional R&D areas that support testing user interfaces in an AR/VR environment and ensure that the impacts are transferable to real-world operations.

a. Anticipated PSIAP-UI R&D Projects for Goal 2:

i. Develop and test methods to induce cognitive load and physical strain in a safe and repeatable manner. Examples include, but are not limited to, VR treadmills, warm-up exercises before entering simulation, physical navigation of a room with AR, or the use of noise or visual elements to load sensory receptors.

ii. Identify characteristics and tasks (e.g., duration, location) for ideal public safety scenarios and environments. Examples include, but are not limited to, evaluating whether CPR is an effective simulation that transfers to real-world tasks, testing whether extinguishing a fire or navigating a structure is effective for measuring impacts of user interfaces, or determining if a 10-minute simulation can capture sufficient test results or if 30 minutes is required.

iii. Determine what public safety equipment is most applicable for testing user interfaces within AR/VR environments. Examples include, but are not limited to, testing the appropriateness of using objects, whether simulator or real, such as fire hoses, defibrillators, hand guns, Tasers, vehicles, axes, or oxygen tanks.

iv. Determine what attributes can be measured within an AR/VR environment, how the attributes are measured, and what attributes indicate a positive or negative impact of a user interface for a specific task or scenario. Examples include, but are not limited to, determining whether a participant completing a task in a shorter duration, avoiding hazards and risks, or completing objectives translates to a more effective user interface.

v. Test the ability to reuse environments for multiple tests without biasing measurements. Examples include, but are not limited to, determining what elements of an environment must be changed for the participant to complete another test of a user interface or test if multiple scenarios (e.g., extinguish fire in a kitchen, rescue victim in bedroom) can be conducted in the same environment by the same participant without impacting the effectiveness of the user interface because the user becomes more familiar with the content.

vi. Explore methods to improve the immersive experience or the presence of participants and determine whether such methods translate to more effective testing. Examples include, but are not limited to, warm-up or training exercises prior to the simulations uses for testing user interfaces, determining whether there is a certain time range as to when the participant becomes more immersed, testing if an upper time limit impacts the participant's presence in an experience due to fatigue or discomfort, or testing for the ideal field-of-view ranges.

vii. Identify means to interact and complete tasks that are likely to transfer to real-world implementations. Examples include, but are not limited to, testing the use of an object that replicates a gun being fired or a fire hose spraying water, benefit of using a treadmill for navigating within a VR simulation, testing if gloves that display virtual hands are more efficient than controllers or wands.

viii. Determine the ideal amount and method of delivering content to user through the user interface. Examples include, but are not limited to, measuring cognitive load and the participant's response to heads-up display displaying multiple indicators, audio cues at various decibel levels, or tactile feedback.

ix. Testing user interfaces to determine if a specific one is better than others for aiding the various public safety disciplines (e.g., EMS, fire service, and law enforcement) in conducting tasks. Examples include, but are not limited to, determining if heads-up displays are more effective then audio cues when navigating a structure fire,

measuring the ability of EMS to alert to a patient from a tactile indicator, or testing law enforcement's ability to process input on a suspect from a AR visual display while conducting a traffic stop.

x. Explore techniques to measure the situational awareness of participant. Examples include, but are not limited to, creating content with multiple events and measuring participant's response to various aspects of the scenario or research user interfaces that highlight areas of a simulation that may be out of the norm.

Research areas beyond those described above in Section I.D.2.a. may be beneficial. Applicants may propose additional projects they believe useful in achieving Goal-2.

E. PSCR Public Safety Stakeholder Yearly Meetings

PSCR hosts an annual stakeholders meeting with public safety, industry, and academia. The meeting provides the opportunity to share project updates and identify new endeavors. Awardees will be required to send a minimum of one team member to the meetings to meet with stakeholders and present key plans and findings of their work to date. Awardees may be given the opportunity to present materials through plenary, demonstration tables, or poster sessions. These meetings should be included in project timelines and budgets. Costs for attending this meeting and any other travel must be included in the budget form SF-424A (*see* Section IV.3.a.(2) of this NOFO) and described in the budget narrative (*see* Section IV.3.a.(9)(d) of this NOFO).

II. Federal Award Information

1. Funding Instrument

The funding instrument for these awards will be grants or cooperative agreements, as appropriate. Where cooperative agreements are used, the nature of NIST's "substantial involvement" will generally include collaboration with the recipients in the scope of work.

2. Multi-Year Funding Policy

When an application for a multi-year award is approved, funding will usually be provided for only the first year of the project. If a project is selected for funding, NIST has no obligation to provide any additional funding in connection with that award. Continuation of an award to increase funding or extend the period of performance is at the sole discretion of NIST. Continued funding will be contingent upon satisfactory performance, continued relevance to the mission and priorities of the PSIAP-UI, and the availability of

funds. Under this NOFO, NIST may elect to fully fund awards or to fund awards in accordance with the Multi-Year Funding policy.

3. Anticipated Amounts

In FY 2018, NIST anticipates funding up to $5,000,000 in new awards. For awards covering Goal 1 - AR/VR Technology Development and Prototyping, funds are expected to range from $200,000 to $500,000 per year per project. For awards covering Goal 2 – Research on the Effectiveness and Transferability of AR/VR Simulations, funds are expected to range from $100,000 to $200,000 per year per project. If applicants submit one proposal covering both goals, the combined fund awards range is expected to be $200,000 to $600,000 per year. Project performance periods may be up to two (2) years, with the exception of proposals submitted by institutions of higher education for the purposes of supporting research by graduate students as part of a doctoral program, for which the period of performance may be up to 3 (three) years. All awards will be consistent with the multi-year funding policy (*see* Section II.2. of this NOFO).

III. Eligibility Information

1. Eligible Applicants

All programs listed in this NOFO are open to all non-Federal entities. Eligible applicants include institutions of higher education, non-profit organizations, for-profit organizations, state and local governments, Indian tribes, hospitals, foreign public entities, and foreign governments. Please note that individuals and unincorporated sole proprietors are not considered “non-Federal entities” and are not eligible to apply under this NOFO. Although Federal entities are not eligible to receive funding under this NOFO, they may participate as unfunded collaborators.

NIST will consider multiple Pre-Applications and Full Applications per applicant; however, an individual researcher may only be listed as the principal investigator on one Pre-Application and Full Application. In addition, applicants should refrain from submitting multiple Pre-Applications with related subject matter.

2. Cost Sharing or Matching

Matching funds are not required for this NOFO.

IV. Pre-Application / Full Application and Submission Information

1. Address to Request Application Package

The Pre-Application package is available at www.grants.gov under Funding Opportunity Number 2018-NIST-PSIAP-UI. The Full Application package can be obtained by requesting it via an e-mail message to pscr@nist.gov.

2. Content and Form of Pre-Application Submission

a. Required Forms and Documents. The Pre-Application must contain the following:

(1) SF-424, Application for Federal Assistance. The SF-424 must be signed by an authorized representative of the applicant organization.

- SF-424, Item 8.d. Zip/Postal Code field, should reflect the Zip Code + 4 (#####-####) format.
- SF-424, Item 12, should list the NOFO number 2018-NIST-PSIAP-UI.
- SF-424, Item 18, should list the total Federal budget amount requested for the entire project.
- For SF-424, Item 21, the list of certifications and assurances is contained in the SF-424B.

(2) SF-424A, Budget Information - Non-Construction Programs. A preliminary budget estimate that reflects the anticipated expenses for the entire project, considering all potential cost increases, including cost of living adjustments.

(3) Executive Summary and Quad Chart. (This does not count toward the page limit.) The executive summary must explicitly state the objectives and approaches to meet those objectives, anticipated challenges, and benefits and impacts of the proposed project. The summary must state which goal(s) the applicant is addressing (i.e., Goal 1, Goal 2, or both). The quad chart must contain a summary of the proposed project, the potential impact of the project, key milestones and/or deliverables, and applicant background. **The executive summary and the quad chart must not exceed one (1) page each.** Any materials provided beyond the one (1) page limit for the executive summary and the one (1) page limit for the quad chart will not be redacted and not provided to the reviewers.

(4) Pre-Application Narrative. A word-processed document of no more than seven (7) pages. The Pre-Application Narrative should describe the proposed project and degree of alignment with objectives detailed in the goals of this NOFO. Sufficient information should be provided to address the Pre-Application evaluation criteria (*see* Section V.1. of this NOFO), specifically: strategic alignment with the program's objectives *(see* Section I. of this NOFO); qualifications and resources availability; project execution; and public safety mission.

(5) Resume(s). Resumes are required for all key personnel, including the principal investigator. Resumes are limited to two (2) pages per individual and do not count toward the seven (7) page limit of the Pre-Application Narrative.

b. Attachment of Required Documents for the Pre-Application

Items IV.2.a.(1) and IV.2.a.(2) above are part of the standard application package in Grants.gov for 2018-NIST-PSIAP-UI Pre-Applications and can be completed through the download application process.

Items IV.2.a.(3) through IV.2.a.(5) must be completed and attached by clicking on "Add Attachments" found in item 15 of the SF-424, Application for Federal Assistance. This will create a zip file that allows for transmittal of the documents electronically via Grants.gov.

