February 19, 2016

ANNOUNCEMENT OF FEDERAL FUNDING OPPORTUNITY (FFO)
Measurement Science and Engineering (MSE) Research Grant Programs

EXECUTIVE SUMMARY

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

- **Funding Opportunity Title:** Measurement Science and Engineering (MSE) Research Grant Programs for:

  (1) the Material Measurement Laboratory (MML);
  (2) the Physical Measurement Laboratory (PML);
  (3) the Engineering Laboratory (EL);
  (4) Fire Research (FR);
  (5) the Information Technology Laboratory (ITL);
  (6) the Communications Technology Laboratory (CTL);
  (7) the NIST Center for Neutron Research (NCNR);
  (8) the Center for Nanoscale Science and Technology (CNST);
  (9) the Special Programs Office (SPO);
  (10) the Standards Coordination Office (SCO);
  (11) the International and Academic Affairs Office (IAAO); and
  (12) the Associate Director for Laboratory Programs (ADLP).

- **Announcement Type:** Initial

- **Funding Opportunity Number:** 2016-NIST-MSE-01

- **Catalog of Federal Domestic Assistance (CFDA) Numbers:** 11.609, Measurement and Engineering Research and Standards, 11.619: Arrangements for Interdisciplinary Research Infrastructure, and 11.620: Science, Technology, Business and/or Education Outreach

- **Dates:** Applications will be accepted and considered on a rolling basis as they are received. *See* Section IV.4. in the Full Announcement Text of this FFO.

  When developing your submission timeline, please keep in mind that (1) all applicants are required to have a current registration in the System for Award Management (SAM.gov); (2) the free annual registration process in the electronic System for Award Management (SAM.gov) (*see* Section IV.3. and Section IV.7.a.(2).b. of this FFO) may take between three and five business days, or as long as more than two weeks; (3) electronic applicants are required to have a current registration in Grants.gov; and (4) applicants will receive a series of e-mail messages from Grants.gov over a period of up to two business days before learning

whether a Federal agency's electronic system has received its application. **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:** *See* Section IV. in the Full Announcement Text of this FFO.

- **Funding Opportunity Description:** NIST is soliciting applications for financial assistance for Fiscal Year 2016 (FY16) within the following NIST Laboratory grant programs:

  (1) the Material Measurement Laboratory (MML) Grant Program;
  (2) the Physical Measurement Laboratory (PML) Grant Program;
  (3) the Engineering Laboratory (EL) Grant Program;
  (4) the Fire Research (FR) Grant Program;
  (5) the Information Technology Laboratory (ITL) Grant Program;
  (6) the Communications Technology Laboratory (CTL) Grant Program;
  (7) the NIST Center for Neutron Research (NCNR) Grant Program;
  (8) the Center for Nanoscale Science and Technology (CNST) Grant Program;
  (9) the Special Programs Office (SPO) Grant Program;
  (10) the Standards Coordination Office (SCO) Grant Program;
  (11) the International and Academic Affairs Office (IAAO) Grant Program; and
  (12) the Associate Director for Laboratory Programs (ADLP) Grant Program.

  This funding opportunity will result in the award of grants or cooperative agreements. A grant or cooperative agreement is not the correct funding vehicle if the principal purpose is to provide products or services for the direct benefit or use of the federal government.

- **Anticipated Funding Amounts:** *See* Section II. in the Full Announcement Text of this FFO.

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

- **Who is Eligible:** Eligibility for all programs listed in this FFO is 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. Applicants selected for awards under 15 U.S.C. § 278g-1 are encouraged, but not required, to select underrepresented minorities for participation. In addition, NIST is not able to accept an application from an individual unaffiliated with a sponsoring applicant organization.

- **Cost Sharing Requirements:** The MSE Research Grant Programs do not require

cost sharing.

Table of Contents

I. Program Description.....3
II. Federal Award Information.....22
III. Eligibility Information.....25
IV. Application and Submission Information.....25
V. Application Review Information.....34
VI. Federal Award Administration Information.....45
VII. Federal Awarding Agency Contact(s).....56

FULL ANNOUNCEMENT TEXT

I. Program Description

This funding opportunity will result in the award of grants or cooperative agreements.

1. Material Measurement Laboratory (MML) Grant Program

The statutory authority for the MML Grant Program is 15 U.S.C. § 272(b) and (c) and 15 U.S.C. § 278g-1.

Program Description: The MML Grant Program provides financial assistance to support the conduct of research or a recipient's portion of collaborative research in the following fields: materials science and engineering, materials measurement science, biosystems and biomaterials, biomolecular measurements, chemical sciences, and applied chemicals and materials.

MML supports the NIST mission by serving as the national reference laboratory for measurements in the chemical, biological, and material sciences. MML is entrusted with developing, maintaining, advancing, and enabling measurement systems in these areas for the nation. MML activities range from fundamental and applied research on the composition, structure, and properties of industrial, biological, and environmental materials and processes to the development and dissemination of certified reference materials, critically evaluated data and other programs that help assure measurement quality. MML research and measurement services support areas of national importance, such as:

- Advanced materials, from nanomaterials to structural steels to complex fluids;
- Electronics, from semiconductors to organic electronics;

- Energy, from characterization and performance of fossil and alternative fuels to next-generation renewables;
- Environment, from the measurement of automotive exhaust emissions to contaminant monitoring to assessment of climate change and the health and safety aspects of engineered nanomaterials;
- Food safety and nutrition, from contaminant monitoring to ensuring the accuracy of nutritional labels;
- Health care, from clinical diagnostics to tissue engineering and more efficient manufacturing of biologic drugs;
- Infrastructure, from the aging of the country's bridges and pipelines to the quality of our drinking water;
- Manufacturing, from lightweight alloys for fuel-efficient automobiles to biomanufacturing and data for chemical manufacturing; and
- Safety, security and forensics, from gunshot and explosive residue detection to ensuring the performance of body armor materials and DNA-based human identity testing.

MML also coordinates the NIST-wide Standard Reference Materials® and Standard Reference Data programs, which include production, documentation, inventory, marketing, distribution, and customer service.

The research and measurement services provided by MML underpin measurements in the chemical, biological, and material sciences and support innovation in both mature and emerging industrial sectors. As examples, work to enable reliable and trustworthy measurements and data help:

- Physicians make more accurate diagnoses and better monitor the effectiveness of new drug therapies;
- Policy makers and regulatory bodies make science-based decisions about environmental quality;
- Investigators build cases based on sound DNA and other forensic evidence.
- Trading partners confidently exchange commodities such as foods, fuels, materials and structural steel;
- Manufacturers reliably develop and use advanced materials and processes.
- Industry to link the performance of materials with their structure, processing; and concepts necessary for the design of products ranging from coatings and composites to magnetic devices and sensors.

MML shapes its programs based on national needs. MML's research base provides MML with the flexibility to respond to the country's priorities and rapid advances in science and technology. MML's success depends upon timely dissemination of its:

- Critically evaluated measurement methods;
- Standard Reference Materials®;
- Standard Reference Data;

- Publications describing MML's measurement science and technologies; and
- Training, education, and best practices, of which Recommended Practice Guides are one example.

Additional information about the MML and MML Programs may be obtained at www.nist.gov/mml. All applications submitted to the MML Grant Program must complement or align or accord with the program objectives set forth below. The appropriate MML Program Manager for each MML field of research described in this Section may be contacted for clarification of the program objectives. The contact person for the MML Grant Program is Bill Clark and he may be reached at (303) 497-3268 or by e-mail at william.clark@nist.gov.

a. MML Office. Financial support may be provided for conferences, workshops, or other technical research meetings that are relevant to the mission of the Material Measurement Laboratory. Support is generally provided in increments of $5000. The contact person for this office is Bill Clark and he may be reached at (303) 497-3268 or by e-mail at william.clark@nist.gov.

b. Materials Science and Engineering Division. The primary objective is to collaborate or conduct research consistent with division programs that provide the measurement science, standards, technology, instrumentation, and data required to support the Nation's need to design, develop, manufacture, and use materials. Division programs include measurement methods, data, standards, and science that support the development of polymeric materials which minimize environmental impacts and reduce stress on natural resources; polymeric materials in energy and electronics applications; the development of complex fluids and nanoparticle dispersions; thin films and nanostructures processing of metals and electronic materials; advanced magnetic materials and devices; the mechanical and corrosion properties of advanced materials, such as high strength steel and aluminum alloys, under extreme environmental and operating conditions; and the development of thermodynamic and kinetic models, measurements and data to predict phase transformations, microstructure evolution, and properties of advanced materials. The contact person for this division is Eric Lin and he may be reached at (301) 975-6743 or by email at eric.lin@nist.gov.

c. Materials Measurement Science Division. The primary objective is to collaborate or conduct research consistent with division programs in support of measurement science, measurement standards, and measurement technology required to enable world-leading characterization of materials in support of the nation's needs for the determination of the composition, structure, and properties of materials. The division develops state-of-the-art instrumentation, methods, models and software to accurately and precisely measure materials over a range of length and time scales. The division provides benchmarking and validation of emerging materials analysis methods, and disseminates reference materials, standards and scientific data to foster innovation and advance a wide range of technologies, such as those for public safety, forensics, homeland security and nanomanufacturing. The contact person

for this division is John Small and he may be reached at (301) 975-3900 or by email at john.small@nist.gov.

d. Biosystems and Biomaterials Division. The primary objective is to collaborate with or conduct research consistent with division projects in standards, measurement methods, and theoretical models that improve understanding and prediction of complex biological processes associated with environmental health, human health, and cell-based manufacturing. This includes analytical and bioanalytical measurements pertinent to method validation for bioassays, genome sequencing, cell identification, and quantitation of biological activity; facilitating research to support development of biomaterials with improved performance and appropriate interaction with cells and tissue; instrumentation, software, models and standards that support the understanding of complex biological phenomena at the cellular and subcellular level; and measurement science in bioimaging, proteomics, genomics, microfluidics, flow cytometry and informatics that facilitates characterization of biological state through the contemporaneous measurement of many biomolecules. The contact person for this division is Anne Plant and she may be reached at (301) 975-3124 or by e-mail at anne.plant@nist.gov.

e. Biomolecular Measurement Division. The primary objective is to collaborate with or conduct research consistent with the division activities in measurement science, standards, technology, and data required to support the nation's needs in determining the composition, structure, quantity, and function of biomolecules. In partnership with U.S. industry, government agencies, and scientific institutions, the division performs fundamental and applied research on the measurement of macromolecules such as proteins and nucleic acids, as well as peptides, glycans, metabolites, lipids, and natural products. Specific areas of interest include development of measurement methods, standards, reference data, and technologies for applications involving clinical diagnostics for healthcare; characterization, development, and manufacturing of biotherapeutics; proteomics, metabolomics, and drug discovery; and genetic testing in agriculture, law enforcement, and clinical diagnostics. The contact person for this division is Michael Tarlov and he may be reached at (301) 975-2058 or by email at michael.tarlov@nist.gov.

f. Chemical Sciences Division. The primary objective is to collaborate with or conduct research consistent with the division activities in support of the measurement science, standards, technology, data and chemical informatics required to support the nation's needs in the determination of chemical composition and chemical structure of gases, organic, and inorganic species and in the measurement of a wide variety of chemical properties and processes, including chemical reactivity and mechanisms, and thermochemical properties. In partnership with U.S. industry, government agencies, and academic scientific institutions, the division performs fundamental and applied research to advance and create state-of-the-art chemical measurement capabilities, theory and computational methods for quantitative measurements, and sensing of solids, liquids, gases, plasmas, transient species, and multicomponent matrices. The division also formulates and

disseminates reference materials and measurement standards, and critically evaluates reference data. These activities support the chemical science, technology, and engineering enterprise with the intent of fostering innovation and confidence in measurements and technologies used in a wide range of applications, including chemical analysis, environmental and climate assessment, clinical health assessment, food and nutritional assessment, sensing, manufacturing, and energy transformation. The contact person for this division is Carlos Gonzalez and he may be reached at (301) 975-2483 or by e-mail at carlos.gonzalez@nist.gov.

g. Applied Chemicals and Materials Division. The primary objective is to collaborate with or conduct research consistent with division programs in the measurement science, standards, technology, instrumentation, models and data required to support the nation's needs for design, production, and assessment of chemical and material products. In partnership with U.S. industry, other government agencies and other scientific institutions, the division provides thermophysical and mechanical properties; analysis of reliability and performance of materials and structures; and information systems for chemical and materials engineering, with the intent of fostering innovation and confidence in the nation's physical and energy infrastructures, enabling advances in chemical manufacturing and in electronics, and promoting sustainability. The contact person for this division is Jim Fekete and he may be reached at (303) 497-5204 or by e-mail at james.fekete@nist.gov.

