

IARPA

BROAD AGENCY ANNOUNCEMENT

IARPA-BAA-18-03



I A R P A  
BE THE FUTURE

MIST Program

IARPA-BAA-18-03

**May 22, 2018**

**AMENDMENT 1**

**June 14, 2018**

**BROAD AGENCY ANNOUNCEMENT: IARPA-BAA-18-03**

**MIST Program**

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## GENERAL INFORMATION

This publication constitutes a Broad Agency Announcement (BAA) and sets forth research of interest in the area of scalable information storage and retrieval. Awards based on responses to this BAA are considered to be the result of full and open competition.

- **Federal Agency Name** – Intelligence Advanced Research Projects Activity (IARPA)
- **Funding Opportunity Title** – MIST Program
- **Announcement Type** – Initial
- **Funding Opportunity Number** – IARPA-BAA-18-03
- **Catalog of Federal Domestic Assistance Numbers (CFDA)** – Not applicable
- **Dates**
  - Posting Date: May 22, 2018
  - Proposal Due Date for Initial Round of Selections: July 16, 2018, 5:00 PM EST
  - BAA Closing Date: October 15, 2018
- **Anticipated individual awards** – Multiple awards anticipated
- **Types of instruments that may be awarded** – Procurement Contracts and Other Transactions<sup>1</sup>
- **Agency Points of contact**
  - ATTN: IARPA-BAA-18-03
  - Office of the Director of National Intelligence
  - Intelligence Advanced Research Projects Activity
  - Washington, DC 20511
  - Electronic mail: [dni-IARPA-BAA-18-03@iarpa.gov](mailto:dni-IARPA-BAA-18-03@iarpa.gov)
  - Unclassified Fax: 301-851-7557
- **Program Manager** – Dr. David A. Markowitz, IARPA
- **Program website** – <http://www.iarpa.gov/index.php/research-programs/MIST>
- **BAA Summary** – The Molecular Information Storage (MIST) Program seeks to use sequence-controlled polymers as the basis for deployable storage technologies that can eventually scale into the exabyte regime and beyond with reduced physical footprint, power and cost requirements relative to conventional storage technologies.
- **Questions**

Submit questions on administrative, technical, or contractual issues by email to [dni-IARPA-BAA-18-03@iarpa.gov](mailto:dni-IARPA-BAA-18-03@iarpa.gov). All requests must include the full name and affiliation of a point of contact. Do not send questions with proprietary content. A consolidated Question and Answer response will be posted on the Federal Business Opportunities website (<http://www.fbo.gov>) and linked from the IARPA website (<http://www.iarpa.gov/index.php/research-programs/MIST>) No answer will go directly to the submitter. IARPA will accept questions until June 22, 2018.

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<sup>1</sup>**Procurement Contract:** This is a standard government contract that follows the processes, format and terms and conditions as outlined in the Federal Acquisition Regulations (FAR) and supplementing Agency specific regulations.

**Other Transaction:** These agreements generally are not subject to the federal laws and regulations governing procurement contracts and thus are not required to comply with the Federal Acquisition Regulation (FAR), its supplements, or laws that are limited in applicability to procurement contracts. They may be used with non-traditional contractors under certain circumstances.

## **SECTION 1: FUNDING OPPORTUNITY DESCRIPTION**

The Intelligence Advanced Research Projects Activity (IARPA) often selects its research efforts through the Broad Agency Announcement (BAA) process. The use of a BAA solicitation allows a wide range of innovative ideas and concepts. The BAA shall be posted on the FedBizOpps website (<http://www.fedbizopps.gov>) and then linked from the IARPA website (<http://www.iarpa.gov>). The following information is for those wishing to respond to this Program BAA.

This BAA (IARPA-BAA-18-03) is for the Molecular Information Storage (MIST) Program. IARPA is seeking innovative solutions for the MIST Program in this BAA. The MIST Program is envisioned to begin in late 2018.

### **1.A. Program Overview**

#### **1.A.1 Background**

The scale and complexity of the world's "big data" problems are increasing rapidly. Use cases that require storage and random access from exabytes of mostly unstructured data are now well-established in the private sector and are of increasing relevance to the public sector. However, meeting these requirements poses extraordinary logistical and financial challenges. Today's exabyte-scale data centers occupy large warehouses, consume megawatts of power, and cost billions of dollars to build, operate and maintain over their lifetimes. This resource intensive model does not offer a tractable path to scaling beyond the exabyte regime in the future. Faced with exponential data growth, large data consumers may soon face a choice between investing exponentially more resources in storage or discarding an exponentially increasing fraction of data.