Applicants should carefully follow specific Grants.gov instructions at www.grants.gov to ensure the attachments will be accepted by the Grants.gov system. ***A receipt from Grants.gov indicates only that an application was transferred to a system. It does not provide details concerning whether all attachments (or how many attachments) transferred successfully.*** Applicants using Grants.gov will receive a series of e-mail messages over a period of up to two business days before learning whether a Federal agency's electronic system has received its application.

The Grants.gov Online Users Guide available at the Grants.gov site (http://go.usa.gov/cjaEh) provides vital information on checking the status of applications. See especially the "Check My Application Status" option, found by clicking first on Applicants, and then by clicking on Applicant Actions.

Applicants can track their submission in the Grants.gov system by following the procedures at the Grants.gov site (http://go.usa.gov/cjamz). It can take up to two business days for an application to fully move through the Grants.gov system to NIST, however, applicants can immediately check that they properly submitted the application in Grants.gov by following the Grants.gov tracking procedures cited above.

NIST uses the Tracking Numbers assigned by Grants.gov, and does not issue Agency Tracking Numbers.

c. Pre-Application Format

(1) Paper, E-mail and Facsimile (fax) Submissions. Will not be accepted.

(2) Figures, Graphs, Images, and Pictures. Should be of a size that is easily readable or viewable and may be landscape orientation.

(3) Font. Easy to read font (12-point minimum). Smaller type may be used in figures and tables but must be clearly legible**.**

(4) Page Limit. The Pre-Application Executive Summary is limited to one (1) page; the Pre-Application Quad Chart is limited to one (1) page; and the Pre-Application Narrative is limited to seven (7) pages.

(5) Page Limit Excludes: SF-424, Application for Federal Assistance; SF-424A, Budget Information – Non-Construction Programs; and Resumes of key personnel (although resumes are limited to two (2) pages per individual).

(6) Page size. 21.6 centimeters by 27.9 centimeters (8 ½ inches by 11 inches).

(7) Application language. English.

d. Pre-Application Replacement Pages. Applicants may not submit replacement pages and/or missing documents once an application has been submitted. Revisions can only be made by submitting a complete new Pre-Application that is received by NIST before the submission deadline.

3. Content and Form of Full Application Submission (only for Applicants who submitted Pre-Applications and are invited to submit Full Applications)

a. Required Forms and Documents. The Full Application must contain the following:

(1) SF-424, Application for Federal Assistance. The SF-424 must be signed by an authorized representative of the applicant organization.

SF-424, Item 8.d. Zip/Postal Code field, should reflect the Zip Code + 4 (#####-####) format.

- SF-424, Item 12, should list the NOFO number supplied by NIST to the applicants invited to submit Full Applications.
- SF-424, Item 18, should list the total Federal budget amount requested for the entire project.
- For SF-424, Item 21, the list of certifications and assurances is contained in the SF-424B.

(2) SF-424A, Budget Information - Non-Construction Programs. The budget should reflect anticipated expenses for the project, considering all potential cost increases, including cost of living adjustments.

The Grant Program Function or Activity on Section A, line 1 under Column (a) should be entered as “Public Safety Communications Research Grant Program”. The Catalog of Federal Domestic Assistance Number on Line 1 under Column (b) should be entered as “11.609”. Line 1, column (e) should reflect the anticipated expenses for the full term of the project.

Section B, column (1) of the SF-424A should reflect funds for the first year of the award. Section B, column (2) of the SF-424A should reflect funds for the second year of the award. If the application includes a third year, use Section B, column (3) for the third year's budget. Section D requires a breakdown of the first year's budget by quarter. The budget estimate for the second year of the award should be entered in Section E, field 16, column (b). If the project includes a third year, the budget estimate for the third year should be entered in Section E, field 16, column (c).

Further details about this form can be can be found at:

http://www.grants.gov/web/grants/form-instructions/sf-424a-instructions.html.

(3) SF-424B, Assurances - Non-Construction Programs

(4) CD-511, Certification Regarding Lobbying. Enter "2018-NIST-PSIAP-UI" in the Award Number field. Enter the title of the application used in field 15 of the SF-424, or an abbreviation of that title, in the Project Name field.

(5) SF-LLL, Disclosure of Lobbying Activities (if applicable)

(6) Executive Summary and Quad Chart. (This does not count toward the page limit.) The executive summary must explicitly state the objectives and approaches to meet those objectives, anticipated challenges, and benefits and impacts of the proposed project. The summary must state which goal(s) the applicant is addressing (i.e., Goal 1, Goal 2, or both). The quad chart must contain a problem statement, the concept of the proposed project, the potential impact of the project, and key milestones and/or deliverables. **The executive summary and the quad chart must not exceed one (1) page each.** Any materials provided beyond the one (1) page limit for the executive summary and the one (1) page limit for the quad chart will be redacted and not provided to the reviewers.

(7) Technical Proposal. The Technical Proposal is a document of no more than twenty (20) pages total that is responsive to the goal(s) in the program description (*see* Section I. of this NOFO) and the Full Application evaluation criteria (*see* Section V.2. of this NOFO). The Technical Proposal must contain the following information:

(a) Project Description. This is a detailed description of the proposed project and should include:

i. A clear problem statement and well-defined objectives;

ii. A description of how the proposed R&D aligns with and meets the relevant goal(s) described in Section I. of this NOFO;

iii. A technology assessment that reflects the current state of the technology and the projected state of the technology as a direct result of successful project completion;
iv. Technology-specific key performance indicators and goals, as well as measurement techniques;
v. Hardware platform(s) and software engine(s) to be used to achieve objectives;
vi. Drawings, renderings, or diagrams and an explicit description of standards-based vs. non-standards-based interfaces, if applicable;
vii. Identification of anticipated outputs with a discussion of how the research and technology developed will be disseminated or made available; and
viii. Discussion of potential impacts to first responder communications and operations.

This section will be evaluated in accordance with the following three evaluation criteria: *Technical*, *Performance*, and *Price* (*see* Sections V.2.a.-c., of this NOFO).

(b) Project Execution. This section should provide clear and quantifiable milestones, timelines, and outputs that support the goals in the technical proposal. Technology transfer activities should not be included in this section, but rather in the Project Description, Section IV.3.a.(7)(a)vii (Identification of anticipated outputs with a discussion of how the research and technology developed will be disseminated or made available).

This section will be evaluated in accordance with the *Performance* evaluation criteria (*see* Section V.2.b.) of this NOFO).

(c) Qualifications and Resources Availability. This section should provide a detailed description of the qualifications of key personnel, both technical and managerial, who will be assigned to work on the proposed project. In addition, the applicant's experience with technology development and production should be described, as well as the applicant's access to the necessary staff, equipment, facilities, and overall support and resources required to accomplish the proposed objectives. Examples of the applicant's demonstrated success on projects that are similar in scope and magnitude to the proposed project should be included in this section, if applicable. In addition, the applicant's plans to sustain and manage work related to or in support of the proposed project once the project is complete should be included.

This section will be evaluated in accordance with the *Performance* evaluation criteria (*see* Section V.2.b.) of this NOFO.

(8) Resume(s). Resumes are required for all key personnel, including the principal investigator. Resumes are limited to two (2) pages per individual and do not count toward the twenty (20) page limit.

This section will be evaluated in accordance with the *Performance* evaluation criterion (*see* Section V.2.b. of this NOFO).

(9) Budget Narrative. (This does not count toward the page limit). The Budget Narrative must provide a detailed breakdown of each of the object class categories as reflected on the SF-424A. The budget justification should address all the budget categories (personnel, fringe benefits, equipment, travel, supplies, other direct costs and indirect costs) for which Federal funds are requested. The written justification should include the necessity and the basis for the cost. Proposed funding levels must be consistent with the project scope, and only allowable costs should be included in the budget. Information on cost allowability is available in the Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards at 2 C.F.R. Part 200 (http://go.usa.gov/SBYh), which apply to awards in this program. Information needed for each category is as follows:

(a) Personnel. At a minimum, the budget justification for all personnel should include the following: name, job title, commitment of effort on the proposed project in terms of average number of hours per week or percentage of time, salary rate, total direct charges on the proposed project, description of the role of the individual on the proposed project and the work to be performed.

(b) Fringe Benefits. Fringe benefits should be identified separately from salaries and wages and based on rates determined by organizational policy. The items included in the fringe benefit rate (e.g. health insurance, parking, etc.) should not be charged under another cost category.

(c) Equipment. Equipment is defined as an item of property that has an acquisition cost of $5,000 or more (unless the organization has established lower levels) and an expected service life of more than one year. Any items that do not meet the threshold for equipment can be included under the supplies line item. The budget justification should list each piece of equipment, the cost, and a description of how it will be used and why it is necessary to the successful completion of the proposed project. Please note that any general use equipment (computers, etc.) charged directly to the award should be allocated to the award according to expected usage on the project.

(d) Travel. For travel costs required by the recipient to complete the project, the budget justification for travel should include the following: destination; names and number of people traveling; dates and/or duration; mode of

transportation, lodging and subsistence rates; and description of how the travel is directly related to the proposed project. For travel that is yet to be determined, please provide best estimates based on prior experience. If a destination is not known, an approximate amount may be used with the assumptions given for the location of the meeting.

As is described in Section I.E. of this NOFO, PSIAP-UI recipients will be required to send a minimum of one team member to the PSCR Public Safety Broadband Stakeholder Meetings each June during the term of the award to meet with stakeholders and present key plans and findings of their work to date. The meetings are typically three to four days in length, but the exact dates and location of future meetings have not been determined yet. The stakeholder's meeting will be held in the continental United States.