2. Physical Measurement Laboratory (PML) Grant Program

The statutory authority for the PML Grant Program is 15 U.S.C. § 272(b) and (c) and 15 U.S.C. § 278g-1.

Program Description: The PML Grant Program provides financial assistance to support the conduct of research or a recipient's portion of collaborative research consistent with the PML mission to support research in the broad areas of mechanical metrology, semiconductors, ionizing radiation physics, medical physics, biophysics, neutron physics, atomic physics, optical technology, optoelectronics, electromagnetics, time and frequency, quantum physics, weights and measures, quantum electrical metrology, temperature, pressure, flow, far UV physics, and metrology with synchrotron radiation. Additional information about the PML and PML Programs may be obtained at www.nist.gov/pml.

All applications submitted to the PML Grant Program must be in accordance with the program objectives listed below. The appropriate PML Program Manager for each PML field of research that follows may be contacted for clarification of the program objectives. The contact person for the PML Grant Program is Patrick Hovis and he may be reached at (301)-975-4290 or by e-mail at patrick.hovis@nist.gov.

a. PML Office. Financial support may be provided for conferences, workshops, or other technical research meetings that are relevant to the mission of PML. Support is generally provided in increments of $5,000 per award. The contact person for this

office is Patrick Hovis and he may be reached at (301) 975-4290 or by e-mail at patrick.hovis@nist.gov.

b. **Office of Weights and Measures.** The primary objective is to provide funding for the broad areas of documentary standards and legal metrology. Specific objectives of interest in this area include: evaluation of the impact of legal metrology on commerce, support for specific standards related activities, and the development of a national weights and measures training program. Support for legal metrology may include awards to the states for: purchase of specialized equipment required to conduct inspections and tests; purchase of specialized metrology laboratory equipment; purchase of software/hardware needed to collect data of inspection records/results; and conducting training schools for weights and measures field inspectors. Financial support may be provided for conferences, workshops, or other technical research meetings that are relevant to the mission and programs of the office. The contact person for this office is Carol Hockert and she may be reached at (301) 975-5507 or by e-mail at carol.hockert@nist.gov.

c. **Radiation Physics Division.** The primary objective is to collaborate with or conduct research consistent with the division's programs in the areas of terahertz measurements, ionizing radiation (x- and gamma-ray) dosimetry, neutron physics, and radioactivity measurements supporting the protection of workers and the general public, therapy and diagnosis, nuclear medicine and medical imaging, radiography, industrial processing, nuclear and alternative energies, national defense and security, space science, and environmental protection. The contact person for this division is Lisa Karam and she may be reached at 301-975-5561 or by e-mail at lisa.karam@nist.gov.

d. **Engineering Physics Division.** The primary objective is to collaborate with or conduct research consistent with the division's programs in the areas of dimensional, nanometer-scale, surface, and acoustic pressure metrology; accelerometry; silicon Complementary Metal-Oxide Semiconductor (CMOS) technology; beyond CMOS future electronics; more than Moore technologies; MicroElectroMechanical Systems (MEMS); power electronics; nanoelectronics; and flexible/printed electronics. The contact person for this division is David Seiler and he may be reached at (301) 975–2054 or by e-mail at david.seiler@nist.gov.

e. **Quantum Measurement Division.** The primary objective is to collaborate with or conduct research consistent with division basic and applied research programs, including precision measurements; mass, force, and electrical metrology; electronic instrumentation; measurements of basic atomic properties including new metrology techniques in atomic spectroscopy; measuring fundamental quantum processes in ultra cold atomic systems including Bose-Einstein condensates and Fermi degenerate gases, nanophotonic systems, quantum dots, single electron devices, single photon devices, and quantum materials relevant to these system; and advancing quantum information science and laser cooling and their broad applications to measurement science and measurement beyond the standard

quantum limit. The contact person for this division is Carl Williams and he may be reached at (301) 975-3200 or by e-mail at carl.williams@nist.gov.

f. **Sensor Science Division.** The primary objective is to collaborate with or conduct research consistent with the division's programs in temperature, humidity, pressure, vacuum, flow, optical properties, and optical radiation measurement and standards and their application to addressing national needs. The contact person for this division is Gerald Fraser and he may be reached at (301) 975-3797 or by e-mail at gerald.fraser@nist.gov.

g. **Applied Physics Division.** The primary objective is to collaborate with or conduct research consistent with the division's programs in areas including laser metrology, superconducting sensor array fabrication and application, quantum information and computing, single photonics, medical imaging, fiber and free-space communication, radio-frequency and microwave technology, greenhouse gas monitoring, terahertz imaging and metrology, laser applications, and compound semiconductor nanophotonics. The contact person for this division is Marla Dowell and she may be reached at (303) 497–7455 or by e-mail at marla.dowell@nist.gov.

h. **Quantum Electromagnetics Division.** The primary objective is to collaborate with or conduct research consistent with the division's programs in areas including quantum sensors, superconductive electronics, molecular and bio-photonics, quantum information processing, spin electronics, nanoscale magnetodynamics, and related microfabrication. The contact person for this division is Robert Hickernell and he may be reached at (303) 497-3455 or by e-mail at robert.hickernell@nist.gov.

i. **Time and Frequency Division.** The primary objective is to collaborate with or conduct research consistent with the division's basic and applied research programs in the areas of time and frequency standards, phase noise measurements, network synchronization, ion storage, quantum information, atomic standards and optical frequency measurements in support of future standards, chip-scale atomic clocks, magnetometers, and related devices, time and frequency dissemination services, and time and frequency applications such as navigational systems and telecommunications. The contact person for this division is Thomas R. O'Brian and he may be reached at (303) 497-4570 or by e-mail at thomas.obrian@nist.gov.

j. **Quantum Physics Division.** The primary objective is to collaborate with or conduct research consistent with the division's basic and applied research programs in the areas of quantum degenerate gases, ultrafast phenomena, femtosecond laser frequency comb development and applications, precision quantum measurements, chemical physics, nanotechnology, and biophysics. The contact person for this division is Thomas R. O'Brian and he may be reached at (303) 497-4570 or by e-mail at thomas.obrian@nist.gov.

3. Engineering Laboratory (EL) Grant Program

The statutory authorities for the EL Grant Program are 15 U.S.C. § 272(b) and (c), 15 U.S.C. § 278g-1, 15 U.S.C. § 278n-1, 15 U.S.C. § 278n-2, 42 U.S.C. § 7701 et seq., 42 U.S.C. § 15701 et seq., and section 1305 of the Energy Independence and Security Act of 2007 (Pub. L. 110-140).

Program Description: The EL Grant Program provides financial assistance to support the conduct of research or a recipient's portion of collaborative research consistent with the EL's mission to support research in the following fields: advanced manufacturing; additive manufacturing; robotics; intelligent systems and information systems integration for applications in manufacturing; structures; inorganic materials; polymeric materials; heating, ventilation, air conditioning, and refrigeration (HVAC & R) equipment performance; mechanical systems and controls; heat transfer and alternative energy systems; computer integrated building processes; indoor air quality and ventilation; cyber-physical systems; smart grid; windstorm impact reduction; applied economics; and fire research. Financial support may be provided for conferences, workshops, or other technical research meetings that are relevant to the mission of EL. Additional information about the EL and EL Programs may be obtained at www.nist.gov/el.

The EL Grant Program promotes the development and dissemination of advanced manufacturing and construction technologies, guidelines, and services to the U.S. manufacturing and construction industries through activities including measurement science research, performance metrics, tools and methodologies for engineering applications, and critical technical contributions to standards and codes development.

All applications submitted must be in accordance with the program objectives listed below. The appropriate EL Program Manager for each EL field of research described in this Section may be contacted for clarification of the program objectives. The contact person for the EL Grant Program is Millie Glick and she may be reached at 301-975-5962 or by e-mail at millie.glick@nist.gov.

a. **Applied Economics Office.** The primary objective is to provide standardized methods, economic models, training programs and materials and expert technical consulting in support of resource allocation decisions and uses techniques such as benefit-cost analysis, life-cycle costing, multi-criteria decision analysis and econometrics to evaluate new technologies. The contact person for this division is Robert Chapman and he may be reached at (301) 975-2723 or by email at robert.chapman@nist.gov.

b. **Smart Grid and Cyber-Physical Systems Program Office.** The primary objective is to promote U.S. innovation and industrial competitiveness in areas of critical national priority by anticipating and meeting the measurement science and standards needs for cyber-physical systems, such as smart grid, in ways that enhance economic prosperity and improve the quality of life. The contact person is David Wollman and he may be reached at (301) 975-2433 or by email at david.wollman@nist.gov.

c. Materials and Structural Systems Division. The primary objective is to collaborate with or conduct research consistent with the division's programs in the area of construction materials and infrastructural systems (including safety, security, and sustainability of building and physical infrastructure, service-life performance of engineered materials and nanomaterials, and construction cycle time reductions). In particular, applications for financial assistance are sought that would address the following specific subject area:

- **Polymeric Materials:** Provide the measurement science needed to support standards used to classify and specify materials used in infrastructure, construction, and manufacturing to ensure sustainable performance. This materials program approaches the solution of this problem from the perspective of service life prediction, a crucial sustainability metric, and applies this concept to multifunctional polymers and nano-composites. These two material thrusts will support the development of measurement science composed of a combination of characterization, performance measurement, accelerated durability tests, and modeling to develop standards that will be used by industry and specified by end-users in these broad application areas to enable service life prediction and thus help to ensure sustainable materials performance.

The contact person for this division is Jason Averill and he may be reached at (301) 975-2585 or by email at jason.averill@nist.gov.

d. Energy and Environment Division. The primary objective is to collaborate with or conduct research consistent with the laboratory programs in areas related to measurement science needed to enable Net Zero Energy High Performance Green Buildings. The breadth of this area includes measurement science associated with the building envelope, HVAC equipment, renewable energy systems, building controls/building automation systems, and strategies to achieve acceptable indoor air quality. In particular, applications for financial assistance are sought that would:

(1) Provide measurement science for net-zero energy, high-performance buildings. Measurement systems, approaches, and predictive models are required that can help to enable net-zero energy, high-performance buildings. A primary objective is to develop measurement methods and approaches, data, and predictive models to assess the effectiveness of building enclosures from a thermal and airtightness perspective, the performance of indoor space conditioning systems, the performance of photovoltaics and other renewable energy systems, and indoor air quality. Additionally, an objective is to develop techniques to assess buildings on a whole-building scale. These techniques could involve standards, system interactions, and factors beyond energy use. The contact person is William Healy and he may be reached at (301) 975-4922 or by email at william.healy@nist.gov.

(2) Enable energy-use reduction through embedded intelligence in building controls. Next-generation metrics and tools are needed that enable the

development and deployment of building automation and control systems with embedded intelligence that reduce energy consumption through improvements to building system operation. A primary objective is to develop measurement methods, models, and algorithms/tools suitable for embedding in building control system products that enable better or more automated system commissioning, automated fault detection and diagnostics, improved system-level optimization, and integration of building systems with a smart electrical grid. Additionally, an objective is to conduct research that provides a basis for new industry standards for embedded intelligence systems. The contact person is Steven Bushby and he may be reached at (301) 975-5873 or by email at steven.bushby@nist.gov.