Although many factors drive the resource requirements of today's large-scale storage systems, perhaps the single largest factor is media. All conventional storage paradigms (magnetic, optical, and solid state) write bit features onto planar media. Once areal storage density has been maximized, these paradigms offer limited ability to write bits isotropically in 3D. As a result, to build a data center with exponentially larger capacity than a single unit of planar storage media requires purchasing exponentially more media and read/write hardware, which drives physical footprint, cooling, power and cost requirements. Furthermore, conventional planar media require routine integrity checks and typically have an operational lifetime of only 3-5 years. The need to continuously verify and replace bad storage media, and the need to migrate data to new media due to obsolescence of media and read/write hardware, are both additional major drivers of cost.

An ideal solution to these problems would be a storage medium with three key properties. First, it should offer orders of magnitude higher volumetric information density than conventional paradigms, as this would enable the development of ultra-scalable storage technologies with a substantially smaller footprint, and lower power and cost requirements of associated read/write hardware, than current systems. Second, it should offer long-term stability against progressive data degradation, as this would obviate the need for regular integrity checks and media replacement, and thereby reduce operation and maintenance costs. Third, basic methods for writing and reading information from the storage medium should already exist, and the engineering optimizations needed to support real-world commercial deployment within a 10 year horizon should be clear and plausible.

In the search for potential solutions to this problem, multiple studies since 2012 have used DNA, and more recently synthetic polymers, to explore the use of sequence-controlled polymers as the basis for molecular information storage (MIST) technologies. In its role as the long-term storage medium of biology, DNA uses sequences of physical bits (nucleotides) that are a full order of magnitude smaller than the smallest bit features used in today's commercial storage media. These oligonucleotides are both highly compressible in 3D space and extremely stable over time. Consequently, DNA offers a theoretical maximum volumetric information density that is  $10^7$  times greater than that of conventional storage media (satisfying requirement #1 above), and has a stable lifetime in excess of 100 years (satisfying requirement #2). Furthermore, biology's machinery for writing information to and reading from DNA are well understood, and a mature ecosystem of biotechnology tools for working with DNA now exists to support the life sciences industry (satisfying requirement #3). Similar arguments have been made recently concerning the properties and technology ecosystem surrounding synthetic polymers.

During 2016 and 2017, IARPA and the Semiconductor Research Corporation organized two workshops that assembled international stakeholders from academia and the biotech, semiconductor and information technology industries to roadmap clear and achievable engineering optimizations that would be necessary to develop scalable MIST systems. The MIST program now seeks to put this roadmap into practice by assembling a multidisciplinary community around the shared goal of developing compact and scalable molecular information storage technologies to support real-world "big data" use cases.

### **1.A.2 Program Summary**

The fundamental aim of the MIST program is to develop deployable storage technologies that can eventually scale into the exabyte regime and beyond with reduced physical footprint, power, and cost requirements relative to conventional storage technologies. MIST seeks to accomplish this by using sequence-controlled polymers as a data storage medium, and by building the necessary devices and information systems to interface with this medium. Technologies are sought to optimize the writing and reading of information to/from polymer media at scale, and to support random access of information from polymer media archives at scale.

Innovative solutions are sought under this BAA and are anticipated to range across a diversity of domains, including chemistry, molecular biology, microfluidics, semiconductor engineering and computer science. Example approaches to writing data may include, but are not limited to, performing massively parallel chemical synthesis of polymers on microfabricated chips. Example approaches to reading data may include, but are not limited to, sequencing polymers using arrays of nanopore sensors. Example approaches to random access may include, but are not limited to, using key-value stores in conjunction with a physical compartmentalization of molecular media by data type.

For the MIST program, the desired capabilities are described by three separate Technical Areas (TAs) (see Table 1):

**TA1 (Storage):** Develop a table-top device capable of writing information to molecular media with a target throughput and resource utilization budget. Multiple, diverse approaches are anticipated, which may utilize DNA, polypeptides, synthetic polymers, or other sequence-

controlled polymer media.

**TA2 (Retrieval):** Develop a table-top device capable of randomly accessing information from molecular media with a target throughput and resource utilization budget. Multiple, diverse approaches are anticipated, which may utilize nanopores, mass spectrometry, or other methods for sequencing polymers in a high-throughput manner.