In addition, PSCR encourages applicants to consider other academic, industry, and public safety forums to present their work. Applicants that propose such activities should address the potential impact in the technical proposal.

Applicants should factor in the cost for attending these events in their budget narrative and SF424A form.

(e) Supplies. Provide a list of each supply, and the breakdown of the total costs by quantity or unit of cost. Include the necessity of the cost for the completion of the proposed project.

(f) Contracts/Subawards. Each contract or subaward should be treated as a separate item. Describe the services to be provided and the necessity of the subaward or contract to the successful performance of the proposed project. Contracts are for obtaining goods and services. Subawardees perform part of the project scope of work. For each subaward, applicants must provide budget detail justifying the cost of the work performed on the project.

(g) Other Direct Costs. For costs that do not easily fit into the other cost categories, e.g., publishing fees or software distribution expenses, please list the cost, and the breakdown of the total costs by quantity or unit of cost. Include the necessity of the cost for the completion of the proposed project. Only allowable costs can be charged to the award.

This section will be evaluated in accordance with the *Price* evaluation criterion (*see* Section V.2.c. of this NOFO). It will also be reviewed to determine if all costs are reasonable, allocable, and allowable under 2 C.F.R. Part 200 Subpart E, Cost Principles.

(10) Indirect Cost Rate Agreement. If indirect costs are included in the proposed budget, provide a copy of the approved negotiated agreement if this rate was negotiated with a cognizant Federal audit agency. If the rate was not established by a cognizant Federal audit agency, provide a statement to this effect. If the successful applicant includes indirect costs in the budget and has not established an indirect cost rate with a cognizant Federal audit agency, the applicant will be required to obtain such a rate in accordance with the Department of Commerce Financial Assistance Standard Terms and Conditions (https://go.usa.gov/xXRxK).

Alternatively, in accordance with 2 C.F.R. § 200.414(f), applicants that have never received a negotiated indirect cost rate may elect to charge indirect costs to an award pursuant to a de minimis rate of 10 percent of modified total direct costs (MTDC), in which case a negotiated indirect cost rate agreement is not required. Applicants proposing a 10 percent de minimis rate pursuant to 2 C.F.R. § 200.414(f) should note this election as part of the budget and budget narrative portion of the application.

(11) Letters of Commitment. Letters of commitment must be submitted by all funded and unfunded entities that will have an active role in executing the activities outlined in the technical proposal. Letters of commitment should address the level of participation, qualifications of the personnel who will be actively involved, and the potential impact on the field. Letters of commitment must be signed by an individual with sufficient authority to legally bind the organization to its commitment.

Letters of commitment will be evaluated in accordance with the *Performance* evaluation criteria (*see* Section V.2.b. of this NOFO). Letters of commitment do not count against the twenty (20) page limit of the technical proposal.

(a) Public Safety Organizations. All Full Applications must include at least one Letter of Commitment from a PSO. Letters of commitment from PSO partners must address the importance of the proposed work as well as potential impact for first responders and public safety in general. The letters of commitment must also include a detailed description of how the PSO will be actively engaged throughout the proposed project. For purposes of this NOFO, PSOs include U.S. federal, state, and local EMS, fire services, law enforcement, and public safety communications/911 centers. Please note that Federal entities are not eligible to receive funding under this NOFO, though they may participate as unfunded collaborators.

(12) Data Management Plan. Consistent with NIST Policy 5700.00[4], *Managing Public Access to Results of Federally Funded Research*, and NIST Order

[4] http://www.nist.gov/data/upload/Final-P-5700.pdf

5701.00[5], *Managing Public Access to Results of Federally Funded Research*, applicants must include a Data Management Plan (DMP).

The DMP is a supplementary document of not more than two pages that must include, at a minimum, a summary of proposed activities that are expected to generate data, a summary of the types of data expected to be generated by the identified activities, a plan for storage and maintenance of the data expected to be generated by the identified activities, and a plan describing whether and how data generated by the identified activities will be reviewed and made available to the public. As long as the DMP meets these NIST requirements, it may take the form specified by the applicant's institution or some other entity (e.g., the National Science Foundation[6] or the National Institutes of Health[7]).

All applications for activities that will generate scientific data using NIST funding are required to adhere to a DMP or explain why data sharing and preservation are not within the scope of the project.

For the purposes of the DMP, NIST adopted the definition of "research data" at 2 C.F.R. § 200.315(e)(3) (available at http://go.usa.gov/3sZvQ).

Reasonable costs for data preservation and access may be included in the application.

The sufficiency of the DMP will be considered as part of the administrative review (*see* Section V.3.a. of this NOFO); however, the DMP will not be evaluated against any evaluation criteria.

b. Attachment of Required Documents for the Full Application

Items IV.3.a.(1) through IV.3.a.(5) above are part of the standard application package in Grants.gov and can be completed through the download application process.

Items IV.3.a.(6) through IV.3.a.(12) must be completed and attached by clicking on "Add Attachments" found in item 15 of the SF-424, Application for Federal Assistance. This will create a zip file that allows for transmittal of the documents electronically via Grants.gov.

Applicants should carefully follow specific Grants.gov instructions at www.grants.gov to ensure the attachments will be accepted by the Grants.gov system. ***A receipt from Grants.gov indicates only that an application was transferred to a system. It does not provide details concerning whether all attachments (or how many attachments) transferred successfully.*** Applicants using Grants.gov will receive a

[5] http://www.nist.gov/data/upload/Final-O-5701_0.pdf
[6] http://www.nsf.gov/bfa/dias/policy/dmp.jsp
[7] http://grants.nih.gov/grants/policy/data_sharing/data_sharing_guidance.htm

series of e-mail messages over a period of up to two business days before learning whether a Federal agency's electronic system has received its application.

Applicants are strongly advised to use the Grants.gov Download Submitted Applications option to check that their application's required attachments were contained in their submission.

After submitting the application, follow the directions found in the grants.gov Online Users Guide (http://go.usa.gov/cjaEh). Click first on Applicants; then click on Applicant Actions; go then to the "Check My Application Status" option, and choose Download Submitted Applications.

If any, or all, of the required attachments are absent from the submission, follow the attachment directions found above, resubmit the application, and check again for the presence of the required attachments.

Applicants can track their submission in the Grants.gov system by following the procedures at the Grants.gov site (http://go.usa.gov/cjamz). It can take up to two business days for an application to fully move through the Grants.gov system to NIST.

NIST uses the Tracking Numbers assigned by Grants.gov, and does not issue Agency Tracking Numbers.

c. Full Application Format

(1) Paper, E-mail and Facsimile (fax) Submissions. Will not be accepted.

(2) Figures, Graphs, Images, and Pictures. Should be of a size that is easily readable or viewable and may be landscape orientation.

(3) Font. Easy to read font (12-point minimum). Smaller type may be used in figures and tables but must be clearly legible**.**

(4) Page Limit. The Full Application Executive Summary is limited to one (1) page; the Full Application Quad Chart is limited to one (1) page; and the Full Application Technical Proposal is limited to twenty (20) pages.

(5) Page Limit Excludes: SF-424, Application for Federal Assistance; SF-424A, Budget Information – Non-Construction Programs; SF-424B, Assurances – Non-Construction Programs; CD-511, Certification Regarding Lobbying; SF-LLL, Disclosure of Lobbying Activities; Resumes of key personnel (although resumes are limited to two (2) pages per individual); Budget Narrative; Indirect Cost Rate Agreement, Letters of Commitment; and the Data Management Plan.

(6) Page size. 21.6 centimeters by 27.9 centimeters (8 ½ inches by 11 inches).

(7) Application language. English.

d. Application Replacement Pages. Applicants may not submit replacement pages and/or missing documents once an application has been submitted. Revisions can only be made by submitting a complete new application that is received by NIST before the submission deadline.

e. Pre-Applications. NIST is requiring Pre-Applications under this NOFO (*see* Section IV.2.)

f. Certifications Regarding Federal Felony and Federal Criminal Tax Convictions, Unpaid Federal Tax Assessments and Delinquent Federal Tax Returns. In accordance with Federal appropriations law, an authorized representative of the selected applicant(s) may be required to provide certain pre-award certifications regarding federal felony and federal criminal tax convictions, unpaid federal tax assessments, and delinquent federal tax returns.

4. Unique Entity Identifier and System for Award Management (SAM)

Pursuant to 2 C.F.R. part 25, applicants and recipients (as the case may be) are required to: (i) be registered in SAM before submitting its application; (ii) provide a valid unique entity identifier in its application; and (iii) continue to maintain an active SAM registration with current information at all times during which it has an active Federal award or an application or plan under consideration by a Federal awarding agency, unless otherwise excepted from these requirements pursuant to 2 C.F.R. § 25.110. **NIST will not make a Federal award to an applicant until the applicant has complied with all applicable unique entity identifier and SAM requirements and, if an applicant has not fully complied with the requirements by the time that NIST is ready to make a Federal award pursuant to this NOFO, NIST may determine that the applicant is not qualified to receive a Federal award and use that determination as a basis for making a Federal award to another applicant.**

5. Submission Dates and Times

Required Pre-Applications must be received electronically through Grants.gov no later than 11:59 p.m. Eastern Time, Friday, December 29, 2017. Pre-Applications received after this date will not be reviewed or considered. NIST will consider the date and time recorded by www.grants.gov as the official submission time. Assessment of Pre-Applications, selection, and notification to applicants is expected to be complete on or about January 26, 2018. Selected applicants will then be invited to submit a Full Application. Full Applications must be received electronically through Grants.gov no later than 11:59 p.m. Eastern Time, Tuesday, March 27, 2018. Applications received after this deadline will not be reviewed or considered.