(3) Develop metrics/tools for building sustainability evaluation. Next-generation metrics and tools enabling rigorous sustainability assessment over the building service life are needed to link sustainable building technology innovation to environmental/economic benefits. A primary objective is the development of databases and/or models for estimating component and system costs for existing and emerging energy-related technologies in new buildings. Additionally, an objective is to develop techniques for performing life-cycle impact assessments of emerging technologies for achieving low energy and/or net zero energy performance in new buildings. The contact person is Robert Chapman and he may be reached at (301) 975-2723 or by email at robert.chapman@nist.gov.

e. Systems Integration Division. Measurement science and standards are important to facilitate smart manufacturing solutions to systems integration problems. A primary objective is the development of mathematically sound, model-based, integration standards and new science-based methods and tools for validating compliance to those standards. Topical areas supporting this objective include system architectures; systems engineering; production network integration; service-based manufacturing; distributed manufacturing simulation; methods and tools for assessing material and energy efficiency; data analytics; uncertainty quantification; systems assurance methods and tools; model-based engineering, including multi-physics modeling, process modeling, requirements modeling, information modeling, material modeling, assembly modeling, sustainability modeling, and model composability and compositionality. The contact person is Vijay Srinivasan and he may be reached at (301) 975-3508 or by e-mail at vijay.srinivasan@nist.gov.

f. Intelligent Systems Division. The primary objective is to collaborate with or conduct research consistent with Division programs and research in measurement science for intelligent systems. Areas of particular interest include:

(1) Robotic systems for smart manufacturing (including measurement science for perception, dexterous manipulation, mobility, human-robot and robot-robot collaboration, agility, and robot system integration);
(2) Additive manufacturing (including characterization of additive manufacturing; materials, modeling and real-time control of additive manufacturing processes,

and measurement science supporting the qualification of additive manufacturing materials, processes, and parts);
(3) Sensing, prognostics, health management, and control for smart manufacturing;
(4) Industrial wireless networking;
(5) Industrial control system cybersecurity; and
(6) Emergency response robot performance metrics and standards.

Additional information regarding Intelligent Systems Division research programs and projects can be found at www.nist.gov/el/isd. The contact person for this division is Albert Wavering and he may be reached at (301) 975-3418 or by e-mail at albert.wavering@nist.gov.

g. National Windstorm Impact Reduction Program. The primary objective is to collaborate with or conduct research consistent with the laboratory programs in the areas of windstorm and coastal inundation impact reduction (including engineering for extreme winds, storm surge, and tsunami). The contact person is Marc Levitan who can be reached at 301-975-5340 or marc.levitan@nist.gov.

h. Disaster and Failure Studies Program. The primary objective is to collaborate with or conduct research consistent with the laboratory programs in the areas of disaster and failure studies. The contact person is Long Phan who can be reached at 301-975-6077 or long.phan@nist.gov. More information about the Disaster and Failure Studies Program can be found at http://www.nist.gov/el/disasterstudies/index.cfm.

4. Fire Research (FR) Grant Program

The statutory authority for the FR Grant Program is 15 U.S.C. § 272(b)(4), 15 U.S.C. § 278f, 15 U.S.C. §278g-1 and 15 U.S.C. § 278n-1.

Program Description: The FR Grant Program provides financial assistance to support the conduct of research or a recipient's portion of collaborative research in areas of current interest to the Fire Research Division. The Fire Research Division develops, verifies, and utilizes measurements and predictive methods to quantify the behavior of fire and means to reduce the impact of fire on people, property, and the environment. This work involves integration of laboratory measurements, verified methods of prediction, and large-scale fire experiments to demonstrate the use and value of the research products. Details on current Division research activities are available at http://www.nist.gov/el/fire_research/index.cfm. Also, NIST SP 1130 "Reducing the Risk of Fire in Buildings and Communities: A Strategic Roadmap to Guide and Prioritize Research" provides an overview of current research interests http://www.nist.gov/manuscript-publication-search.cfm?pub_id=909653. The contact person for the FR Grant Program is Millie Glick and she may be reached at 301-975-5962 or by e-mail at millie.glick@nist.gov.

All applications submitted must be in accordance with the program objectives listed

below. The appropriate FR Program Manager for each FR field of research described in this Section may be contacted for clarification of the program objectives.

a. **Fire Fighting Technology Group.** Develops, advances, and deploys measurement science to improve fire fighting safety and effectiveness, and provide a science-based understanding of fire phenomena. Carries out mission-related measurement science research and services to advance fire fighting tactics, technology integration into fire-fighting equipment, physics-based training tools that predict fire phenomena and their effects on structures and occupants, fire forensics, and conducts disaster and failure studies to reduce the risk of fire hazard to buildings and fire fighters. The contact person for this group is Jiann Yang and he may be reached at (301) 975-6662 or by e-mail at jiann.yang@nist.gov..

b. **Engineered Fire Safety Group.** Develops, advances, and deploys measurement science for cost-effective fire protection of structures. Carries out mission-related measurement science research and services to predict the fire performance of structures with respect to ignition fire growth and spread, detection, suppression, toxicity, and egress; develop cost-effective performance-based codes, standards, and practices used for fire prevention and control; and conduct disaster and failure studies to reduce the risk of fire hazard to buildings and occupants. The contact person for this group is Tom Cleary and he may be reached at (301) 975-6858 or by e-mail at thomas.cleary@nist.gov.

c. **Flammability Reduction Group.** Develops, advances, and deploys measurement science to reduce the fire hazard of building contents and construction materials. Carries out mission-related measurement science research and services to reduce material ignition probability, fire growth and spread, and environmental impacts; and support development of codes and standards for cost-effective, fire-safe building contents and construction materials. The contact person for this group is Rick Davis and he may be reached at (301) 975-5901 or by email at rick.davis@nist.gov.

d. **Wildland Urban Interface Fire Group.** Develops, advances, and deploys measurement science to reduce the risk of fire spread in wildland-urban interface (WUI) communities. Carries out mission-related measurement science research and services to develop risk exposure metrics, predict the spread of fires in WUI communities, assess fire performance of structures and communities, mitigate the impact of WUI fires on structures and communities, and conduct disaster and failure studies to reduce the risk of fire hazard in WUI communities. The contact person for this group is Erica Kuligowski and she may be reached at (301) 975-2309 or by email at erica.kuligowski@nist.gov.

e. **The National Fire Research Laboratory.** Develops, advances, and deploys measurement science to characterize the real-scale fire behavior of combustibles, and the fire performance of structures under realistic fire and structural loading. Carries out mission-related measurement science research and services to improve the fire performance of communities, structures and building contents; develop

physics-based models that predict fire behavior and structural performance; and conduct disaster and failure studies to reduce the risk of fire hazards to structures and fire fighters. The contact person for this group is Matthew Bundy and he may be reached at (301) 975-6880 or by email at matthew.bundy@nist.gov.

5. Information Technology Laboratory (ITL) Grant Program

The statutory authority for the ITL Grant Program is 15 U.S.C. § 272(b) and (c), 15 U.S.C. § 278g-1, and 15 U.S.C. § 278n-1.

Program Description: The ITL Grant Program provides financial assistance to support the conduct of research or a recipient's portion of collaborative research in the broad areas of Advanced Network Technologies, Big Data, Biometrics, Cloud Computing, Cyber-Physical Systems, Forensic Science, Information Access, Information Processing and Understanding, Cybersecurity, Health Information Technology, Human Factors and Usability, Applied and Computational Mathematics, Mathematical Foundations of Measurement Science for Information Systems, Metrology Infrastructure for Modeling and Simulation, Privacy Engineering, Software Testing, Statistics for Metrology and Statistical Methods in Forensic Science.

Specific objectives of interest in these areas of research include: Internet Inter-Domain Routing Robustness; Secure Domain Name System Technologies; Network Anomaly Detection / Evaluation; Network Function Virtualization / Software Defined Networking; Measurement Science for Complex Networked Information Systems; Advanced Distributed Denial of Service Detection and Mitigation Techniques; Next Generation Internet Architectures; Systems Interoperability; Uncertainty Quantification for Scientific Computing; Quantum Information Theory; Quantum Communications; Scientific Visualization; Computational Materials Science; Computational Biology; Systems Biology; Image Analysis; Semantics; Medical Device Interoperability; Software Assurance for Small Applications and Devices; Data Analytics; Search and Retrieval Algorithms; Biometrics for Search, Verification and Clustering of Identity; Human Language Technology; Voting Systems Standards; Grid Computing; Service Oriented Architecture; Post Quantum Cryptography; Light Weight Cryptography; Mobility and Mobile App Security; Secure Distributed Computation; Cryptography and Cryptographic Test Methods; Mobile Platform and Application Security; Trusted Ad Hoc Networks; Device Identity and Authentication; Cybersecurity Awareness, Training, and Education; Security Testing Tools and Metrics; Data Storage, Preservation, Query, Indexing, and Access Technology; Secure Communications for Cloud; Identity Management Support for Clouds; and Device Mobility among Heterogeneous Networks. Additional information about the ITL and ITL Programs may be obtained at www.nist.gov/itl. Financial support may be provided for conferences, workshops, or other technical research meetings that are relevant to the mission of ITL. All applications submitted to the ITL Grant Program must be in accordance with the program objectives listed above. The contact person for the ITL Grant Program, who may be contacted for clarification of program objectives, is Yolanda Bursie and she may be reached at (301) 975-6738 or by e-mail at yolanda.bursie@nist.gov.

6. Communications Technology Laboratory (CTL) Grant Program

The statutory authority for the CTL Grant Program is 15 U.S.C. § 272(b) and (c), 15 U.S.C. § 278g-1 and 15 U.S.C. § 278n-1.

Program Description: The CTL Grant Program provides financial assistance to support the conduct of research or a recipient's portion of collaborative research consistent with the CTL mission in broad areas that support the accelerated development, testing, and deployment of advanced communications technologies in support of both commercial and government applications including: high-speed electronics, wireless systems metrology, antenna and RF capabilities, high-speed and high frequency measurement capabilities, advanced optics, quantum communications, network design and optimization, network modeling, and public safety network communications.

Additional information about the CTL and CTL Programs may be obtained at www.nist.gov/ctl. All applications submitted must be in accordance with the program objectives listed below for the CTL Office and the three CTL divisions. The contact person for the CTL Grant Program, who may be contacted for clarification of program objectives, is Jim Harriman and he may be reached at (303) 497-5312 or by e-mail at james.harriman@nist.gov.

a. CTL Office. Financial support may be provided for conferences, workshops, or other technical research meetings that are relevant to the mission of CTL, as well as the development and deployment of spectrum-efficient and spectrum-sharing technologies including support of the National Advanced Spectrum and Communications Test Network (NASCTN).

b. Public Safety Communications Research (PSCR) Division. The PSCR concentrates on promoting advanced communications capabilities for a nationwide public safety communications broadband network through research, development, testing, and evaluation of public safety communications technologies. The primary focus areas of the PSCR Division currently include but are not limited to the following:

- Researching the capability for mission critical voice functions, currently found on Land Mobile Radio (LMR) networks, on LTE broadband networks and devices;
- Researching the capability to connect existing LMR networks to LTE broadband networks;
- Advanced Location Based Services (LBS) for public safety use;
- Public safety use of data analytics on a broadband LTE network; and
- Enhanced public safety user interfaces for an LTE broadband network.

c. RF Technologies Division. Specific objectives of interest include but are not

limited to researching, developing, promoting, measuring, and deploying emerging technologies and standards in fundamental microwave quantities, high-speed microelectronics, electromagnetic compatibility, electromagnetic field characterization, antenna metrology, electromagnetic properties of materials, and radio-frequency communications systems.

d. **Wireless Networks Division.** Specific objectives of interest include but are not limited to researching, developing, promoting, measuring, and deploying emerging technologies and standards that revolutionize how wireless networks are operated and used; conducting theoretical and experimental research in communication networks, protocols, digital communication systems, and components; utilizing analytical and empirical approaches, developing simulation models, experimental test beds, and building proof of concept prototypes to evaluate new technologies and refine standard specifications for wireless networks and systems; and developing metrics and measurement methods to assess the performance of wireless systems.