**TA3 (Operating System):** Develop an operating system (OS) for use with storage and retrieval devices that coordinates indexing, addressing, data compression, encoding, error-correction and decoding of files from molecular media in a manner that supports efficient random access at scale. Multiple, diverse approaches are anticipated, which may draw on established methods from the storage industry, or develop new methods to accommodate constraints imposed by polymer media.

Offerors may propose to TAs in the following combinations only: all three TAs jointly, TA1 and TA2 jointly, or TA3 alone. Offerors may not propose individually to TA1 or TA2.

The program is designed to enable performers in each TA to satisfy their deliverable requirements without direct support from other TAs. Therefore, offerors to TA1 and TA2 jointly are not required to coordinate with other prime contractors in TA3 as part of the proposed effort.

Offerors to more than one TA must organize proposals by TA, including separate portions of the technical approach, separate tasks, and a separate budget for each TA. Offerors to each TA must include a table listing constraints that their technical approach currently imposes on other TAs with high confidence, and a table listing assumptions about constraints that will be imposed by other TAs on the offeror's TA. For example, a TA2 offeror whose sequencing approach is only compatible with short DNA oligos should indicate this as a constraint on TA1 and TA3 approaches. IARPA will use this information to gauge the potential compatibility of approaches for use in the same end-to-end storage and retrieval workflow.

Collaborative efforts and teaming arrangements among potential performers within each TA are encouraged. It is anticipated that performer teams in each TA will be multidisciplinary, including expertise in fields such as chemistry, molecular biology, microfluidics, semiconductor engineering and computer science.

IARPA will employ a Government-Sponsored Test and Evaluation (T&E) team to assist in evaluating progress and success of the MIST program. The T&E team will measure each performer's developed device or OS performance against a set of Metrics and Milestones specific to each technical area (see Table 2). Offerors to each TA are strongly encouraged to suggest a test and evaluation methodology that is compatible with the proposed technical approach.

### **1.A.3 Out of Scope**

Approaches that rely on media other than sequence-controlled polymers for long-term data storage are out of scope.

### **1.B. Program Structure, Goals and Approach**

The MIST Program is anticipated to have a duration of 4 years, comprising two phases in each



Technical Area. Phase One (1) will be 24 months in duration, and Phase Two (2) is anticipated to be 24 months in duration. A top-level overview of the MIST program is shown in Table 1.

**Table 1: Overview of the MIST Program Structure**

	Technical Area 1	Technical Area 2	Technical Area 3
Goal	Storage device with performance suitable for practical applications	Retrieval device with performance suitable for practical applications	Operating system that supports random access of files at scale
Phase 1 (24 mos)	<ul style="list-style-type: none"> <li>De-risk scalable synthesis approaches</li> <li>Develop device</li> <li>Provide an initial demonstration of capabilities and performance</li> </ul>	<ul style="list-style-type: none"> <li>De-risk scalable sequencing approaches</li> <li>Develop device</li> <li>Provide an initial demonstration of capabilities and performance</li> </ul>	<ul style="list-style-type: none"> <li>Develop computational tools and methods</li> <li>Provide an initial demonstration of capabilities and performance in simulation</li> </ul>
Phase 2 (24 mos)	<ul style="list-style-type: none"> <li>Further development and improvement to optimize capacity, write throughput and resource requirements</li> <li>Deliver device that satisfies metrics for practical utility</li> </ul>	<ul style="list-style-type: none"> <li>Further development and improvement to optimize read throughput and resource requirements</li> <li>Deliver device that satisfies metrics for practical utility</li> </ul>	<ul style="list-style-type: none"> <li>Further development and improvement to optimize indexing, addressing and random access</li> <li>Deliver tools that satisfy metrics for practical utility</li> </ul>

### 1.B.1 Research Areas / Program Goals and Approach

#### Technical Area 1: Storage

The goal of this TA is to demonstrate a fully automated<sup>2</sup> device capable of writing information to polymer media with high throughput, low cost, and write accuracy sufficient to enable subsequent random access and error-free decoding of files using tools developed by performers in TA2 and TA3. In Phase 1, performers are expected to optimize existing<sup>3</sup> methods for writing information to polymers, and to develop and demonstrate devices that achieve a target write throughput given a target resource budget. If selected for continuation into Phase 2, write capabilities should be further improved, refined, and optimized such that an advanced device with performance suitable for practical applications is developed by the completion of the program. Offerors must make a credible argument that Phase 2 storage devices could be further optimized to support a commercially-relevant use case, such as exascale archival storage.