Applicants should be aware, and factor in their application submission planning for both Pre- and Full Applications, that **the Grants.gov system is expected to be closed for**

routine maintenance from 12:01 a.m. Eastern Time, Saturday, November 18, 2017 until Monday, November 20, 2017 at 6:00 a.m. Eastern Time; and from 12:01 a.m. Eastern Time, Saturday, December 16, 2017 until Monday, December 18, 2017 at 6:00 a.m. Eastern Time; and again from 12:01 a.m. Eastern Time, Saturday, February 17, 2018 until Tuesday, February 20, 2018 at 6:00 a.m. Eastern Time; and also from 12:01 a.m. Eastern Time, Saturday, March 17, 2018 until Monday, March 19, 2018 at 6:00 a.m. Eastern Time. **Pre- and Full Applications cannot be submitted when Grants.gov is closed.**

NIST expects to complete its review, selection of successful applicants, and award processing by May 2018. NIST expects the earliest start date for awards under this NOFO to be June 1, 2018.

When developing the submission timeline, please keep in mind that: (1) all applicants are required to have a current registration in the electronic System for Award Management (SAM.gov); (2) the free annual registration process in the SAM.gov (*see* Sections IV.4. and IV.8.a.(1).(b). of this NOFO) often takes between three and five business days and may take as long as two weeks; (3) applicants are required to have a current registration in Grants.gov; and (4) applicants using Grants.gov will receive e-mail notifications over a period of up to two business days as the application moves through intermediate systems before the applicant learns via a validation or rejection notification whether NIST has received the application. (*See* http://www.grants.gov for full information on application and notification through Grants.gov.). Please note that a federal assistance award cannot be issued if the designated recipient's registration in the System for Award Management (SAM.gov) is not current at the time of the award.

6. Intergovernmental Review
Applications under this Program are not subject to Executive Order 12372.

7. Funding Restrictions
Applications for product development and/or commercialization are not considered responsive to this NOFO. Profit or fee is not an allowable cost.

8. Other Submission Requirements

a. Pre-Applications and Full Applications must be submitted electronically.

(1) Applications must be submitted via Grants.gov at www.grants.gov.

(a) Applicants should carefully follow specific Grants.gov instructions to ensure that all attachments will be accepted by the Grants.gov system. A receipt from Grants.gov indicating an application is received does not provide information about whether attachments have been received. For further information or questions regarding applying electronically for the 2018-NIST-PSIAP-UI

announcement, contact Christopher Hunton by phone at 301-975-5718 or by e-mail at grants@nist.gov.

(b) Applicants are strongly encouraged to start early and not wait until the approaching due date before logging on and reviewing the instructions for submitting an application through Grants.gov. The Grants.gov registration process must be completed before a new registrant can apply electronically. If all goes well, the registration process takes three to five business days. If problems are encountered, the registration process can take up to two weeks or more. Applicants must have a valid unique entity identifier number and must maintain a current registration in the Federal government's primary registrant database, the System for Award Management (https://www.sam.gov/), as explained on the Grants.gov Web site. Also *see* Section IV.4. of this NOFO. After registering, it may take several days or longer from the initial log-on before a new Grants.gov system user can submit an application. Only individuals authorized as organization representatives will be able to submit the application, and the system may need time to process a submitted application. Applicants should save and print the proof of submission they receive from Grants.gov. If problems occur while using Grants.gov, the applicant is advised to (a) print any error message received and (b) call Grants.gov directly for immediate assistance. If calling from within the United States or from a U.S. territory, please call 800-518-4726. If calling from a place other than the United States or a U.S. territory, please call 606-545-5035. Assistance from the Grants.gov Help Desk will be available around the clock every day, with the exception of Federal holidays. Help Desk service will resume at 7:00 a.m. Eastern Time the day after Federal holidays. For assistance using Grants.gov, the applicant may also contact support@grants.gov.

(c) To find instructions on submitting an application on Grants.gov, Applicants should refer to the "Applicants" tab in the banner just below the top of the www.grants.gov home page. Clicking on the "Applicants" tab produces two exceptionally useful sources of information, Applicant Actions and Applicant Resources, which applicants are advised to review.

Applicants will receive a series of e-mail messages over a period of up to two business days before learning whether a Federal agency's electronic system has received its application. Closely following the detailed information in these subcategories will increase the likelihood of acceptance of the application by the Federal agency's electronic system.

Applicants should pay close attention to the guidance under "Applicant FAQs," as it contains information important to successful submission on Grants.gov, including essential details on the naming conventions for attachments to Grants.gov applications.

All applicants should be aware that adequate time must be factored into applicants' schedules for delivery of their application. Applicants are advised that volume on Grants.gov may be extremely heavy leading up to the deadline date.

The application must be both received and validated by Grants.gov. The application is "received" when Grants.gov provides the applicant a confirmation of receipt and an application tracking number. If an applicant does not see this confirmation and tracking number, the application has not been received. After the application has been received, it must still be validated. During this process, it may be "validated" or "rejected with errors." To know whether the application was rejected with errors and the reasons why, the applicant must log in to Grants.gov, select "Applicants" from the top navigation, and select "Track my application" from the drop-down list. If the status is "rejected with errors," the applicant may still seek to correct the errors and resubmit the application before the deadline. If the applicant does not correct the errors, the application will not be forwarded to NIST by Grants.gov.

Refer to important information in Section IV.5. Submission Dates and Times, to help ensure the application is received on time.

b. Amendments. Any amendments to this NOFO will be announced through Grants.gov. Applicants may sign up on Grants.gov to receive amendments by e-mail or may request copies by e-mail from pscr@nist.gov.

V. Application Review Information

Proposals, reports, documents and other information related to applications submitted to NIST and/or relating to financial assistance awards issued by NIST will be reviewed and considered by Federal employees, Federal agents and contractors, and/or by non-Federal personnel who have entered into nondisclosure agreements covering such information, when applicable.

1. Pre-Application Evaluation Criteria

Pre-Applications will be reviewed by an Evaluation Panel according to the criteria listed below. Reviewers will not use specific numerical weights, but will generally consider the Technical criterion as the most important factor, followed by Performance, and then Price.

a. Technical

(1) **Strategic alignment:** Reviewers will evaluate:
   (a) The extent to which the proposed R&D meets the objectives listed in the Program Description (*see* Section I. of this NOFO).
   (b) The breadth of the responsiveness to the topic area goals.

(c) The likelihood that successful implementation of the proposed solution will have a significant real-world impact.

b. Performance

(1) **Qualifications and Resources Availability:** Reviewers will evaluate:
(a) The relevance of the qualifications and experience of the key staff, leadership, and technical experts.
(b) The extent of the applicant's prior experience and the quality of the results achieved in leading programs similar in nature to the purpose, scope, and/or work activities as those described in Section I. of this NOFO.

(2) **Public Safety Mission:** Reviewers will evaluate the extent of the Applicant's demonstrated knowledge of public safety requirements, missions, operations, and tasks.

c. Price

(1) **Budget Estimate:** Reviewers will evaluate the appropriateness and cost-effectiveness of the proposed estimated budget with respect to carrying out the work and objectives, including:
(a) Whether the estimated cost is generally appropriate for the work to be performed, evaluated per year for the entire project period.
(b) The degree to which the estimated budget reflects a clear understanding of the objectives and requirements of the NOFO.

2. Full Application Evaluation Criteria

The evaluation criteria that will be used in evaluating for Full Applications are listed below.

a. Technical (10 points)

(1) **Strategic alignment:** Reviewers will evaluate:
(a) The extent to which the proposed R&D meets the objectives listed in the Program Description (*see* Section I. of this NOFO).
(b) The breadth of the responsiveness to the topic area goals.
(c) The likelihood that successful implementation of the proposed solution will have a significant real-world impact.

(2) **Market:** Reviewers will evaluate:
(a) The extent to which the proposed solution would easily integrate with existing hardware and software platforms.
(b) The likelihood that the technology or research outcomes could achieve widespread adoption in the marketplace.

b. Performance (10 points)

(1) **Qualifications and Resources Availability:** Reviews will evaluate:
   (a) The appropriateness of the qualifications and experience of the key staff, leadership, and technical experts.
   (b) The extent of the applicant's prior experience and results achieved in leading programs similar in nature to the purpose, scope, and/or work activities as those described in Section I. of this NOFO.
   (c) The sufficiency, availability, and appropriateness of proposed facilities and resources.
   (d) Letters of commitment for the appropriateness of the partnership to PSIAP-UI, the relevance of the organization's expertise, and their ability to contribute to the project.

(2) **Project Execution:** Reviewers will evaluate the feasibility and appropriateness of the milestones, timelines, and budgeted costs with respect to executing the proposed project and meeting the stated objectives.