7. NIST Center for Neutron Research (NCNR) Grant Program

The statutory authority for the NCNR Grant Program is 15 U.S.C. § 272(b) and (c) and 15 U.S.C. § 278g-1.

Program Description: The NCNR Grant Program provides financial assistance to support the conduct of research or a recipient's portion of collaborative research involving neutron scattering and the development of innovative technologies that advance the state-of-the-art in neutron research. Financial assistance may be provided for conferences, workshops, or other technical research meetings that are relevant to the mission of NCNR. Additional information about the NCNR and NCNR Programs may be obtained at www.nist.gov/ncnr.

All applications submitted to the NCNR Grant Program must be in accordance with the program objectives: to create novel approaches to advance high resolution cold and thermal neutron scattering research; to develop new applications of neutron scattering to physics, chemistry, and macromolecular and materials research; and to support the development of innovative technologies relevant to neutron research, including, for example, high resolution two-dimensional neutron detectors, neutron monochromators, and neutron focusing and polarizing devices. The contact person for the NCNR Grant Program, who may be contacted for clarification of the program objectives, is Dan Neumann and he may be reached at (301) 975-5252 or by e-mail at dan.neumann@nist.gov.

8. Center for Nanoscale Science and Technology (CNST) Grant Program

The statutory authorities for the CNST Grant Program are 15 U.S.C. § 272(b) and (c), 15 U.S.C. § 278g-1 and 15 U.S.C. § 7501 *et seq*.

The NIST Center for Nanoscale Science and Technology is a national user facility, located in Gaithersburg Maryland that provides easy access to advanced nanotechnology fabrication and measurement methods to industry, academia, and government agencies.

Program Description: The CNST Grant Program provides financial assistance to support the conduct of research or a recipient's portion of collaborative research in the field of nanotechnology specifically aimed at developing essential measurement and fabrication methods and technology in support of all phases of nanotechnology development, from discovery to production; conducting collaborative research with CNST staff scientists and engineers; and supporting researchers visiting CNST to conduct such collaborative research. Financial assistance may be provided for conferences, workshops, or other technical research meetings, or fellowships that are relevant to the mission of the CNST. Applications involving fellowships are intended to support scientists and engineers with the education, experience, training, and demonstrated record of excellence to effectively pursue and advance the proposed field of nanotechnology research. In some cases one or more scientific staff members, including undergraduate and/or graduate students, and/or postdoctoral fellows, may be stationed at NIST in order to work in collaboration with CNST and other visiting scientists.

The primary program objectives of the CNST Grant Program are to develop new measurement and fabrication methods and instrumentation that support the development of nanotechnology and that will be made available to facility users. Broad areas of interest include new methods and instrumentation needed to advance nanoscience and technology, including nanophotonics; nanofabrication and nanomanufacturing; energy transport, storage, and conversion; bionanotechnology (including nanoparticle tracking and characterization); and post-CMOS electronics. Specific areas of interest include measurement and fabrication methods and instrumentation needed by current and future users for atomic-scale characterization and manipulation; scanning and transmission electron microscopy; focused ion beams; laser-atom manipulation; nanophotonics; nanoplasmonics; optical micro- and nanoelectromechanical systems (MEMS and NEMS); nanomagnetic imaging and dynamics; nanolithography; nanofabrication process development; directed self-assembly; nanoscale properties of soft matter; nanoscale electronic and ionic transport; light-matter interactions, charge and energy transfer processes, catalytic activity, and interfacial structure in energy-related devices (including photovoltaics, thermoelectric, photoanodes, fuel cells, batteries, supercapacitors, and field emitters); nanobiosensors; nanofluidics; nanomedicine; and theory, modeling, and simulation of nanostructures. Additional objectives of this program are to assist and train CNST collaborators and users in their research; and to conduct other outreach and educational activities that advance the development of nanotechnology by U.S. academic and industrial scientists. These objectives will entail collaborative research between the selected financial assistance recipients and the CNST technical staff. Additional information about CNST may be obtained at www.nist.gov/cnst. All applications submitted to the CNST Grant Program must be in accordance with the program objectives listed above. The contact

person for the CNST Grant Program, who may be contacted for clarification of the program objectives, is Donna Lauren and she may be reached at (301) 975-3729 or by e-mail at donna.lauren@nist.gov.

9. Special Programs Office (SPO) Grant Program

The statutory authority for the SP) Grant Program is 15 U.S.C. § 272(b) and (c), 15 U.S.C. § 278g-1 and 15 U.S.C. 278n-1.

Program Description: The SPO Grant Program provides financial assistance to support the conduct of research or a recipient's portion of collaborative research consistent with the SPO mission in the broad areas of greenhouse gas and climate science measurements, forensic science, national security standards, and measurement science for energy research in accordance with the four program descriptions below. Additional information about SPO and SPO Programs may be obtained at http://www.nist.gov/director/spo/index.cfm.

All applications submitted to the SPO Grant Program must be in accordance with the program objectives listed below. The appropriate SPO Program Manager for each SPO field of research that follows may be contacted for clarification of the program objectives. The contact person for the SPO Grant Program is Darlene Hamilton and she may be reached at (301)-975-2227 or by e-mail at darlene.hamilton@nist.gov.

a. Greenhouse Gas (GHG) and Climate Science Measurements Program. The GHG and Climate Science Measurements Grant Program provides financial assistance consistent with program objectives of supporting measurement science research to develop or extend internationally-recognized measurement standards, methodologies, and technologies. Such capabilities enhance science-based GHG emissions data to improve inventory reporting and measurement and standards capabilities advancing both emissions quantification and Earth system observing capability. Specific areas of interest include advances that increase accuracy and confidence in both GHG source and sink flux determination and in climate science measurements and standards in these areas: 1) stationary GHG emission sources, 2) measurement tools better characterizing GHG emissions and uptake in megacities, cities, and metropolitan areas, 3) remote sensing measurements of Earth systems, 4) reconcile GHG inventory data derived from both atmospheric observing and emission process-oriented methodologies as a technical means to address GHG emissions report verification at local and regional scales, and 5) measurement capabilities that further understanding of greenhouse gas transport in the lower atmosphere. Additional information about the SPO GHG and Climate Science Measurements Program may be obtained at http://www.nist.gov/greenhouse-gas/index.cfm. The contact person for the GHG and Climate Science Measurements Grant Program is James Whetstone and he may be reached at (301) 975-2738 or by e-mail at james.whetstone@nist.gov.

b. National Security Standards (NSS) Program. The NSS Program's mission is to

address the equipment needs of first responders, law enforcement, fire fighters, and emergency medical services (EMS) through standards-focused research and development projects based on chemical, biological, radiological, nuclear and explosive (CBRNE) and security requirements. Specific objectives of interest include test methods, guidance, training packages and performance standards in the following areas: electronic media (social media, video, and audio data); human augmentation robots; CBRNE technology including nontraditional threats and food safety; cargo security technology; personal and vehicle safety; and unmanned robotic platforms. Additional information about the SPO NSS Program may be obtained at http://www.nist.gov/national-security-standards/index.cfm. The contact person for the NSS Program is Timothy Brennan and he may be reached at (301) 975-8573 or by e-mail at timothy.brennan@nist.gov.

c. **Forensic Sciences Program (FSP).** FSP conducts and coordinates research and provides technical services to address the needs of the forensic science community. FSP focuses on creating new material standards; initiating research to verify methodology; and evaluating new technologies primarily for the following forensic science disciplines; computer and digital forensics; DNA; impression and pattern evidence, such as fingerprints and toolmarks; controlled and dangerous substances; and trace analysis. FSP also seeks to facilitate knowledge exchange and identify best practices for the forensic science community. Additional information about the SPO Forensic Science Program is available at http://www.nist.gov/forensics. The contact person for FSP is Susan Ballou and she may be reached at (301) 975-8750 or by e-mail at susan.ballou@nist.gov.

d. **Measurement Science for Energy Research Program.** The Measurement Science for Energy Research Program provides financial assistance consistent with the program objective of supporting the metrology and standards infrastructure for interdisciplinary energy research which advances the Nation's energy objectives for energy security, sustainability, flexibility, efficiency, reliability, and resiliency. The program focuses on the development of measurement methods, protocols, tools, data, and measurements to enable domestic and international acceptance of a quantitative understanding of a broad range of technologies. The primary focus areas include metrological aspects of the determination of sustainability, including quantitation, validation, and uncertainty analysis of the appropriate metrics; metrology for energy storage, including fundamental and applied measurements needed for batteries, advanced fuels, and alternative storage technologies; and metrology and standards for efficient manufacturing within the energy technology sector. The contact person for the Measurement Science for Energy Research Program is Dan Friend who may be reached at (303) 497-5424 or by e-mail at daniel.friend@nist.gov.

10. Standards Coordination Office (SCO) Grant Program

The statutory authority for the SCO Grant Program is 15 U.S.C. § 272(b) and (c) and 15 U.S.C. § 278g-1.

Program Description: The SCO conducts standards-related programs, and provides knowledge and services that strengthen the U.S. economy and improve the quality of life. The SCO goals include enhancing coordination of the U.S. standards system with government and private sector organizations and supporting U.S. industry with the standards-related tools and information necessary to effectively compete in the global marketplace.

The SCO manages NIST's responsibilities assigned under the National Technology Transfer and Advancement Act (NTTAA) to coordinate federal, state, and local technical standards and conformity assessment activities, as well as coordinating with those in the private sector.

The SCO Grant Program provides financial assistance to support the conduct of research or a recipient's portion of collaborative research consistent with the NIST mission in the broad areas of standards-related activities, coordination activities with the private sector and with other federal agencies on standards activities and programs, and standards development and conformity assessment activities tailored to equip U.S. industry with the standards-related tools and information necessary to effectively compete in the global marketplace. Financial support may be provided for the development of standards-related training materials, publications, policy analysis, and research and information services. Financial support may also be provided for conferences, workshops, or other standards related activities meetings that are relevant to the mission of the SCO. Additional information about the SCO and SCO Programs may be obtained at http://nist.gov/director/sco/index.cfm.

All applications submitted to the SCO Grant Program must be in accordance with the program objectives listed above. The contact person for the SCO Grant Program, who may be contacted for clarification of the program objectives, is Kerry Miles and she may be reached at (301) 975-5571 or by e-mail at kerry.miles@nist.gov**.**

11. International and Academic Affairs Office (IAAO) Grant Program

The statutory authority for the IAAO Grant Program is 15 U.S.C. § 272(b) and (c).

Program Description: The IAAO Grant Program has been designed to support activities that strengthen and enhance the international metrology community, and promote U.S. innovation and industrial competitiveness in support of the NIST Mission. NIST seeks to promote the efforts of the Regional Metrology Organizations, National Metrology Institutes and Designated Institutes to bolster the global metrology system and quality infrastructure. The IAAO Grant Program will support metrology and related endeavors in the following fields: bioscience, chemistry, materials, physics, engineering, infrastructure, information technology, neutron research and nanotechnology, with an emphasis on the Western Hemisphere and Africa. Financial support may be provided for conferences, workshops, or other technical meetings that are relevant to the mission of the IAAO. Additional information about the IAAO and IAAO Programs may be

obtained at http://nist.gov/iaao/.

All applications submitted to the IAAO Grant Program must be in accordance with the program objectives listed above. The contact person for the IAAO Grant Program, who may be contacted for clarification of the program objectives, is Claire Saundry and she may be reached at (301) 975-2386 or by e-mail at csaundry@nist.gov.

12. Associate Director for Laboratory Programs (ADLP) Grant Program

The statutory authority for the ADLP Grant Program is 15 U.S.C. § 272(b) and (c) and 15 U.S.C. § 278g-1.