<sup>2</sup> “Fully automated” describes all stages of device operation, beginning with receipt of input data through an interface to the TA3 operating system and ending with data output through interfaces to a TA2 device or the OS.

<sup>3</sup> An “existing” method has been demonstrated at the proof-of-concept level, and supporting evidence for its experimental reproducibility must be available. Offerors may additionally propose to develop and optimize novel methods as a replacement for existing methods after Phase 1, but all Phase 1 deliverables must be achievable by optimizing existing methods for writing information to polymers.

Offerors may propose approaches that use any kind of sequence-controlled polymer as a storage medium. This may include, but is not limited to, DNA, peptides, or synthetic polymers. Offerors may propose approaches that use any method for writing data to polymers. This may include, but is not limited to, de novo chemical synthesis, de novo enzymatic synthesis, or selective editing of existing sequences. The most important considerations for development are resource requirements to write each decodable bit of information, bit depth, maximum write error rate, maximum write throughput for decodable data, total storage capacity, longevity of stored data, and compatibility with available retrieval approaches.

Offerors must articulate a clear and credible strategy for addressing the following major challenges for TA1:

1. Optimizing write methods to reduce resource requirements per decodable bit written.
2. Fabricating systems that parallelize the write method to achieve target throughput.
3. (If applicable) Improving methods for localizing and manipulating molecules on solid-state media to support write operations.

Offerors must provide a schedule that indicates the amount of time that will be allocated to each cycle of TA1 device design, fabrication, and testing, and to indicate what a successful outcome looks like during each cycle.

Offerors must articulate a clear strategy for making molecular media accessible to TA2 devices for bulk retrieval and random access. This may include, but is not limited to, approaches involving removable media and/or interoperability standards. Offerors must clearly state plans concerning the physical organization of polymer media on a chip or other storage substrate, polymer sequence length, composition of polymers or molecular anchors, number of copies of each polymer, and other information that TA2 will need to plan a compatible retrieval approach. Offerors must also address in their proposal how they intend to communicate with TA2 during all phases of the program to ensure write and read devices are developed for compatibility with an end-to-end storage and retrieval workflow.

Offerors must articulate a clear and plausible strategy for optimizing write methods to achieve target TA1 milestones for both program phases without relying on operating system innovations by TA3. Where appropriate, offerors to TA1 are encouraged to define any aspects of the operating system that must be developed and built into the storage device by TA1 (e.g. encoding and error correction to support core device functionality). Offerors must propose a public interface to the operating system, such as a block device or get/put interface.

It is expected that offerors to TA1 will comprise a multi-disciplinary collaboration with expertise in molecular biology and/or chemistry, microfluidics, semiconductor engineering, nano/microfabrication, and computer science. Offerors are encouraged to partner with industry stakeholders who have expertise in device development and prototyping, with an emphasis on microsystems design, fabrication, and integration. Approaches that leverage industry resources to accelerate progress will be viewed favorably, but are not a requirement. This may include, but is not limited to, obtaining priority access to fabrication facilities, or securing resource-sharing or co-funding agreements.

Offerors to TA1 that use DNA, RNA or polypeptides as storage media must articulate a biosecurity plan (as Attachment 12) for preventing accidental or deliberate misuse of write capabilities to produce pathogens. This may include, but is not limited to, strategies at the media layer (e.g. using expanded alphabets to prevent transcription), hardware layer (e.g. employing synthesis methods with non-zero error rates by design), and/or software layer (e.g. using translation-arresting codes that make heavy use of stop codons).

## **Technical Area 2: Retrieval**

The goal of this TA is to demonstrate a fully automated<sup>4</sup> device capable of reading information from polymer media produced by TA1 with high throughput, low cost, and read accuracy sufficient to enable random access and error-free decoding using tools developed by TA3. In Phase 1, performers are expected to optimize existing<sup>5</sup> methods for reading information from polymers, and to develop and demonstrate devices that achieve a target read throughput given a target resource budget. If selected for continuation into Phase 2, read capabilities should be further improved, refined, and optimized such that an advanced retrieval device with performance suitable for practical applications is developed by the completion of the program. Offerors must make a credible argument that Phase 2 retrieval devices could be further optimized to support a commercially-relevant use case, such as exascale archival storage.