(3) **Public Safety Mission:** Reviewers will evaluate:
   (a) Applicant's demonstrated knowledge of public safety requirements, missions, operations, and tasks.
   (b) The extent of PSO engagement as expressed through letters of commitment from PSOs.

c. Price (10 points)

(1) **Budget Narrative:** Reviewers will evaluate:
   (a) The appropriateness and cost-effectiveness of the budget regarding the proposed work to be performed, per year for the entire project.
   (b) The degree to which the Budget reflects a clear understanding of the objectives and requirements of the NOFO.

3. Selection Factors

The Selecting Official, the Chief of the PSCR Division, will select Full Applications for award as described in Section V.4.b.(4) of this NOFO.

The selection factors for Full Applications are

a. The results of the merit reviewers' evaluations.
b. Adjectival ratings.
c. The availability of funding.
d. Whether the project duplicates other projects funded by NIST or other Government entities.
e. Alignment with NOFO objectives and PSCR priorities.
f. Diversity within the PSCR R&D portfolio.
g. Regional diversity.

4. Review and Selection Process

Proposals, reports, documents and other information related to applications submitted to NIST and/or relating to financial assistance awards issued by NIST will be reviewed and considered by Federal employees, or non-Federal personnel who have entered into nondisclosure agreements covering such information, when applicable.

a. Pre-Applications

(1) Initial Administrative Review

An initial review of timely received Pre-Applications will be conducted to determine eligibility, completeness, and responsiveness to this NOFO (*see* Section I. of this NOFO). Any Pre-Application determined to be ineligible, incomplete, and/or non-responsive may be eliminated from further review. However, NIST, in its sole discretion, may continue the review process for a Pre-Application that is missing non-substantive information which may easily be rectified or cured in a Full Application.

(2) Review Selection of Applicants to Submit Full Applications.

Pre-Applications that are determined to be eligible, complete, and responsive will be reviewed by an Evaluation Panel composed of three (3) or more independent, objective Federal employees with relevant professional and technical expertise, who are knowledgeable in the subject matter of this NOFO. The Evaluation Panel will use the evaluation criteria in Section V.1. for reviewing the Pre-Applications. Reviewers will not use specific numerical weights, but will generally consider the Technical criterion as the most important factor, followed by Performance, and then Price. The Evaluation Panel will discuss their individual reviews and conduct a final “yes or no” vote based on the evaluation criteria and the following standard: “Whether the Pre-Application provides sufficient evidence that the proposed project and applicant have a reasonable chance of meeting the Goal(s) and objectives identified in this NOFO and the likelihood that the success of that project will make a positive impact on the public safety community.” Applicants whose Pre-Applications receive “yes” votes from a majority of the Evaluation Panel will be invited to submit a Full Application.

b. Full Applications

(1) Initial Administrative Review of Full Applications.

An initial review of timely received Full Applications will be conducted to determine eligibility, completeness, and responsiveness to this NOFO and the scope of the stated program objectives. Full Applications determined to be ineligible, incomplete, and/or nonresponsive may be eliminated from further review. However, NIST, in its sole discretion, may continue the review process

for a Full Application that is missing non-substantive information, the absence of which may easily be rectified during the review process.

(2) **Merit Review and Ranking.**

At least three (3) objective reviewers, who may be Federal employees or non-Federal personnel, with appropriate professional and technical expertise relating to the topics covered in this NOFO, will evaluate and score each eligible, complete, and responsive Full Application based on the evaluation criteria (*see* Section V.2. of this NOFO). While every Full Application will have at least three reviews, Full Applications may have more than three (3) reviewers if specialized expertise is needed to evaluate a Full Application. During the review process, the reviewers may discuss the Full Applications with each other, but scores and narrative comments will be determined on an individual basis. Reviewers may consult as a panel with Federal or non-Federal subject-matter experts to seek clarification or explanation of specific issues identified during the initial review process.

Once the merit reviews have concluded, each Full Application score will be weighted as follows: the Technical score will be multiplied by 4, the Performance score will be multiplied by 4, and the Price score will be multiplied by 2; therefore, the maximum weighted score for each application will be 100 points. The weighted scores for each Full Application will then be averaged to determine each Full Application's average weighted score. The average weighted scores will then be converted into a ranked list of Full Applications, which will be sent to the Evaluation Panel for further review.

(3) **Evaluation Panel.** Following the merit review, a Programmatic Evaluation Panel, consisting of at least three (3) persons comprised of any mix of NIST staff and other Federal employees with appropriate professional and technical expertise, will conduct a programmatic review of the ranked applications. For the purpose of clarifying information in an application, the Evaluation Panel may ask questions of applicants in writing and/or may require teleconferences with all applicants. The Evaluation Panel will prepare written evaluations and provide a final adjectival rating of the applications to the Selecting Official (*see* Section V.3. of this NOFO) for further consideration, taking into consideration the following information:

i. All application materials;
ii. Results of the merit reviewers' evaluations;
iii. Any clarifying information obtained through written questions or teleconferences with the applicants; and
iv. Any relevant publicly available information.

The adjectival ratings are:

Fundable, Outstanding;
Fundable, Very Good;
Fundable; or
Unfundable.

For decision-making purposes, applications receiving the same adjectival rating will be considered to have an equivalent ranking, although their review scores may not necessarily be the same.

(4) **Recommendation and Selection.**

The Selecting Official, Chief of the PSCR Division, will make final award recommendations to the NIST Grants Officer. The Selecting Official will generally select and recommend the most meritorious applications for award based on the final adjectival ratings prepared by the Evaluation Panel and one or more of the seven (7) selection factors described in Section V.3. of this NOFO. The Selecting Official retains the discretion to select and recommend an application out of rating order (i.e., from a lower adjectival category) based on one or more of the selection factors.

NIST reserves the right to negotiate the budget costs with any applicant selected to receive an award, which may include requesting that the applicant removes certain costs. Additionally, NIST may request that successful applicants modify objectives or work plans and provide supplemental information required by the agency prior to award. NIST also reserves the right to reject an application where information is uncovered that raises a reasonable doubt as to the responsibility of the applicant. NIST may select some, all, or none of the applications, or part(s) of any particular application. NIST may request that applicants rated fundable or higher work together in a combined project if this approach might effectively advance the program mission. The final approval of selected applications and issuance of awards will be by the NIST Grants Officer. The award decisions of the NIST Grants Officer are final.

c. Federal Awarding Agency Review of Risk Posed by Applicants. After applications are proposed for funding by the Selecting Official, the NIST Grants Management Division (GMD) performs pre-award risk assessments in accordance with 2 C.F.R. § 200.205, which may include a review of the financial stability of an applicant, the quality of the applicant's management systems, the history of performance, and/or the applicant's ability to effectively implement statutory, regulatory, or other requirements imposed on non-Federal entities.

In addition, prior to making an award where the total Federal share is expected to exceed the simplified acquisition threshold (currently $150,000), NIST GMD will review and consider the publicly available information about that applicant in the

Federal Awardee Performance and Integrity Information System (FAPIIS). An applicant may, at its option, review and comment on information about itself previously entered into FAPIIS by a Federal awarding agency. As part of its review of risk posed by applicants, NIST GMD will consider any comments made by the applicant in FAPIIS in making its determination about the applicant's integrity, business ethics, and record of performance under Federal awards. Upon completion of the pre-award risk assessment, the Grants Officer will make a responsibility determination concerning whether the applicant is qualified to receive the subject award and, if so, whether appropriate special conditions that correspond to the degree of risk posed by the applicant should be applied to an award.

5. Anticipated Announcement and Award Date

Review of Full Applications, selection of successful applicants, and award processing is expected to be completed by May 2018. The earliest start date for awards under this NOFO is expected to be June 1, 2018.

6. Additional Information

a. Safety. Safety is a top priority at NIST. Employees and affiliates of award recipients who conduct project work at NIST will be expected to be safety-conscious, to attend NIST safety training, and to comply with all NIST safety policies and procedures, and with all applicable terms of their guest research agreement.

b. Notification to Unsuccessful Applicants. Unsuccessful applicants will be notified by e-mail.

c. Retention of Unsuccessful Applications. All electronic applications, whether successful or unsuccessful, are retained in the NIST Grants Management and Information System for at least three years.

VI. Federal Award Administration Information

1. Federal Award Notices

Successful applicants will receive an award package from the NIST Grants Officer.

2. Administrative and National Policy Requirements

a. Uniform Administrative Requirements, Cost Principles and Audit Requirements. Through 2 C.F.R. § 1327.101, the Department of Commerce adopted Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards at 2 C.F.R. Part 200, which apply to awards in this program. Refer to http://go.usa.gov/SBYh and http://go.usa.gov/SBg4.

b. **Department of Commerce Financial Assistance Standard Terms and Conditions.** The Department of Commerce will apply the Financial Assistance Standard Terms and Conditions dated March 31, 2017, accessible at https://go.usa.gov/xXRxK, to this award. Refer to Section VII. of this NOFO, Federal Awarding Agency Contacts, Grant Rules and Regulations, if you need more information.

c. **Pre-Award Notification Requirements.** The Department of Commerce will apply the Pre-Award Notification Requirements for Grants and Cooperative Agreements dated December 30, 2014 (79 FR 78390), accessible at http://go.usa.gov/hKkR. Refer to Section VII. of this NOFO, Federal Awarding Agency Contacts, Grant Rules and Regulations, if you need more information.

d. **Funding Availability and Limitation of Liability.** NIST is funding the program listed in this NOFO from the proceeds of the Public Safety Communications and Electromagnetic Spectrum Auction conducted pursuant to Title VI of the Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. 112-96 (Feb. 22, 2012). However, NIST issues this notice subject to the appropriations made available under the current continuing resolution funding the Department of Commerce, Division D of Continuing Appropriations Act, 2018 and Supplemental Appropriations for Disaster Relief Requirements Act, 2017, Public Law 115-56, September 8, 2017. NIST anticipates making awards for the program listed in this notice provided that funding for Fiscal Year 2018 is continued beyond December 8, 2017, the expiration of the current continuing resolution.