Program Description: The ADLP Grant Program provides financial assistance to support the conduct of research or a recipient's portion of collaborative research consistent with the NIST mission in the following fields: bioscience, chemistry, materials, physics, engineering, infrastructure, information technology, neutron research and nanotechnology. Financial support may be provided for education and outreach programs, conferences, workshops, or other technical research meetings that are relevant to the mission of the ADLP. Additional information about the ADLP and ADLP Programs may be obtained at http://www.nist.gov/director/adlp.cfm.

All applications submitted to the ADLP Grant Program must be in accordance with the program objectives listed above. The contact person for the ADLP Grant Program, who may be contacted for clarification of the program objectives, is Donna Kimball and she may be reached at (301) 975-8362 or by e-mail at donna.kimball@nist.gov.

II. Federal Award Information

1. **Funding Instrument.** The funding instruments used in these programs will be grants or cooperative agreements, as appropriate. Where cooperative agreements are used, the nature of NIST's "substantial involvement" will generally be collaboration with the recipients in the scope of work. Additional forms of substantial involvement that may arise are described in Chapter 5.C of the DoC Grants and Cooperative Agreements Manual, as may be periodically amended, which is available at http://go.usa.gov/SNJd.

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 individual MSE research grant programs, and the availability of funds.

3. **Funding Availability.** The availability of funds depends upon actual authorization of funds, programmatic needs, and other costs expected to be incurred by individual divisions within each laboratory, center, or office. If funds are identified as available for financial assistance, those funds may be awarded to highly ranked applications as determined by the applicable program's review and selection process (*see* Section V.2. of this FFO).

a. **Material Measurement Laboratory (MML) Grant Program.** In 2016, MML anticipates funding individual projects in the $10,000 - $1,000,000 range and with project performance periods of up to five (5) years, consistent with the multi-year funding policy (*see* Section II.2. of this FFO). In FY2015, the MML Grant Program funded fifty-two (52) new awards totaling $21,000,000.

b. **Physical Measurement Laboratory (PML) Grant Program.** In FY 2016, PML anticipates funding individual projects in the $5,000 - $250,000 range and with project performance periods of up to five (5) years, consistent with the multi-year funding policy (*see S*ection II.2. of this FFO). In FY 2015, the PML Grant Program funded thirty (30) new awards totaling $2,622,551.

c. **Engineering Laboratory (EL) Grant Program.** In FY 2016, EL anticipates funding individual projects in the $5,000 - $500,000 range and with project performance periods of up to five (5) years, consistent with the multi-year funding policy (*see* Section II.2. of this FFO). In FY 2015, the EL Grant Program funded forty-two (42) new awards totaling $7,418,982.

d. **Fire Research (FR) Grant Program.** In FY 2016, the FR Grant Program anticipates funding individual projects in the $25,000 - $100,000 per year range and with project performance periods of up to five (5) years, consistent with the multi-year funding policies (*see S*ection II.2. of this FFO). In FY 2015, the FR Grant Program funded six (6) new awards, totaling $546,787.

e. **Information Technology Laboratory (ITL) Grant Program.** In FY 2016, ITL anticipates funding individual projects in the $10,000 - $500,000 range and with project performance periods of up to five (5) years, consistent with the multi-year funding policy (*see* Section II.2. of this FFO). In FY 2015, the ITL Grant Program funded thirty-eight (38) new awards totaling $6,980,364.

f. **Communications Technology Laboratory (CTL) Grant Program.** In FY 2016, CTL anticipates funding individual projects in the $10,000 to $2,000,000 range and with project performance periods for up to five (5) years, consistent with the multi-year funding policy (*see* Section II.2. of this FFO). In FY 2015, the CTL Grant Program funded one (1) award totaling $50,000.

g. **NIST Center for Neutron Research (NCNR) Grant Program.** In FY 2016, NCNR anticipates funding new, individual projects in the $25,000 - $100,000 per year range and with project performance periods of up to five (5) years, consistent with the

multi-year funding policy (*see* Section II.2. of this FFO). In FY 2015, the NCNR Grant Program funded two (2) new awards totaling $76,000.

h. Center for Nanoscale and Science and Technology (CNST) Grant Program. Although funding may be available to support continuation projects under the CNST Grant Program, at this time CNST does not anticipate funding becoming available for new awards in FY 2016. If funds become available in FY 2016, a typical project may be in the $15,000 - $100,000 per year range and with project performance periods of up to five (5) years, consistent with the multi-year funding policy (*see* Section II.2. of this FFO). In FY 2015, the CNST Grant Program funded two (2) new awards totaling $99,000.

i. Special Programs Office (SPO) Grant Program. In FY 2016, SPO anticipates funding individual projects under the Greenhouse Gas (GHG) and Climate Science Measurements Grant Program in the $25,000 - $1,800,000 range, under the National Security Standards (NSS) Grant Program in the $25,000 - $1,000,000, under the Forensic Science Grant Program in the $25,000 - $2,000,000 range, and under the Measurement Science for Energy Research Grant Program in the $25,000 to $1,000,000 range, with project performance periods of up to five (5) years, consistent with the multi-year funding policy (*see* Section II.2. of this FFO). In FY 2015, NIST funded eleven (11) awards totaling $ 4,063,385 under the GHG and Climate Science Measurements Grant Program, four (4) awards totaling $1,190,573 under the National Security Standards Grant Program, and three (3) awards totaling $212,715 under the Forensic Science Grant Program. In FY 2015, NIST did not fund any awards under the Measurement Science for Energy Research Grant Program.

j. Standards Coordination Office (SCO) Grant Program. In FY 2016, SCO anticipates funding individual projects in the $5,000 - $100,000 range and with project performance periods of up to three (3) years, consistent with the multi-year funding policy (*see* Section II.2. of this FFO). In FY 2015, the SCO Grant Program funded one (1) award totaling $50,000.

k. International and Academic Affairs Office (IAAO) Grant Program. In FY 2016, IAAO anticipates funding individual projects in the $5,000 - $200,000 range and with project performance periods of up to five (5) years, consistent with the multi-year funding policy (*see* Section II.2. of this FFO). In FY 2015, the IAAO Grant Program funded one (1) award totaling $213,000.

l. Associate Director for Laboratory Programs (ADLP) Grant Program. In FY 2016, ADLP anticipates funding individual projects in the $5,000 - $1,500,000 range and with project performance periods of up to five (5) years, consistent with the multi-year funding policy (*see* Section II.2. of this FFO). In FY 2015, the ADLP Grant Program did not fund any new awards under the ADLP Grant Program.

III. Eligibility Information

1. **Eligible Applicants.** Eligibility for all programs listed in this FFO is 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. Applicants selected for awards under 15 U.S.C. § 278g-1 are encouraged, but not required, to select underrepresented minorities for participation. In addition, NIST is not able to accept an application from an individual unaffiliated with a sponsoring applicant organization.

2. **Cost Sharing or Matching.** The MSE research grant programs do not require cost sharing.

IV. Application and Submission Information

1. **Address to Request Application Package.** The standard application package, consisting of the standard forms, i.e., SF-424, SF-424A, SF-424B, SF-LLL, and the CD-511, is available at www.grants.gov. The standard application package may also be requested by contacting the appropriate MSE research grant program office personnel listed below.

a. **Material Measurement Laboratory (MML) Grant Program.** Bill Clark, Material Measurement Laboratory, National Institute of Standards and Technology, 325 Broadway, Mail Stop 647.00, Boulder, CO 80305 (Phone: (303) 497-3268; e-mail: william.clark@nist.gov).

b. **Physical Measurement Laboratory (PML) Grant Program.** Patrick Hovis, Physical Measurement Laboratory, National Institute of Standards and Technology, 100 Bureau Drive, Stop 8400, Gaithersburg, MD 20899-8400 (Phone: (301) 975-4290; e-mail: patrick.hovis@nist.gov).

c. **Engineering Laboratory (EL) Grant Program.** Millie Glick, Engineering Laboratory, National Institute of Standards and Technology, 100 Bureau Drive, Stop 8600, Gaithersburg, MD 20899-8602 (Phone: (301) 975-5962; e-mail: millie.glick@nist.gov).

d. **Fire Research Grant Program.** Millie Glick, Engineering Laboratory, National Institute of Standards and Technology, 100 Bureau Drive, Stop 8600, Gaithersburg, MD 20899-8602 (Phone: (301) 975-5962; e-mail: millie.glick@nist.gov).

e. **Information Technology Laboratory (ITL) Grant Program.** Yolanda Bursie, Information Technology Laboratory, National Institute of Standards and Technology, 100 Bureau Drive, Stop 8900, Gaithersburg, Maryland 20899-8900 (Phone: (301) 975-6738; e-mail: yolanda.bursie@nist.gov).

f. Communications Technology Laboratory (CTL) Grant Program. Jim Harriman, Communications Technology Laboratory, National Institute of Standards and Technology, 325 Broadway, MS 670.00, Boulder, Colorado 80305 (Phone: (303) 497-5312; e-mail: james.harriman@nist.gov).

g. NIST Center for Neutron Research (NCNR) Grant Program. Tanya Burke, NIST Center for Neutron Research, National Institute of Standards and Technology, 100 Bureau Drive, Stop 6100, Gaithersburg, Maryland 20899-6100 (Phone: (301) 975-4711; e-mail: tanya.burke@nist.gov).

h. Center for Nanoscale and Science and Technology (CNST) Grant Program. Donna Lauren, Center for Nanoscale Science and Technology, National Institute of Standards and Technology, 100 Bureau Drive, Stop 6200, Gaithersburg, Maryland 20899-6200 (Phone: (301) 975-3729; e-mail: donna.lauren@nist.gov).

i. Special Programs Office (SPO) Grant Program. Darlene Hamilton, Office of Special Programs, National Institute of Standards and Technology, 100 Bureau Drive, Stop 8102, Gaithersburg, MD 20899-8102 (Phone: (301) 975-2227; e-mail: darlene.hamilton@nist.gov).

j. Standards Coordination Office (SCO) Grant Program. Kerry Miles, National Institute of Standards and Technology, Associate Director for Laboratory Programs, 100 Bureau Drive, Stop 2100, Gaithersburg, MD 20899-2100. Phone: 975-557. Email: kerry.miles@nist.gov.

k. International and Academic Affairs Office (IAAO) Grant Program. Claire Saundry, International and Academic Affairs Office, National Institute of Standards and Technology, 100 Bureau Drive, Stop 1090, Gaithersburg, Maryland 20899-1090 (Phone: (301) 975-2386; e-mail: claire.saundry@nist.gov .

l. Associate Director for Laboratory Programs (ADLP) Grant Program. Donna Kimball, National Institute of Standards and Technology, Associate Director for Laboratory Programs, 100 Bureau Drive, Stop 6000, Gaithersburg, MD 20899-6000 (Phone: (301) 975-8362; e-mail: donna.kimball@nist.gov).

2. Content and Format of Application Submission for all programs listed in this FFO

a. Required Forms and Documents

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

SF-424, Item 12, should list the FFO number 2016-NIST-MSE-01.

SF-424, Item 18, should list the total budget information for the duration of the project.

The list of certifications and assurances referenced in Item 21 of the SF-424 is contained in the SF-424B.

(2) SF-424A, Budget Information – Non-Construction Programs. The budget should reflect anticipated expenses for each year of the project, considering all potential cost increases, including cost of living adjustments. The applicant should reflect all expenses for the full term of the project on the SF-424A form. The SF-424A form accommodates up to five (5) years of budget information. Please carefully follow the directions found at http://www.grants.gov/web/grants/form-instructions/sf-424a-instructions.html when filling out this form.

Do not enter the Grant Program Function or Activity on Line 1 under Column (a), and do not enter the Catalog of Federal Domestic Assistance Number on Line 1 under Column (b).

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

(4) CD-511, Certification Regarding Lobbying. Enter "2016-NIST-MSE-01" 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) Technical Proposal. The Technical Proposal is a word-processed document responsive to the applicable program description(s) (*see* Section I. of this FFO) and the evaluation criteria (*see* Section V.1. of this FFO). The Technical Proposal should describe in depth the scope of the proposal, its goals, the methods and equipment to be used, its schedule, the personnel working on the project and their qualifications, and the institutional capabilities of the applicant.