Offerors may propose approaches that require the use of any kind of sequence-controlled polymer as a storage medium. This may include, but is not limited to, DNA, peptides, or synthetic polymers. Offerors may propose approaches that use any method for reading data from polymers. This may include, but is not limited to, Sequencing By Synthesis, Single Molecule RealTime Sequencing, nanopore sequencing or mass spectrometry. The most important considerations for development are resource requirements to read each decodable bit of information, bit depth, maximum read error rate, maximum read throughput for decodable data, time to first byte after a read request, and compatibility with available write approaches. Offerors must indicate sources of error in the chosen read method and justify the achievability of proposed error rates for MIST applications in Phase 1 and Phase 2.

Offerors must provide a schedule that indicates the amount of time that will be allocated to each cycle of TA2 device design, fabrication, and testing, and to indicate what a successful outcome looks like during each cycle.

Offerors must list all requirements concerning the polymer media that are provided by TA1 for readout. This may include, but is not limited to, requirements concerning the type of polymer media, physical organization of polymer media on a chip or other storage substrate, polymer sequence length, composition of polymers (e.g. maximum GC frequency) or molecular anchors, number of copies of each polymer, and/or interoperability standards.

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<sup>4</sup> “Fully automated” describes all stages of device operation, beginning with receipt of input data through an interface to the TA3 operating system and ending with data output through interfaces to a TA1 device or the OS.

<sup>5</sup> An “existing” method has been demonstrated at the proof-of-concept level, and supporting evidence for its experimental reproducibility must be available. Offerors may additionally propose to develop and optimize novel methods as a replacement for existing methods after Phase 1, but all Phase 1 deliverables must be achievable by optimizing existing methods for reading information from polymers.

Offerors must provide a clear plan for performing both bulk retrieval and random access of files from molecular archives provided by TA1. Offerors must also address in their proposal how they intend to communicate with TA1 during all phases of the program to ensure write and read devices are developed for compatibility with an end-to-end storage and retrieval workflow. Offerors are encouraged to articulate how real-world use cases may require specific forms of coordination between TA1 and TA2, given the constraints of the TA2 approach. For example, a TA2 approach that destroys polymers during retrieval may require special coordination with TA1 to ensure data are immediately rewritten to the archive after reading.

Offerors must articulate a clear and plausible strategy for optimizing read methods to achieve target metrics for both program phases without relying on operating system innovations by TA3. Where appropriate, offerors to TA2 are encouraged to define any aspects of the operating system that must be developed and built into the storage device by TA1 or TA2 (e.g. encoding and error correction to support core device functionality). Offerors must propose a public interface to the operating system, such as a block device or get/put interface.

It is expected that offerors to TA2 will comprise a multi-disciplinary collaboration with expertise in molecular biology and/or chemistry, microfluidics, semiconductor engineering, nano/microfabrication, and computer science. Offerors are encouraged to partner with industry stakeholders who have expertise in device development and prototyping, with an emphasis on microsystems design, fabrication, and integration. Approaches that leverage industry resources to accelerate progress will be viewed favorably, but are not a requirement. This may include, but is not limited to, obtaining priority access to fabrication facilities, or securing resource-sharing or co-funding agreements.

### **Technical Area 3: Operating System**

The goal of this TA is to demonstrate an operating system that coordinates scalable and efficient bulk write/read and random access workflows using devices produced by TA1 and TA2. In Phase 1, TA3 performers are expected to develop a simulator of molecular storage and retrieval devices that are under development by one or more teams of TA1 and TA2 performers, and to use this simulator as a platform for operating system development.<sup>6</sup> Successful Phase 1 operating systems will demonstrate robustness to anticipated failure modes of storage and retrieval devices, and will demonstrate indexing, addressing, decoding and random access capabilities that plausibly scale into the exabyte regime. If selected for continuation into Phase 2, operating system capabilities should be further improved, refined, and optimized such that an advanced operating system that works in conjunction with TA1 and TA2 devices and offers performance suitable for practical applications is developed by the completion of the program.