   In no event will NIST or the Department of Commerce be responsible for proposal preparation costs if these programs fail to receive funding or are cancelled because of agency priorities. Publication of this announcement does not oblige NIST or the Department of Commerce to award any specific project or to obligate any available funds.

e. **Collaborations with NIST Employees.** If an applicant proposes collaboration with NIST, the statement of work should include a statement of this intention, a description of the collaboration, and prominently identify the NIST employee(s) involved, if known. Any collaboration by a NIST employee must be approved by appropriate NIST management and is at the sole discretion of NIST. Prior to beginning the merit review process, NIST will verify the approval of the proposed collaboration. Any unapproved collaboration will be stricken from the application prior to the merit review. Any collaboration with an identified NIST employee that is approved by appropriate NIST management will not make an application more or less favorable in the competitive process.

f. **Use of NIST Intellectual Property.** If the applicant anticipates using any NIST-owned intellectual property to carry out the work proposed, the applicant should

identify such intellectual property. This information will be used to ensure that no NIST employee involved in the development of the intellectual property will participate in the review process for that competition. In addition, if the applicant intends to use NIST-owned intellectual property, the applicant must comply with all statutes and regulations governing the licensing of Federal government patents and inventions, described in 35 U.S.C. §§ 200-212, 37 C.F.R. Part 401, 2 C.F.R. §200.315, and in Section C.03 of the of the Department of Commerce Financial Assistance Terms and Conditions dated March 31, 2017, accessible at https://go.usa.gov/xXRxK.

Any use of NIST-owned intellectual property by a recipient of an award under this announcement is at the sole discretion of NIST and will be negotiated on a case-by-case basis if a project is deemed meritorious. The applicant should indicate within the statement of work whether it already has a license to use such intellectual property or whether it intends to seek one.

If any inventions made in whole or in part by a NIST employee arise in the course of an award made pursuant to this NOFO, the United States government may retain its ownership rights in any such invention. Licensing or other disposition of NIST's rights in such inventions will be determined solely by NIST, and include the possibility of NIST putting the intellectual property into the public domain.

g. Research Activities Involving Human Subjects, Human Tissue, Data or Recordings Involving Human Subjects Including Software Testing. Any application that includes research activities involving human subjects, human tissue/cells, or data or recordings from or about human subjects, must satisfy the requirements of the Common Rule for the Protection of Human Subjects ("Common Rule"), codified for the Department of Commerce at 15 C.F.R. Part 27. Research activities involving human subjects that fall within one or more of the classes of vulnerable subjects found in 45 C.F.R. Part 46, Subparts B, C and D must satisfy the requirements of the applicable subpart(s). In addition, any such application that includes research activities on these subjects must be in compliance with all applicable statutory requirements imposed upon the Department of Health and Human Services (DHHS) and other Federal agencies, all regulations, policies and guidance adopted by DHHS, the Food and Drug Administration (FDA), and other Federal agencies on these topics, and all Executive Orders and Presidential statements of policy on applicable topics. (Regulatory Resources: http://www.hhs.gov/ohrp/humansubjects/index.html which includes links to FDA regulations, but may not include all applicable regulations and policies).

NIST uses the following Common Rule definitions for research and human subjects research:

Research: A systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge. Activities

which meet this definition constitute research for purposes of this policy, whether or not they are conducted or supported under a program which is considered research for other purposes. For example, some demonstration and service programs may include research activities.

Human Subject: A living individual about whom an investigator (whether professional or student) conducting research obtains data through intervention or interaction with the individual or identifiable private information.

(1) *Intervention* includes both physical procedures by which data are gathered and manipulations of the subject or the subject's environment that are performed for research purposes.

(2) *Interaction* includes communication or interpersonal contact between investigator and subject.

(3) *Private information* includes information about behavior that occurs in a context in which an individual can reasonably expect that no observation or recording is taking place, and information which has been provided for specific purposes by an individual and which the individual can reasonably expect will not be made public (for example, a medical record). Private information must be individually identifiable (i.e., the identity of the subject is or may readily be ascertained by the investigator associated with the information) in order for obtaining the information to constitute research involving human subjects.

See 15 C.F.R. § 27.102 (Definitions).

1. **Requirement for Federalwide Assurance.** If the application is accepted for [or awarded] funding, organizations that have an Institutional Review Board (IRB) are required to follow the procedures of their organization for approval of exempt and non-exempt research activities that involve human subjects. Both domestic and foreign organizations performing non-exempt research activities involving human subjects will be required to have protocols approved by a cognizant, active IRB currently registered with the Office for Human Research Protections (OHRP) within the DHHS that is linked to the engaged organizations. All engaged organizations must possess a currently valid Federalwide Assurance (FWA) on file from OHRP. Information regarding how to apply for an FWA and register an IRB with OHRP can be found at http://www.hhs.gov/ohrp/assurances/index.html. NIST relies only on OHRP-issued FWAs and IRB Registrations for both domestic and foreign organizations for NIST supported research involving human subjects. NIST will not issue its own FWAs or IRB Registrations for domestic or foreign organizations.

2. **Administrative Review.** The NIST Human Subjects Protection Office (HSPO) reserves the right to conduct an administrative review[8] of all applications that potentially include research involving human subjects and were approved by an authorized non-NIST institutional entity (an IRB or entity analogous to the NIST HSPO) under 15 C.F.R. § 27.112 (Review by Institution). If the NIST HSPO determines that an application includes research activities that potentially involve human subjects, the applicant will be required to provide additional information to NIST for review and approval. The documents required for funded proposals are listed in each section below. Most documents will need to be produced during the proposal review process; however, the Grants Officer may allow final versions of certain required documents to be produced at an appropriate designated time post-award. Research involving human subjects may not start until the NIST Grants Officer issues an award explicitly authorizing such research. In addition, all amendments, modifications, or changes to approved research and requests for continuing review and closure will be reviewed by the NIST HSPO.

3. **Required documents for proposal review. All applications involving human subject research must clearly indicate, by separable task, all research activities believed to be exempt or non-exempt research involving human subjects, the expected institution(s) where the research activities involving human subjects may be conducted, and the institution(s) expected to be engaged in the research activities.**

    a. **Not research determination.** If an activity/task involves human subjects as defined in the Common Rule, but the applicant participant(s) indicates to NIST that the activity/task is not research as defined in the Common Rule, the following information may be requested for that activity/task:

        (1) Justification, including the rationale for the determination and such additional documentation as may be deemed necessary by NIST to review and/or support a determination that the activity/task in the application is not research as defined in the Common Rule.
        (2) If the applicant participant(s) used a cognizant IRB that provided a determination that the activity/task is not research, a copy of that determination documentation must be provided to NIST. The applicant

[8] Conducting an "administrative review" means that the NIST HSPO will review and verify the performing institution's determination for research not involving human subjects or exempt human subjects research. In addition, for non-exempt human subjects research, the NIST HSPO will review and confirm that the research and performing institution(s) are in compliance with 15 C.F.R. Part 27, which means HSPO will 1) confirm the engaged institution(s) possess, or are covered under a Federalwide Assurance, 2) review the research study documentation submitted to the IRB and verify the IRB's determination of level of risk and approval of the study for compliance with 15 C.F.R. Part 27, 3) review and verify IRB-approved substantive changes to an approved research study before the changes are implemented, and 4) review and verify that the IRB conducts an appropriate continuing review at least annually.

participant(s) is not required to establish a relationship with a cognizant IRB if they do not have one.

NIST will review the information submitted and may coordinate further with the applicant before determining whether the activity/task will be defined as research under the Common Rule in the applicable NIST financial assistance program or project.

b. **Research not involving human subjects**. If an activity/task is determined to be research and involves human subjects, but is determined to be *not human subjects research* (or *research not involving human subjects*) under the Common Rule, the following information may be requested for that activity/task:

   (1) Justification, including the rationale for the determination and such additional documentation as may be deemed necessary by NIST to review and/or support a determination that the activity/task in the application is not research as defined in the Common Rule.
   (2) If the applicant participant(s) used a cognizant IRB that provided a determination that the activity/task is research not involving human subjects, a copy of that determination documentation must be provided to NIST. The applicant participant(s) is not required to establish a relationship with a cognizant IRB if they do not have one.

c. **Exempt research determination with no IRB.** If the application appears to NIST to include exempt research activities, and the performer of the activity or the supplier and/or the receiver of the biological materials or data from human subjects **does not** have a cognizant IRB to provide an exemption determination, the following information may be requested during the review process so that NIST can evaluate whether an exemption under the Common Rule applies (*see* 15 C.F.R. § 27.101(b), (c) and (d)):

   (1) The name(s) of the institution(s) where the exempt research will be conducted.
   (2) The name(s) of the institution(s) providing the biological materials or data from human subjects.
   (3) A copy of the protocol for the research to be conducted; and/or the biological materials or data from human subjects to be collected/provided, not pre-existing samples (*i.e.,* will proposed research collect only information without personal identifiable information, will biological materials or data be de-identified and when and by whom was the de-identification performed, how were the materials or data originally collected).