(7) Budget Narrative. There is no set format for the Budget Narrative; however, it should provide a detailed breakdown of each of the object class categories as reflected on the SF-424A.

(8) 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 available at

http://go.usa.gov/hKbj.

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 portion of the application.

(9) Data Management Plan. In accordance with the Office of Science and Technology Memorandum for the Heads of Executive Departments and Agencies of February 22, 2013[1], *Increasing Access to the Results of Federally Funded Scientific Research*, and as implemented through NIST Policy 5700.00[2], *Managing Public Access to Results of Federally Funded Research,* and NIST Order 5701.00[3], *Managing Public Access to Results of Federally Funded Research*", applicants should 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[4] or the National Institutes of Health[5]). Some organizations' templates are available on the Internet[6].

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/or 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.

[1] https://www.whitehouse.gov/sites/default/files/microsites/ostp/ostp_public_access_memo_2013.pdf
[2] http://www.nist.gov/open/upload/Final-P-5700.pdf
[3] http://www.nist.gov/open/upload/Final-O-5701_0.pdf
[4] http://www.nsf.gov/bfa/dias/policy/dmp.jsp
[5] http://grants.nih.gov/grants/policy/data_sharing/data_sharing_guidance.htm
[6] https://www.cic.net/projects/technology/shared-storage-services/data-management-plans

The sufficiency of the DMP will be considered as part of the administrative review (*see* Section V.2.a. of this FFO); however, the DMP will not be evaluated against any evaluation criteria.

If submitting the application electronically via Grants.gov, items IV.2.a.(1) through IV.2.a.(5) above are part of the standard application package in Grants.gov and can be completed through the download application process. **Items IV.2.a.(6) through IV.2.a.(9) 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 indicating that an application is received does not provide information about whether attachments have been received.***

If submitting an application by paper, all of the required application documents should be submitted in the order listed above.

b. Application Format

(1) Cover Page. In an effort to route an application to the appropriate program official, applicants should reference on the Technical Proposal cover page the applicable MSE research grant program that the application is being submitted under using the following choices:

1) the Material Measurement Laboratory (MML) Grant Program;
2) the Physical Measurement Laboratory (PML) Grant Program;
3) the Engineering Laboratory (EL) Grant Program;
4) the Fire Research (FR) Grant Program;
5) the Information Technology Laboratory (ITL) Grant Program;
6) the Communications Technology Laboratory (CTL) Grant Program;
7) the NIST Center for Neutron Research (NCNR) Grant Program;
8) the Center for Nanoscale Science and Technology (CNST) Grant Program;
9) the Special Programs Office (SPO) Grant Program;
10) the Standards Coordination Office (SCO) Grant Program;
11) the International and Academic Affairs Office (IAAO) Grant Program; and
12) the Associate Director for Laboratory Programs (ADLP) Grant Program.

(2) Double-sided. For paper submissions, print on both sides of the paper for original and copies.

(3) E-mail and facsimile (fax) submissions. Will not be accepted.

(4) Number of paper copies. For paper submissions, one (1) signed stapled original and two (2) stapled copies. If the original proposal is in color, the two

(2) copies must also be in color. If submitting electronically via Grants.gov, paper copies are not required.

(5) Page layout. The Technical Proposal must be in portrait orientation.

(6) Page numbering. Number pages sequentially.

(7) Application language. English.

(8) Staple paper submission. For paper submissions, staple the original signed application and each of the two (2) copies securely with one (1) staple in the upper left-hand corner.

(9) Typed document. All applications, including forms, must be typed; handwritten applications and forms will not be accepted.

c. Application Replacement Pages. Applicants may not submit replacement pages and/or missing documents once an application has been submitted. Any revisions must be made by submission of a new application that must be received by NIST by the submission deadline.

d. Pre-Applications. NIST is not accepting pre-applications or white papers under this FFO.

e. 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.

3. 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 FFO, 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.

4. Submission Dates and Times

When developing your submission timeline, please keep in mind that (1) all applicants are required to have a current registration in the System for Award Management (SAM.gov); (2) the free annual registration process in the electronic System for Award Management (SAM.gov) (*see* Section IV.3. and Section IV.7.a.(2).b. of this FFO) may take between three and five business days, or as long as more than two weeks; (3) electronic applicants are required to have a current registration in Grants.gov; and (4) applicants will receive a series of e-mail messages from Grants.gov over a period of up to two business days before learning whether a Federal agency's electronic system has received its application. **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.**

Electronic applicants will find instructions on registering with SAM.gov as part of the Grants.gov process at:
http://www.grants.gov/web/grants/applicants/organization-registration.html.

Paper applicants will find instructions on registering with SAM.gov by going to www.sam.gov **and choosing "Create User Account". Carefully read Section IV.3 of this FFO to understand the steps involved.**

All NIST MSE Research Grant Programs. Applications will be considered on a continuing/rolling basis as they are received. To ensure consideration in the current fiscal year, applications should be received by 5:00 p.m. Eastern Time on June 13, 2016. Applications received after this deadline may be processed and considered for funding in the current fiscal year or in the next fiscal year, subject to the availability of funds.

All applications submitted to the MSE Research Grants programs, paper and electronic, must be received prior to the posting of the FY 2017 NIST MSE Research Grants Programs FFO on Grants.gov in order to be processed under this FFO.

5. **Intergovernmental Review**. Applications under all Programs in this FFO are not subject to Executive Order 12372.

6. **Funding Restrictions.** Applications for product development and/or commercialization are not considered responsive to this FFO.

7. **Other Submission Requirements for all programs listed in this FFO**

a. Applications may be submitted by paper or electronically.

(1) Paper applications must be submitted in triplicate (an original and two copies) and submitted to the appropriate MSE research grant program office personnel listed in Section IV.1. of this FFO.

(2) Electronic applications must be submitted via Grants.gov at www.grants.gov, under announcement 2016-NIST-MSE-01.

Cover Page. In an effort to route an application to the appropriate program official, applicants should reference on the Technical Proposal cover page the applicable MSE research grant program that the application is being submitted under using the choices provided in Section IV.2.b.(1). of this FFO.

a) Submitters of electronic applications should carefully follow specific Grants.gov instructions to ensure the 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 2016-NIST-MSE-01 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 (3) to five (5) business days. If problems are encountered, the registration process can take up to two (2) weeks or more. Applicants must have a 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. *See also* Section IV.3. of this FFO. 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 authorized individual(s) 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, you 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.

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 your application before the deadline. If the applicant does not correct the errors, the application will not be forwarded to NIST by Grants.gov.

All applicants, both electronic and paper submitters, should be aware that adequate time must be factored into applicants' schedules for delivery of their application. Submitters of electronic applications are advised that volume on Grants.gov may be extremely heavy on the deadline date, and if Grants.gov is unable to accept applications electronically in a timely fashion, applicants are encouraged to exercise their option to submit applications in paper format. Submitters of paper applications should allow adequate time to ensure a paper application will be received on time, taking into account that Federal Government security screening for U.S. Postal Service mail may delay receipt of mail for up to two (2) weeks and that guaranteed express mailings and/or couriers are not always able to fulfill their guarantees.

Refer to important information in Section IV.4. Submission Dates and Times, to help ensure your application is received on time.

b. Amendments. Any amendments to this FFO will be announced through Grants.gov. Applicants may sign up for Grants.gov FFO amendments or may

request copies from the programmatic and technical questions contact for the appropriate program (*see* Section VII. of this FFO).

V. Application Review Information

1. Evaluation Criteria

a. Material Measurement Laboratory (MML) Grant Program. The evaluation criteria that will be used in evaluating applications considered by the MML Grant Program are as follows:

(1) Rationality. The coherence of the applicant's approach and the extent to which the application effectively addresses scientific and technical issues that are relevant to MML programs (*see* Section I.1. of this FFO). **(0 – 25 points)**

(2) Qualifications of Technical Personnel. The professional accomplishments, skills, and training of the proposed personnel to perform the work proposed in the application. **(0 – 25 points)**

(3) Resources Availability. The extent to which the applicant has access to the necessary facilities and overall support to accomplish project objectives. **(0 – 25 points)**

(4) Technical Merit of Contribution. The potential technical effectiveness of the proposed work and the value it would contribute to the field of measurement science and engineering, especially as it pertains to reference methods, reference materials and reference data in Material Measurements. **(0 – 25 points)**

Each of these factors will be given equal weight in the evaluation process.

b. Physical Measurement Laboratory (PML) Grant Program.

(1) The evaluation criteria that will be used in evaluating applications considered by the **PML Grant Program**, except for applications to the Office of Weights and Measures (*see* Section V.1.b.(2) of this FFO) are as follows:

i. Rationality. The coherence of the applicant's approach and the extent to which the application effectively addresses scientific and technical issues that are relevant to PML programs (*see* Sections I.2.a. and I.2.c. through I.2.j. of this FFO).

ii. Qualifications of Technical Personnel. The professional accomplishments, skills, and training of the proposed personnel to perform the work proposed in the application.

iii. **Resources Availability.** The extent to which the applicant has access to the necessary facilities and overall support to accomplish project objectives.

iv. **Technical Merit of Contribution.** The potential technical effectiveness of the proposed work and the value it would contribute to the field of measurement science. Applications must be relevant to current PML research programs and have a relation to the objectives of ongoing PML programs and activities.

Each of these factors will be given equal weight in the evaluation process.

(2) The evaluation criteria that will be used in evaluating applications considered by the **Office of Weights and Measures** and assigned weights are as follows:

i. **Technical Quality of the Research.** The rationality, innovation and imagination of the application and the fit to NIST's documentary standards and legal metrology programs (*see* Section I.2.b. of this FFO). **(0 – 35 points)**

ii. **Potential Impact of the Results.** The potential impact and the technical application of the results to NIST's in-house programs and the documentary standards and legal metrology communities. **(0 – 25 points)**

iii. **Staff and Institution Capability to Perform the Work.** The quality of the facilities and experience of the staff to assess the likelihood of achieving the objective of the application**. (0 – 20 points)**

iv. **Match of Budget to Proposed Work.** Assessment of the budget against the proposed work to ascertain the reasonableness of the request. **(0 – 20 points)**

c. Engineering Laboratory (EL) Grant Program. The evaluation criteria that will be used in evaluating applications considered by the EL Grant Program and assigned weights are as follows:

(1) Technical Quality of the Research. The clarity, rationality, organization, innovation and imagination of the application. **(0 – 35 points)**

(2) Potential Impact of the Results. The potential impact and the likelihood of achieving technical application of the results, and the degree of alignment with NIST's EL programs (*see* Section I.3. of this FFO). **(0 – 35 points)**

(3) Staff and Institution Capability to Perform the Work. The quality of the facilities and experience of the staff to assess and overcome barriers to

successfully achieve the objective of the application. **(0 – 15 points)**

(4) Match of Budget to Proposed Work. Assessment of the budget compared to the proposed work to ascertain the reasonableness of the request. **(0 – 15 points)**

d. Fire Research (FR) Grant Program. The evaluation criteria that will be used in evaluating applications considered by the FR Grant Program and assigned weights are as follows:

(1) Technical Quality of the Research. The clarity, rationality, organization, innovation, and imagination of the proposed work. **(0 - 35 points)**

(2) Potential Impact of the Results. The potential impact and the likelihood of the technical application of the results and the degree of alignment with NIST EL's Fire Research Program (*see* Section I.4 of this FFO). **(0 - 35 points)**

(3) Staff and Institution Capability to Perform the Work. The quality of the facilities and experience of the staff to assess and overcome barriers to successfully achieve the objective of the application. **(0 - 15 points)**

(4) Match of Budget to Proposed Work. Assessment of the budget compared to the proposed work to ascertain the reasonableness of the request. **(0 - 15 points)**

e. Information Technology Laboratory (ITL) Grant Program. The evaluation criteria that will be used in evaluating applications considered by the ITL Grant Program are as follows:

(1) Rationality. The coherence of the applicant's approach and the extent to which the application effectively addresses scientific and technical issues relevant to ITL programs (*see* Section I.5. of this FFO).