Offerors may propose approaches that require the use of any kind of sequence-controlled polymer as a storage medium by TA1, and any approach to molecular readout by TA2. However, any

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<sup>6</sup> Offerors to TA3 should propose a separate task for simulator development, and provide a task description that clearly indicates what information is required from TA1 and TA2 performers to support this effort. If proprietary information, intellectual property, or other concerns by TA1 or TA2 performers limit the availability of this information to TA3, IARPA may eliminate this TA3 task and instead rely on Government-sponsored T&E partners to produce the simulator. In such a situation, IARPA would provide TA3 with access to the simulator through a virtual interface.

constraints imposed by TA3 on the TA1 or TA2 approaches should be clearly explained in terms of the performance benefits they convey. Approaches that impose the fewest requirements and offer the broadest applicability to potential TA1/TA2 approaches will be viewed favorably.

Offerors to TA3 must seek to translate mature methods from the storage industry where possible, and to develop novel approaches that are specific to the use of polymer media where necessary. During Phase 1, TA3 will be encouraged (but not required) to suggest device specifications to TA1 and TA2 that optimally support scalable bulk storage, retrieval and random access workflows. As such, offerors must provide a clear plan for performing bulk retrieval and random access from molecular archives written by TA1 and read by TA2. Offerors must also address in their proposal whether and how they believe it would be beneficial to communicate with TA1 and TA2 performers during all phases of the program to encourage development of write and read devices for compatibility with an end-to-end storage and retrieval workflow. Offerors to TA3 must propose a public interface between the operating system and storage/retrieval devices, such as a block device or get/put interface.

The most important considerations for operating system development are resource requirements for addressing and encoding of files for use with molecular media, performance of algorithms for physically organizing media by file type or other properties, specific resource requirements for error correction and random access of files, and overall resource requirements for reconstruction of files. Offerors to TA3 should clearly indicate computing hardware and software requirements for meeting operating system performance goals in Phase 1 and 2, including assumptions about where and how any helper data to support error correction will be stored. Power, cost or speed bottlenecks should be anticipated and clearly articulated, where appropriate.

Although non-destructive reads are not a requirement of TA2 devices, by the end of Phase 2, the operating system produced by TA3 must ensure that the integrity of a molecular archive is maintained. Therefore, if reading data is a destructive process, the operating system must ensure that data are written back to the archive as they are read.

For planning purposes, offerors should anticipate the dominant access pattern in Phase 1 will be archival storage, in which reads are uncommon. In Phase 2, the dominant access pattern will be analytics, in which reads are common.

Operating systems developed through TA3 should ideally support discoverability, or the ability to know what's in large archives. If MIST storage and retrieval workflows can be accelerated by indexing metadata in a short-term archive that is physically distinct from and smaller than the long-term archive, a clear plan for generating and maintaining the metadata store should be specified. Metadata may be stored to any media type or format, but the resource requirements of maintaining a separate metadata archive at scale should be clearly specified.

Offerors must articulate a clear and credible strategy for addressing the following major challenges for TA3:

1. Optimizing the code for the noise properties of the write/read channel and the data to be stored. Approaches to this problem may involve concatenation codes, fountain codes, methods for approximate reconstruction of certain data types, or other methods. Where

appropriate, constraints on bit depth, maximum polymer length, channel noise properties or other properties should be clearly specified.

2. Addressing in the limit of exabytes of data. Approaches to this problem may involve strategies for physically segregating similar addresses to prevent collisions during random access, or other methods.
3. Achieving target energy consumption metrics. Approaches to this problem may involve the development of codes that are efficiently decodable, new ways to exploit chips that the storage industry has already developed for solving decoding problems rapidly, or other methods.

It is expected that offerors to TA3 will comprise a multi-disciplinary collaboration with expertise in computer science, molecular biology and/or polymer chemistry. Approaches should be rooted in best practices gleaned from previous efforts to develop simulators of novel storage technologies (e.g. high-bandwidth memory or memristors).

Although not required, approaches to achieving any of the following additional TA3 performance goals by the end of Phase 2 are of interest to the MIST program:

1. Tools for extreme compression and approximate reconstruction of multimedia data.
2. Support for content-addressable memory, or pattern-based search over the content of a molecular archive.
3. Support for security access control, such as the ability to dynamically set unique policies per asset and/or per user.