(4) For pre-existing biological materials or data from human subjects, provide copies of the consent forms used for collection and a description of how the materials or data were originally collected and stripped of personal identifiers. If copies of consent forms are not available, explain.
(5) Any additional clarifying documentation that NIST may deem necessary in order to make a determination whether the activity/task or use of biological materials or data from human subjects is exempt under the Common Rule.

d. **Research review with an IRB.** If the application appears to NIST to include research activities (exempt or non-exempt) involving human subjects, and the proposed performer of the activity has a cognizant IRB registered with OHRP, and linked to their Federalwide Assurance, the following information may be requested during the review process:

(1) The name(s) of the institution(s) where the research will be conducted.
(2) The name(s) and institution(s) of the cognizant IRB(s), and the IRB registration number(s).
(3) The FWA number of the applicant linked to the cognizant IRB(s);
(4) The FWAs associated with all organizations engaged in the planned research activity/task, linked to the cognizant IRB.
(5) If the IRB review(s) is pending, the estimated start date for research involving human subjects.
(6) The IRB approval date (if currently approved for exempt or non-exempt research).
(7) If any of the engaged organizations has applied for or will apply for an FWA or IRB registration, those details should be clearly provided for each engaged organization.

If the application includes research activities involving human subjects to be performed in the first year of an award, additional documentation may be requested by NIST during pre-award review for those performers, and may include the following for those research activities:

(1) A signed (by the study principal investigator) copy of each applicable final IRB-approved protocol.
(2) A signed and dated approval letter from the cognizant IRB(s) that includes the name of the institution housing each applicable IRB, provides the start and end dates for the approval of the research activities, and any IRB-required interim reporting or continuing review requirements.
(3) A copy of any IRB-required application information, such as documentation of approval of special clearances (*i.e.,* biohazard, HIPAA, etc.) conflict-of-interest letters, or special training requirements.

(4) A brief description of what portions of the IRB submitted protocol are specifically included in the application submitted to NIST, if the protocol includes tasks not included in the application, or if the protocol is supported by multiple funding sources. For protocols with multiple funding sources, NIST will not approve the study without a non-duplication-of-funding letter indicating that no other federal funds will be used to support the tasks proposed under the proposed research or ongoing project
(5) If a new protocol will only be submitted to an IRB if an award from NIST is issued, a draft of the proposed protocol.
(6) Any additional clarifying documentation that NIST may request during the review process to perform the NIST administrative review of research involving human subjects. (*See* 15 C.F.R. § 27.112 (Review by Institution)).

This clause reflects the existing NIST policy and requirements for Research Involving Human Subjects. Should the policy be revised prior to award, a clause reflecting the policy current at time of award may be incorporated into the award.

If the policy is revised after award, a clause reflecting the updated policy may be incorporated into the award.

For more information regarding research projects involving human subjects, contact Anne Andrews, Director, NIST Human Subjects Protection Office (e-mail: anne.andrews@nist.gov; phone: (301) 975-5445).

h. Research Activities Involving Live Vertebrate Animals or Pre-Existing Cell Lines/Tissues From Vertebrate Animals. Any application that proposes research activities involving live vertebrate animals that are to be cared for, euthanized, or used by award recipients to accomplish research goals, teaching, or testing must meet the requirements of the Animal Welfare Act (AWA) (7 U.S.C. § 2131 et seq.), and the AWA final rules (9 C.F.R. Parts 1, 2, and 3), and if appropriate, the Good Laboratory Practice for Nonclinical Laboratory Studies (21 C.F.R. Part 58). In addition, such research activities should be in compliance with the *"U.S. Government Principles for Utilization and Care of Vertebrate Animals Used in Testing, Research, and Training"* (Principles). The Principles and guidance on these Principles are available in the National Research Council's "Guide for the Care and Use of Laboratory Animals," which can be obtained from National Academy Press, 500 5th Street, N.W., Department 285, Washington, DC 20055, or as a free PDF online at http://www.nap.edu/catalog/12910/guide-for-the-care-and-use-of-laboratory-animals-eighth.

1. **Administrative Review.** NIST reserves the right to conduct an administrative review[9] of all applications that potentially include research activities that involve live vertebrate animals, or custom samples from, or field studies with live vertebrate animals. If the application includes research activities, field studies, or custom samples involving live vertebrate animals, the applicant will be required to provide additional information for review and approval. In addition, NIST will verify the applicant's determination(s) of excluded samples from vertebrate animals. The documents required for funded proposals are listed in each section below. Some may be requested for a pre-review during the proposal review process; however, the Grants Officer may allow final versions of certain required documents to be produced at an appropriate designated time post-award. If an award is issued, no research activities involving live vertebrate animals shall be initiated or costs incurred for those activities under the award until the NIST Grants Officer issues written approval. In addition, all re-approvals, amendments, modifications, changes, annual reports and closure will be reviewed by NIST.

2. **Required documents for NIST proposal review.** ***The applicant should clearly indicate in the application, by separable task, all research activities believed to include research involving live vertebrate animals and the institution(s) where the research activities involving live vertebrate animals may be conducted. In addition, the applicant should indicate any activity/task that involves an excluded or custom collection from vertebrate animals, or a field study with animals.***

    a. **Excluded Collections from Vertebrate Animals:** The requirements for review and approval by an Institutional Animal Care and Use Committee (IACUC) do not apply to proposed research using preexisting images of animals or to research plans that do not include live animals. These regulations also do not apply to obtaining stock or pre-existing items from animal material suppliers (*e.g.,* tissue banks), such as pre-existing cell lines and tissue samples, or from commercial food processors, where the vertebrate animal was euthanized for food purposes and not for the purpose of sample collection.

[9] Conducting an "administrative review" means that the NIST HSPO will review and verify the performing institution's IACUC's approval of research with live vertebrate animals, and confirm that the research and performing institution(s) have an appropriate assurance and are in compliance with applicable regulations. HSPO will 1) confirm the engaged institution(s) possess, or are covered under an applicable assurance, 2) review the research study documentation submitted to the IACUC and verify the IACUC's determination of level of risk and approval of the study for compliance with applicable regulations, 3) review and verify IACUC-approved substantive changes to an approved research study before the changes are implemented, and 4) review and verify that the IACUC receives an annual report for the study and conducts an appropriate continuing review at least every three years.

For pre-existing cell lines and tissue samples originating from vertebrate animals, NIST requires that the proposer provide documentation or the rationale for the determination that the cell line or tissue is pre-existing and not a custom collection from live vertebrate animals for an activity/task within the proposal. NIST may require additional documentation to review and/or support the determination that the cells and/or tissues from vertebrate animals are excluded from IACUC review.

b. **Custom Collections Harvested from Live Vertebrate Animals:** NIST requires documentation for obtaining custom samples from live vertebrate animals from animal material suppliers and other organizations (*i.e.,* universities, companies, and government laboratories, etc.). A custom sample includes samples from animal material suppliers, such as when a catalog item indicates that the researcher is to specify the characteristics of the live vertebrate animal to be used, or how a sample is to be collected from the live vertebrate animal.

c. **Field Studies of Animals:** Some field studies of animals may be exempt under the Animal Welfare Act from full review and approval by an animal care and use committee, as determined by each institution. Field study is defined as "*… a study conducted on free-living wild animals in their natural habitat...".* 9 C.F.R. § 1.1. However, this term excludes any study that involves an invasive procedure or that harms or materially alters the behavior of an animal under study. Field studies, with or without invasive procedures, may also require obtaining appropriate federal or local government permits (marine mammals, endangered species, etc.). If the applicant's institution requires review and approval by an animal care and use committee, NIST will require that documentation to be provided as described below.

d. **For custom collections or studies with live vertebrate animals that require review and approval by an animal care and use committee the following documentation is required:**

(1) **Requirement for Assurance.** An applicable assurance for the care and use of the live vertebrate animal(s) to be used in the proposed research is required. NIST may request documentation to confirm an assurance, if adequate confirmation is not available through an assuring organization's website. The cognizant IACUC where the research activity is located may hold one or more assurances applicable to the research activity that are acceptable to NIST. These three assurances are:

i. Animal Welfare Assurance from the Office of Laboratory Animal Welfare (OLAW) indicated by the OLAW assurance number, *i.e.,* A-1234;
ii. USDA Animal Welfare Act certification indicated by the certification number, *i.e.,* 12-R-3456;
iii. Association for the Assessment and Accreditation of Laboratory Animal Care (AAALAC) indicated by providing the organization name accredited by AAALAC as listed in the AAALAC Directory of Accredited Organizations.