(2) Technical Merit of Contribution. The potential technical effectiveness of the proposed work and the value it would contribute to the field of information technology research.

(3) Qualifications of Technical Personnel. The professional accomplishments, skills, and training of the proposed personnel to perform the proposed work.

(4) Resources Availability. The extent to which the applicant has access to the necessary facilities and overall support to accomplish project objectives.

Each of these factors will be given equal weight in the evaluation process.

f. Communications Technology Laboratory (CTL) Grant Program. The evaluation

criteria that will be used in evaluating applications considered by the CTL Grant Program and assigned weights are as follows:

(1) Rationality. The coherence of the applicant's approach and the extent to which the application effectively addresses scientific and technical issues that are relevant to CTL programs (*see* Section I.6. of this FFO). **(0 – 25 points)**

(2) Technical Merit of Contribution. The potential technical effectiveness of the proposed work and the value it would contribute to the field of measurement science and engineering, especially as it pertains to reference methods, reference materials and reference data in communications technology. **(0 – 25 points)**

(3) Qualifications of Technical Personnel. The professional accomplishments, skills, and training of the proposed personnel to perform the work proposed in the application. **(0 – 25 points)**

(4) Resources Availability. The extent to which the applicant has access to the necessary facilities and overall support to accomplish project objectives. **(0 – 25 points)**

g. NIST Center for Neutron Research (NCNR) Grant Program. The evaluation criteria that will be used in evaluating applications considered by the NCNR Grant Program and assigned weights are as follows:

(1) Rationality. The innovation, rationality, and coherence of the applicant's approach and the extent to which the application effectively addresses important scientific and technical issues using neutron methods and/or the development of innovative devices for neutron research (*see* Section I.7. of this FFO). **(0 to 35 points)**

(2) Qualifications of Technical Personnel. The professional accomplishments, skills, and training of the proposed personnel to perform the work proposed in the application. **(0 to 20 points)**

(3) Resources. The extent to which the applicant has access to the necessary resources, facilities, and overall support to accomplish project objectives, and assessment of the budget against the proposed work to ascertain the reasonableness of the request. **(0 to 20 points)**

(4) Technical Merit of Contribution. The potential technical effectiveness of the proposed work and the value it would contribute to neutron research. **(0 to 25 points)**

h. Center for Nanoscale Science and Technology (CNST) Grant Program. The evaluation criteria that will be used in evaluating applications considered by the

CNST Grant Program are as follows:

(1) Rationality. The coherence of the applicant's approach and the extent to which the application effectively addresses scientific and technical issues relevant to CNST (*see* Section I.8. of this FFO).

(2) Qualifications of Technical Personnel. The professional accomplishments, skills, and training of the proposed personnel to perform the work proposed in the application.

(3) Resources Availability. The extent to which the applicant has access to the necessary facilities and overall support to accomplish project objectives.

(4) Technical Merit of Contribution. The potential technical effectiveness of the proposed work and the value it would contribute to the field of nanotechnology.

Each of these factors will be given equal weight in the evaluation process.

i. Special Programs Office (SPO) Grant Program. The evaluation criteria that will be used in evaluating applications considered by the SPO Grant Program are as follows:

(1) Rationality. The logic and soundness of the applicant's approach and the extent to which the successful completion of the proposed work addresses scientific and technical issues relevant to SPO programs (*see* Section I.9. of this FFO).

(2) Technical Merit of Contribution. The potential technical effectiveness of the proposed work and the value it would contribute to the fields of science relevant to SPO (*see* Section I.9. of this FFO).

(3) Qualifications of Technical Personnel. The professional accomplishments, skills, and training of the proposed personnel to perform the work proposed in the application.

(4) Resources Availability. The extent to which the applicant has access to the necessary equipment and facilities and overall support to accomplish project objectives.

Each of these factors will be given equal weight in the evaluation process.

j. Standards Coordination Office (SCO) Grant Program. The evaluation criteria that will be used in evaluating applications considered by the SCO Grant Program and assigned weights are as follows:

(1) Rationality. The coherence of the applicant's approach and the extent to which the application effectively addresses scientific and technical issues relevant to

the SCO mission (*see* Section I.10. of this FFO). **(0 – 30 points)**

(2) Technical Merit of Contribution. The potential technical effectiveness of the proposed work and the value it would contribute to the field of standardization. **(0 – 30 points)**

(3) Qualifications of Technical Personnel. The professional accomplishments, skills, and training of the proposed personnel to perform the proposed work. **(0 – 20 points)**

(4) Use of Funds and Cost-effectiveness. An assessment of the budget against the proposed activities will be conducted to determine the reasonableness of the request. **(0 – 20 points)**

k. International and Academic Affairs Office (IAAO) Grant Program. The evaluation criteria that will be used in evaluating applications considered by the IAAO Grant Program are as follows:

(1) Rationality. The rationality, innovation and creativity of the application and the fit of the proposed work to the objectives of the IAAO Grant Program (*see* Section I.11. of this FFO).

(2) Technical Merit of Contribution. The potential effectiveness of the proposed activity, its value to global metrology and quality infrastructure, and the likelihood and potential impact of the applicant's technical application of the proposed activity.

(3) Staff and Institutional Capability to perform the Work. The quality of facilities and experience of the staff to assess the likelihood of achieving the objective of the proposed work.

(4) Match of Budget to Proposed Work. Assessment of the budget compared to the proposed work to ascertain the reasonableness of the request.

Each of these factors will be given equal weight in the evaluation process.

l. Associate Director for Laboratory Programs (ADLP) Grant Program. The evaluation criteria that will be used in evaluating applications considered by the ADLP Grant Program and assigned weights are as follows:

(1) Technical Quality of the Research. The rationality, innovation and imagination of the application, and the fit to ADLP programs (*see* Section 1.12. of this FFO). **(0 – 35 points)**

(2) Potential Impact of the Results. The potential impact and the likelihood of the technical application of the results. **(0 – 25 points)**

(3) Staff and Institution Capability to Perform the Work. The quality of the facilities and experience of the staff to assess the likelihood of achieving the objective of the application. **(0 – 20 points)**

(4) Match of Budget to Proposed Work. Assessment of the budget against the proposed work to ascertain the reasonableness of the request. **(0 – 20 points)**

2. 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, Federal agents and contractors, and/or by non-Federal personnel who have entered into nondisclosure agreements covering such information, when applicable

a. Initial Screening of all NIST MSE Research Grant Program Applications. All applications received in response to this FFO will be assigned to the program designated on the cover page of the Technical Proposal and reviewed as received on a rolling basis to determine whether they are eligible, complete, and responsive to this FFO and aligned with the respective program objectives and research grant areas as described in the Program Description (*see* Section I. of this FFO).

Applications determined to be ineligible, incomplete, and/or non-responsive based on the initial screening will be eliminated from further review. However, NIST, in its sole discretion, may continue the review process for an application that is missing non-substantive information that can easily be rectified or cured.

b. Full Review of Eligible, Complete, and Responsive Applications for all NIST MSE Research Grant Applications. All applications that are determined to be eligible, complete, and responsive will proceed for full reviews in accordance with the review and selection processes set forth below for each of the respective programs.

NIST reserves the right to negotiate the budget costs with the applicants that have been selected to receive awards, which may include requesting that the applicant remove certain costs. Additionally, NIST may request that the applicant modify objectives or work plans and provide supplemental information. For international applications, NIST will follow applicable U.S. laws and policies. 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. In some cases, NIST may ask applicants to consider combining projects. 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.

(1) Material Measurement Laboratory (MML) Grant Program

At least three (3) objective individuals knowledgeable about the particular scientific area described in the application will c review the merits of each application, based on the evaluation criteria (*see S*ection V.1.a. of this FFO). The reviewers may discuss the applications with each other, but scores will be determined on an individual basis, not as a consensus.

The Selecting Official, who is the MML Executive Officer, or designee, will make final application selections taking into consideration the results of the reviewers' evaluations, consultations with the appropriate MML Division Chief, relevance to the objectives described in the MML Grant Program Description (*see* Section I.1. of this FFO), and the availability of funds.

(2) Physical Measurement Laboratory (PML) Grant Program

At least three (3) objective individuals knowledgeable about the particular scientific area described in the application will review the merits of each application, based on the appropriate evaluation criteria (*see S*ections V.1.b.(1) and *S*ection V.1.b.(2) of this FFO). The reviewers may discuss the applications with each other, but scores will be determined on an individual basis, not as a consensus.

The Selecting Official, who is the PML Director, or designee, will make final application selections, taking into consideration the results of the reviewers' evaluations, relevance to the objectives described in the PML Grant Program Description (*see* Section I.2. of this FFO), and the availability of funds.

(3) Engineering Laboratory (EL) Grant Program

At least three (3) objective individuals knowledgeable about the particular scientific area described in the application will review the merits of each application, based on the evaluation criteria (*see S*ection V.1.c. of this FFO). The reviewers may discuss the applications with each other, but scores will be determined on an individual basis, not as a consensus.

The Selecting Official, who is the EL Director, or designee, will make final application selections, taking into consideration the results of the reviewers' evaluations, relevance to the objectives described in the EL Grant Program Description (*see* Section I.3. of this FFO), program balance, and the availability of funds.

(4) Fire Research (FR) Grant Program

Prospective applicants are encouraged to contact the group leaders listed in the FR Grant Program Description (see Section I.4. of this FFO) to

determine the responsiveness of the application and compliance with program objectives prior to preparation of an application to the FR Grant Program.

At least three (3) objective individuals knowledgeable about the particular scientific area described in the application will review the merits of each application, based on the evaluation criteria (*see* Section V.1.d. of this FFO). The reviewers may discuss the applications with each other, but scores will be determined on an individual basis, not as a consensus.

The Selecting Official, who is the EL Director, or designee, will make final application selections, taking into consideration the results of the reviewers' evaluations, relevance to the objectives described in the EL Fire Research Program Description (*see* Section I.4. of this FFO), program balance, and the availability of funds.

(5) Information Technology Laboratory (ITL) Grant Program

At least three (3) objective individuals knowledgeable about the particular scientific area described in the application will review the merits of each application, based on the evaluation criteria (*see* Section V.1.e. of this FFO). The reviewers may discuss the applications with each other, but scores will be determined on an individual basis, not as a consensus.

The Selecting Official, who is the appropriate ITL Division Chief, or designee will make final application selections, taking into consideration the results of the reviewers' evaluations, consultations with the ITL Director, relevance to the objectives described in the ITL Grant Program Description (*see* Section I.5. of this FFO), and the availability of funds.

(6) Communications Technology Laboratory (CTL) Grant Program

At least three (3) objective individuals knowledgeable about the particular scientific area described in the application will review the merits of each application, based on the evaluation criteria (*see* Section V.1.f. of this FFO). The reviewers may discuss the applications with each other, but scores will be determined on an individual basis, not as a consensus.

The Selecting Official, who is the CTL Executive Officer, or designee, will make final application selections taking into consideration the results of the reviewers' evaluations, consultations with the appropriate CTL Division Chief, relevance to the objectives described in the CTL Grant Program Description (*see* Section I.6. of this FFO), and the availability of funds.

(7) NIST Center for Neutron Research (NCNR) Grant Program

At least three (3) objective individuals knowledgeable about the particular scientific area described in the application will review the merits of each application, based on the evaluation criteria (*see* Section V.1.g. of this FFO). The reviewers may discuss the applications with each other, but scores will be determined on an individual basis, not as a consensus.

The Selecting Official, who is the NCNR Director, or designee, will make final application selections, taking into consideration the results of the reviewers' evaluations, relevance to the objectives described in the NCNR Grant Program Description (*see* Section I.7. of this FFO), and the availability of funds.

(8) Center for Nanoscale Science and Technology (CNST) Grant Program

At least three (3) objective individuals knowledgeable about the particular scientific area described in the application will review the merits of each application, based on the evaluation criteria (*see* Section V.1.h. of this FFO). The reviewers may discuss the application with each other, but scores will be determined on an individual basis, not as a consensus.