### **1.B.2 Testing & Evaluation**

IARPA will use Program Milestones and Metrics (see Table 2) to assess the effectiveness of proposed solutions in achieving the stated program objectives and to determine whether satisfactory progress is being made to warrant continued funding of the program. These milestones are only one aspect of how project and program success will be monitored and assessed, and are intended to focus the MIST program, while allowing flexibility, creativity, and innovation in proposing solutions to meet the MIST program goals. Proposals with a plan to surpass the listed milestone(s) in one or more categories are desirable and offerors will need to provide clear justification as to why their proposed approach will be able to meet the enhanced milestone(s). In addition to IARPA-specified metrics and milestones, offerors are also encouraged to provide any additional metrics and associated milestones relevant to their particular technical approach and the basis for their relevance.

### **Technical Area 1: Storage**

Devices for writing information to polymer media will be evaluated based on several criteria, to include physical footprint, power, reagent volume, and waste disposal requirements, as well as write throughput and the accuracy with which data can be randomly accessed and decoded from molecular archives generated by the device. To assess performance, T&E partners may require physical access to devices and the ability to instrument them with sensors. To assess random

access and decoding accuracy, T&E partners will provide TA1 performers with a digital collection of files that must be written to polymer media within 24 hours, after which T&E partners will take possession of the polymer media archive for sequencing and decoding using methods identified in consultation with performers. To enable appropriate planning by T&E partners, offerors must either propose a strategy for removing polymer media from the write device to support T&E, or, in cases where media are not easily removable, propose a strategy for independent test and evaluation of TA1 write capabilities.

In Phase 1, the digital collection of files to be stored will include a mixture of both structured and unstructured data, including text documents, spreadsheets, server logs, images, audio and video, with file sizes ranging from kilobytes to megabytes. In Phase 2, the digital collection of files to be stored will include the same diversity of file types and sizes used in Phase 1, but will further be tailored for specific use cases that have relevance to program transition partners. Example use cases include storage and random access retrieval of files from archives containing audio and video, transactions, genomes, and/or neuroscience data.

### **Technical Area 2: Retrieval**

Devices for reading information from polymer media will be evaluated based on several criteria, to include physical footprint, power, reagent volume, and waste disposal requirements, as well as read throughput and the accuracy with which data can be randomly accessed and decoded from molecular archives provided by T&E partners and by TA1. To assess performance, T&E partners may require physical access to devices and the ability to instrument them with sensors. To assess random access and decoding accuracy, T&E partners will provide TA2 performers with a polymer data archive that must be sequenced and decoded within 24 hours, after which T&E partners will evaluate the accuracy of decoded data with reference to source data that were used to generate the molecular archive. To enable appropriate planning by T&E partners, offerors must specify their requirements concerning polymer chemical composition, addressing and encoding scheme, copy number, physical organization, or other properties of the source molecular archive that will be provided to TA2 for read-out.

In both phases, the composition of the digital collection of files to be recovered will be similar to the collection specified for TA1 above.

### **Technical Area 3: Operating System**

Operating systems for coordinating the storage and retrieval of information from MIST devices will be evaluated based on several criteria, to include resource requirements for encoding, random access and decoding operations, how resource requirements and performance scale with the volume of data to be written/retrieved from molecular archives, and effective write and read throughput.

In Phase 1, T&E partners will evaluate operating systems that are interfaced with simulated write and read hardware provided by performers. T&E will explore the robustness of indexing, random access and encoding/decoding operations to probable hardware failure modes in simulation. In Phase 2, T&E partners will further evaluate operating systems that are interfaced with hardware simulators, and by the end of the phase, will also evaluate operating systems that are interfaced

with physical storage and retrieval hardware.

In both phases, the composition of the digital collection of files to be stored and retrieved by TA3 will be similar to the collections specified for TA1 and TA2 above. However, the composition and size of the collection may be changed to support evaluation of scalability.

### 1.B.3 Milestones & Metrics

Metrics to be addressed as part of the proposal should include, but are not limited to, those specified in Table 2 below. Offerors are encouraged to suggest additional relevant metrics of progress using the proposed approach.