(2) **Documentation of Research Review by an IACUC:** If the applicant's application appears to include research activities, field studies, or custom sample collections involving live vertebrate animals the following information regarding review by an applicable IACUC may be requested during the application review process:

1. The name(s) of the institution(s) where the research involving live vertebrate animals will be conducted and/or custom samples collected.
2. The assurance type and number, as applicable, for the cognizant Institutional Animal Care and Use Committee (IACUC) where the research activity is located. [For example: Animal Welfare Assurance from the Office of Laboratory Animal Welfare (OLAW) should be indicated by the OLAW assurance number, i.e. A-1234; an USDA Animal Welfare Act certification should be indicated by the certification number i.e. 12-R-3456; and an Association for the Assessment and Accreditation of Laboratory Animal Care (AAALAC) should be indicated by AAALAC.]
3. The IACUC approval date for the Animal Study Protocol (ASP) (if currently approved).
4. If the review by the cognizant IACUC is pending, the estimated start date for research involving vertebrate animals.
5. If any assurances or IACUCs need to be obtained or established, that should be clearly stated.
6. If any special permits are required for field studies, those details should be clearly provided for each instance, or indicated as pending.

If the application includes research activities involving vertebrate animals to be performed in the first year of an award, additional documentation may be requested by NIST during pre-award review for those performers, and may include the following for those research activities, which may also include field studies, custom sample collections involving live vertebrate animals:

1. A signed (by the Principal Investigator) copy of the IACUC approved ASP.
2. Documentation of the IACUC approval indicating the approval and expiration dates of the ASP.
3. If applicable, a non-duplication-of-funding letter if the ASP is funded from several sources.
4. If a new ASP will only be submitted to an IACUC if an award from NIST is issued, a draft of the proposed ASP may be requested.
5. Any additional clarifying documentation that NIST may request during review of applications to perform the NIST administrative review of research involving live vertebrate animals.

This clause reflects the existing NIST policy for Research Involving Live Vertebrate Animals. Should the policy be revised prior to award, a clause reflecting the policy current at time of award may be incorporated into the award.

If the policy is revised after award, a clause reflecting the updated policy may be incorporated into the award.

For more information regarding research projects involving live vertebrate animals, contact Linda Beth Schilling, Senior Analyst (e-mail: linda.schilling@nist.gov; phone: (301) 975-2887).

3. Reporting

a. Reporting Requirements. The following reporting requirements described in Sections A.01, Reporting Requirements, of the Department of Commerce Financial Assistance Standard Terms and Conditions dated March 31, 2017 (http://go.usa.gov/xXRxK) apply to awards in this program:

(1) Financial Reports. Each award recipient will be required to submit an SF-425, Federal Financial Report on a quarterly basis for the periods ending March 31, June 30, September 30, and December 31 of each year. Reports will be due within 30 days after the end of the reporting period to the NIST Grants Officer and Grants Specialist named in the award documents. A final financial report is due within 90 days after the end of the project period.

(2) Performance (Technical) Reports. Each award recipient will be required to submit a technical progress report to the NIST Grants Officer and the NIST Federal Program Officer on a quarterly basis for the periods ending March 31, June 30, September 30, and December 31 of each year. Technical progress reports shall contain information as prescribed in 2 C.F.R. § 200.328 (http://go.usa.gov/xkVgP) and Department of Commerce Standard Terms and Conditions, Section A.01 (https://go.usa.gov/xXRxK). Reports will be due within 30 days after the end of the reporting period. A final technical report shall be

submitted within 90 days after the expiration date of the award, and publication citation information as well as links to publicly available data shall be submitted as soon as they become available. If a recipient's Data Management Plan (DMP) has changed since their last submission of a technical progress report, the recipient must include their revised DMP in the next technical progress report following the revision to the DMP. The revised DMP must include all the requirements described in Section IV.3.a.(12) of this NOFO.

(3) Patent and Property Reports. From time to time, and in accordance with the Administrative and National Policy Requirements (*see* Section VI.2 of this NOFO) and other terms and conditions governing the award, the recipient may need to submit property and patent reports.

(4) Recipient Integrity and Performance Matters. In accordance with section 872 of Public Law 110-417 (as amended; see 41 U.S.C. 2313), if the total value of a recipient's currently active grants, cooperative agreements, and procurement contracts from all Federal awarding agencies exceeds $10,000,000 for any period of time during the period of performance of an award made under this NOFO, then the recipient shall be subject to the requirements specified in Appendix XII to 2 C.F.R. Part 200, http://go.usa.gov/cTBwC, for maintaining the currency of information reported to SAM that is made available in FAPIIS about certain civil, criminal, or administrative proceedings involving the recipient.

b. Audit Requirements. 2 C.F.R. Subpart F, adopted by the Department of Commerce through 2 C.F.R. § 1327.101 requires any non-Federal entity (i.e., including non-profit institutions of higher education and other non-profit organizations) that expends Federal awards of $750,000 or more in the recipient's fiscal year to conduct a single or program-specific audit in accordance with the requirements set out in the Subpart. Applicants are reminded that NIST, the Department of Commerce Office of Inspector General, or another authorized Federal agency may conduct an audit of an award at any time.

c. Federal Funding Accountability and Transparency Act of 2006. In accordance with 2 C.F.R. Part 170, all recipients of a Federal award made on or after October 1, 2010, are required to comply with reporting requirements under the Federal Funding Accountability and Transparency Act of 2006 (Pub. L. No. 109-282). In general, all recipients are responsible for reporting sub-awards of $25,000 or more. In addition, recipients that meet certain criteria are responsible for reporting executive compensation. Applicants must ensure they have the necessary processes and systems in place to comply with the reporting requirements should they receive funding. Also see the Federal Register notice published September 14, 2010, at 75 FR 55663 available here http://go.usa.gov/hKnQ.

4. Award Management and Public Engagement

Publication and Technology Transfer. Each award recipient is expected to present the results of their work in appropriate professional literature and conferences in order to make the findings broadly available. Data supporting any findings or conclusions shall be made available in a manner consistent with the Data Management Plan.

VII. Federal Awarding Agency Contacts

Questions should be directed to the following:

Subject Area	Point of Contact
Programmatic and Technical Questions	E-mail: pscr@nist.gov
Technical Assistance with Grants.gov Submissions	Christopher Hunton Phone: 301-975-5718 Fax: 301-975-6368 E-mail: grants@nist.gov Or www.grants.gov Phone: 800-518-4726 E-mail: support@grants.gov
Grant Rules and Regulations	Scott McNichol Phone: 303-497-3444 Fax: 303-497-5470 E-mail: scott.mcnichol@nist.gov

VIII. Other Information

1. Personal and Business Information

The applicant acknowledges and understands that information and data contained in applications for financial assistance, as well as information and data contained in financial, performance and other reports submitted by applicants, may be used by the Department of Commerce in conducting reviews and evaluations of its financial assistance programs. For this purpose, applicant information and data may be accessed, reviewed and evaluated by Department of Commerce employees, other Federal employees, Federal agents and contractors, and/or by non-Federal personnel,

all of whom enter into appropriate conflicts of interest and nondisclosure agreements covering the use of such information. As may be provided in the terms and conditions of a specific financial assistance award, applicants are expected to support program reviews and evaluations by submitting required financial and performance information and data in an accurate and timely manner, and by cooperating with Department of Commerce and external program evaluators. In accordance with 2 C.F.R. § 200.303(e), applicants are reminded that they must take reasonable measures to safeguard protected personally identifiable information and other confidential or sensitive personal or business information created or obtained in connection with a Department of Commerce financial assistance award.

In addition, Department of Commerce regulations implementing the Freedom of Information Act (FOIA), 5 U.S.C. Sec. 552, are found at 15 C.F.R. Part 4, Public Information. These regulations set forth rules for the Department regarding making requested materials, information, and records publicly available under the FOIA. Applications submitted in response to this Federal Funding Opportunity may be subject to requests for release under the Act. In the event that an application contains information or data that the applicant deems to be confidential commercial information that should be exempt from disclosure under FOIA, that information should be identified, bracketed, and marked as Privileged, Confidential, Commercial or Financial Information. In accordance with 15 CFR § 4.9, the Department of Commerce will protect from disclosure confidential business information contained in financial assistance applications and other documentation provided by applicants to the extent permitted by law.

2. Public Website, Frequently Asked Questions (FAQS) and Webinar

NIST PSCR has a public website (https://www.nist.gov/ctl/pscr) that provides information pertaining to this Funding Opportunity[10]. NIST anticipates that a "Frequently Asked Questions" section or other resource materials will be maintained and updated on the website as needed to provide additional guidance and clarifying information that may arise related to this Funding Opportunity. Any amendments to this NOFO will be announced through Grants.gov.

Applicants must submit all questions pertaining to this funding opportunity in writing to pscr@nist.gov. Questions submitted to NIST may be posted on https://www.nist.gov/ctl/pscr. Alternatively, applicants may ask questions during the informational public webinar as described in the next paragraph.

NIST will host a webinar to provide general information regarding this NOFO, offer general guidance on preparing applications, and answer questions. Scheduling details about the webinar will be available at www.nist.gov/ctl/pscr. Proprietary technical discussions about specific project ideas will not be permitted and NIST staff will not

[10] Refer to Section VII. of this NOFO, Federal Awarding Agency Contacts, Programmatic and Technical Questions, if this link is no longer working or more information is needed.

critique or provide feedback on specific project ideas while the competition is in progress. However, questions about the PSIAP-UI, eligibility requirements, evaluation and award criteria, selection process, and the general characteristics of a competitive application can be addressed at the webinar and by e-mail to pscr@nist.gov as described in the previous paragraph. There is no cost to attend the webinar, but participants must register in advance. Participation in the webinar is not required, and will not be considered in the application review and selection process. Additional information on the PSIAP-UI and webinar is available at https://www.nist.gov/ctl/pscr.