The Selecting Official, who is the CNST Director, or designee, will make final application selections, taking into consideration the results of the reviewers' evaluations, relevance to the objectives described in the CNST Grant Program Description (*see* Section I.8. of this FFO), and the availability of funds.

(9) Special Programs Office (SPO) Grant Program

Prospective applicants are encouraged to contact the appropriate point of contact listed in the SPO Grant Program Description (see Section I.9. of this FFO) to determine the responsiveness of the application and compliance with program objectives prior to preparation of an application to the SPO Grant Program.

At least three (3) objective individuals knowledgeable about the particular scientific area described in the application will review the merits of each application, based on the evaluation criteria (*see* Section V.1.i. of this FFO). The reviewers may discuss the applications with each other, but scores will be determined on an individual basis, not as a consensus.

The Selecting Official, who is the SPO Director, or designee, will make final application selections, taking into consideration the results of the reviewers' evaluations, relevance to the objectives described in the SPO Grant Program Description (*see* Section I.9. of this FFO), and the availability of funds.

(10) Standards Coordination Office (SCO) Grant Program

At least three (3) objective individuals knowledgeable about the particular

scientific area described in the application will review the merits of each application, based on the evaluation criteria (*see* Section V.1.j. of this FFO). The reviewers may discuss the applications with each other, but scores will be determined on an individual basis, not as a consensus.

The Selecting Official, who is the SCO Director, or designee, will make final application selections, taking into consideration the results of the reviewers' evaluations, relevance to the objectives described in the SCO Grant Program Description (*see* Section I.10. of this FFO), and the availability of funds.

(11) International and Academic Affairs Office (IAAO) Grant Program

At least three (3) objective individuals knowledgeable about the particular area described in the application will review the merits of each application, based on the evaluation criteria (*see S*ection V.1.k. of this FFO). The reviewers may discuss the applications with each other, but scores will be determined on an individual basis, not as a consensus.

The Selecting Official, the IAAO Director, or designee, will make final application selections, taking into consideration the results of the reviewers' evaluations, relevance to the objectives described in the IAAO Grant Program Description (*see* Section I.11. of this FFO), and the availability of funds.

(12) Associate Director for Laboratory Programs (ADLP) Grant Program

At least three (3) objective individuals knowledgeable about the particular scientific area described in the application will review the merits of each application, based on the evaluation criteria (*see S*ection V.1.l. of this FFO). The reviewers may discuss the applications with each other, but scores will be determined on an individual basis, not as a consensus.

The Selecting Official, the Associate Director for Laboratory Programs, or designee, will make final application selections, taking into consideration the results of the reviewers' evaluations, relevance to the objectives described in the ADLP Grant Program Description (*see* Section I.12. of this FFO), and the availability of funds.

c. Federal Awarding Agency Review of Risk Posed by Applicants. After applications are proposed for funding by the Selecting Official and prior to the issuance of an award, the NIST Grants Management Division will conduct an assessment of the risk posed by the applicant in accordance with 2 C.F.R. § 200.205. In addition to reviewing repositories of government-wide eligibility, qualification or financial integrity information, the risk assessment conducted by NIST may consider items such as the financial stability of an applicant, quality of the applicant's management systems, an applicant's history of performance, previous audit reports and audit findings concerning the applicant and the applicant's ability to

effectively implement statutory, regulatory, or other requirements imposed on non-Federal entities. Upon review of these factors, if appropriate, specific award conditions that correspond to the degree of risk may be applied by the NIST Grants Officer pursuant to 2 C.F.R. § 200.207. In addition, NIST reserves the right to reject an application in its entirety where information is uncovered that raises a significant risk with respect to the responsibility or suitability of the applicant.

3. **Anticipated Announcement and Award Dates. For all NIST MSE Research Grant Programs,** awards will be made approximately 90 days after the end of the review process (*see* Section V.2. of this FFO). See information in Section IV.4. of this FFO regarding awards made in a subsequent fiscal year.

4. **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 in writing.

c. **Retention of Unsuccessful Applications.** For paper applications, one (1) of each non-selected application will be retained for three (3) years for record keeping purposes and the other two (2) copies will be destroyed. After three (3) years, the remaining copy will be destroyed. For electronic applications, an electronic copy of each non-selected application will be retained for at least three (3) years for record keeping purposes.

VI. Federal Award Administration Information

1. **Federal Award Notices.** Successful applicants will receive an award package from the NIST Grants Officer. The award cover page, i.e., CD-450, Financial Assistance Award is the authorizing document available at http://go.usa.gov/SNMR.

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 the Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards at 2 C.F.R. Part 200, which apply to awards made pursuant to this FFO. 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 Financial Assistance Standard Terms and Conditions (December 26, 2014) will apply to this award and are accessible at: http://go.usa.gov/hKbj. Refer to Section VII. of this FFO, Federal Awarding Agency Contacts, Grant Rules and Regulations, if you seek the information at this link and it is no longer working or 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 FFO, Federal Awarding Agency Contacts, Grant Rules and Regulations, if you seek the information at this link and it is no longer working or you need more information.

d. **Funding Availability and Limitation of Liability.** Funding for the program listed in this FFO is contingent upon the availability of appropriations. In no event will NIST or the Department of Commerce be responsible for application preparation costs if this program fails to receive funding or is cancelled because of agency priorities. Publication of this FFO 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.** All applications should include a description of any work proposed to be performed by an entity other than the applicant, and the cost of such work should ordinarily be included in the budget. 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 D.03 of the Department of Commerce Financial Assistance Standard Terms and Conditions dated December 26, 2014, found at http://go.usa.gov/hKbj. Questions about these requirements may be directed to

the Chief Counsel for NIST, (301) 975-2803, nistcounsel@nist.gov.

Any use of NIST-owned intellectual property by an applicant 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 FFO, 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. Additional Consideration of Applications. NIST programs are often cross-cutting and multi-disciplinary. If a NIST program official believes an application that is not selected for funding under a specific MSE research grant program may be of interest to another NIST MSE research grant program(s), the official may forward the application to any other NIST MSE research grant program(s) that the program official believes may have an interest in the project, for potential consideration under the other NIST MSE research grant program(s) procedures. If, upon initial screening, the other NIST MSE research grant program(s) finds the application may be of programmatic interest, the application will proceed through the review and selection process (*see* Section V.2 of this FFO) for the specific MSE research grant program(s). If not, the application will be returned to the original program for final processing. **Any applicant that does not wish for its application to be considered by other NIST programs should indicate on its application that it would like consideration of the project to be limited to the program to which it originally submitted the application.** Applicants will be notified if their applications have been forwarded to another NIST program(s) for potential consideration.

h. 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 who 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, 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 activity.

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 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.** NIST reserves the right to make an independent determination of whether an applicant's activities include research involving human subjects. NIST will conduct an independent administrative review of all applications accepted for funding that include research involving human subjects that were approved by a non-NIST Institutional Review Board (IRB). Research may not start until the NIST Human Subjects Protection Office (HSPO) issues institutional review approval for final action by the NIST Grants Officer. (15 C.F.R. § 27.112 Review by Institution.) If NIST determines that an application includes research activities which involve human subjects, the applicant will be required to provide additional information for review and approval. The documents required for funded proposals are listed in each section below. Most such 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. If an award is issued, no research activities involving human subjects shall be initiated or costs incurred for those activities under the award until the NIST Grants Officer issues written approval. Retroactive approvals are not permitted.

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 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. 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 will be provided.
(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.

c. 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).

i. **Research Applications Involving Live Vertebrate Animals. Research Activities Involving Live Vertebrate Animals.** Any application that includes research activities involving live vertebrate animals, that are being cared for, euthanized, or used by participants in the application 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 Non-clinical Laboratory Studies (21 C.F.R. Part 58). In addition, such applications should be in compliance with the *"U.S. Government Principles for Utilization and Care of Vertebrate Animals Used in Testing, Research, and Training."* 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.

The following requirements 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 items from animal material suppliers (*e.g.,* tissue banks), such as 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.

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.). Custom samples 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.

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."* 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 (*e.g.,* 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.

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 accepts three types of assurances, as may be applicable. NIST may request documentation to confirm an assurance, if adequate confirmation is not available through an assuring organization's website.

   The cognizant Institutional Animal Care and Use Committee (IACUC) where the research activity is located may hold one or more applicable assurance, including:
   - Animal Welfare Assurance from the Office of Laboratory Animal Welfare (OLAW) indicated by the OLAW assurance number, *i.e.,* A-1234;
   - USDA Animal Welfare Act certification indicated by the certification number, *i.e.,* 12-R-3456;
   - 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) **Administrative Review.** NIST reserves the right to make an independent determination of whether an applicant's research activities involve live vertebrate animals or custom samples from, or field studies with live vertebrate animals. If NIST determines that 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. 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 subjects shall be initiated or costs incurred for those activities under the award until the NIST Grants Officer issues written approval.

3) **Required documents for 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.***

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; and
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).

j. Collaborations Making Use of Federal Facilities. All applications should include a description of any work proposed to be performed using Federal facilities.

If an applicant proposes use of NIST facilities, the statement of work should include a statement of this intention and a description of the facilities. Any use of NIST facilities 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 availability of the facilities and approval of the proposed usage. Any unapproved facility use will be stricken from the application prior to the merit review. Examples of some facilities that may be available for collaborations are listed on the following NIST Web site: http://www.nist.gov/user-facilities.cfm.

3. Reporting

a. Reporting Requirements. The following reporting requirements described in Sections A.01 Performance (Technical) Reports and B.02 Financial Reports of the Department of Commerce Financial Assistance Standard Terms and Conditions dated December 26, 2014, http://go.usa.gov/hKbj, 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 semi-annual basis for the periods ending March 31 and September 30 of each year to the NIST Grants Officer and Grants Specialist named in the award documents. 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 Federal Program Officer on a semi-annual basis for the periods ending March 31 and September 30 of each year. 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. Technical progress reports shall contain information as prescribed in 15 C.F.R. § 200.328.

(3) Patent and Property Reports. From time to time, and in accordance with the Uniform Administrative Requirements and other terms and conditions governing the award, the recipient may be required 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 FFO, 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. 200 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.

VII. Federal Awarding Agency Contacts

Questions should be directed to the following contact persons:

Subject Area	Point of Contact
Programmatic and Technical Questions	**MML**: Bill Clark Phone: 303-497-3268 E-mail: william.clark@nist.gov **PML**: Patrick Hovis Phone: 301-975-4290 E-mail: patrick.hovis@nist.gov

Subject Area	Point of Contact
	EL: Millie Glick Phone: 301-975-5962 E-mail: millie.glick@nist.gov **FR:** Millie Glick Phone: 301-975-5962 E-mail: millie.glick@nist.gov **ITL**: Yolanda Bursie Phone: 301-975-6738 E-mail: yolanda.bursie@nist.gov **CTL**: Jim Harriman Phone: 303-497-5312 E-mail: james.harriman@nist.gov **NCNR**: Dan Neumann Phone: 301-975-5252 E-mail: dan.neumann@nist.gov **CNST**: Donna Lauren Phone: 301-975-3729 E-mail: donna.lauren@nist.gov **OSP:** Darlene Hamilton Phone: 301-975-2227 E-mail: darlene.hamilton@nist.gov **SCO:** Kerry Miles Phone: 301-975-5571 E-mail: kerry.miles@nist.gov **IAAO:** Claire Saundry Phone: 301-975-2386 E-mail: claire.saundry@nist.gov **ADLP:** Donna Kimball Phone: 301-975-8362 E-mail: donna.kimball@nist.gov
Technical Assistance with Grants.gov Submissions	Christopher Hunton Phone: 301-975-5718 Fax: 301-975-8884

Subject Area	Point of Contact
	E-mail: grants@nist.gov or Grants.gov Phone: 800-518-4726 E-mail: support@grants.gov
Grant Rules and Regulations	Husai Rahman Phone: (301) 975-4355 Fax: (301) 975-8884 E-mail: husai.rahman@nist.gov