**Table 2: MIST Milestones and Metrics**

Technical Area (TA)	Metric Definition	Milestones
TA1	Write Error Rate	Milestone 1.1, 1.2, 2.1, and 2.2: Target values are offeror-defined for each milestone, but must be low enough to enable error-free decoding of data after retrieval using imperfect TA2 devices.
TA1	Resource Budget for Storage	<p>Milestone 1.1, 1.2, 2.1, and 2.2: Target values are offeror-defined for each milestone, but performers are required to demonstrate a table-top (1 m<sup>2</sup>) device with a &lt;\$1,000 effective cost of encoding and then writing 10 GB of information to molecular media at Milestone 1.2, and 1 TB at Milestone 2.2.</p> <p>Resource budget may entail volume and/or cost of reagents, volume and/or cost of safe disposal of waste products, power requirements, or other factors. Resource budget may be extrapolated from a demonstration involving less data than specified above, but will not be extrapolated from fixed physical variables such as the size of the device. Resource budget does not include the cost of hardware.</p>
TA1	Write Throughput	<p>Using an encoding/decoding scheme of the performer's choice, achieve the following write throughput:</p> <ul style="list-style-type: none"> <li>• Milestone 1.1: Offeror-defined, but sufficient to deliver two copies each of three separate 10 MB data archives (60 MB total) within 24 hours of receiving data.</li> <li>• Milestone 1.2: 10 GB/day</li> <li>• Milestone 2.1: Offeror-defined, but sufficient to deliver two copies each of three separate 100 GB data archives (600 GB total) within 24 hours of receiving data.</li> <li>• Milestone 2.2: 1 TB/day</li> </ul> <p>Write throughput may be extrapolated from a demonstration involving less data in less time, but will not be extrapolated from fixed physical variables such as the size of the device.</p>
TA1	Device Storage Capacity	<ul style="list-style-type: none"> <li>• Milestone 1.1: Offeror-defined</li> <li>• Milestone 1.2: 10 GB</li> <li>• Milestone 2.1: Offeror-defined</li> </ul>



		<ul style="list-style-type: none"> <li>• Milestone 2.2: 1 TB</li> </ul>
TA1	Maximum Volumetric Information Density	Milestone 1.1, 1.2, 2.1, and 2.2: Target values are offeror-defined for each milestone, but must offer a path to future exponential scalability of device capacity.
TA1	Passive Data Degradation Rate	Milestone 1.1, 1.2, 2.1, and 2.2: Target values are offeror-defined for each milestone, but must be low enough to establish that passively stored molecular media are stable against data degradation under conditions that require no special climate controls or protections.
TA2	Read Error Rate	Milestone 1.1, 1.2, 2.1, and 2.2: Target values are offeror-defined for each milestone, but must be low enough to enable error-free decoding of data after storage using imperfect TA1 devices.
TA2	Resource Budget for Retrieval	<p>Milestone 1.1, 1.2, 2.1, and 2.2: Target values are offeror-defined for each milestone, but performers are required to demonstrate a table-top (1 m<sup>2</sup>) device with a &lt;\$1,000 cost of retrieving and perfectly decoding 1 TB of information from molecular media at Milestone 1.2, and 10 TB at Milestone 2.2.</p> <p>Resource budget may entail volume and/or cost of reagents, volume and/or cost of safe disposal of waste products, power requirements, or other factors. Resource budget may be extrapolated from a demonstration involving less data than specified above, but will not be extrapolated from fixed physical variables such as the size of the device. Resource budget does not include the cost of hardware.</p>
TA2	Read Throughput	<p>Using an encoding/decoding scheme of the performer's choice, achieve the following read throughput:</p> <ul style="list-style-type: none"> <li>• Milestone 1.1: 10 GB/day</li> <li>• Milestone 1.2: 1 TB/day</li> <li>• Milestone 2.1: Offeror-defined</li> <li>• Milestone 2.2: 10 TB/day</li> </ul> <p>Read throughput may be extrapolated from a demonstration involving less data in less time, but will not be extrapolated from fixed physical variables such as the size of the device.</p>
TA3	Resource Requirements and Performance Characteristics of Simulated Storage and Retrieval Hardware	Milestone 1.1, 1.2, 2.1, and 2.2: Target values are offeror-defined for each milestone, but must directly address power requirements. It is anticipated that this metric will be refined in consultation with T&E partners who will use the simulator to evaluate performer operating systems.
TA3	Resource Requirements for Operating System-Specific Steps of End-to-End Storage and Retrieval Workflow	<p>Milestone 1.1, 1.2, 2.1, and 2.2: Target values are offeror-defined for each milestone, but must directly address power requirements.</p> <p>Requirements must be specified separately for encoding and decoding steps of the workflow.</p>
TA3	Precision and Recall of Random Access Operations	Milestone 1.1, 1.2, 2.1, and 2.2: Target values are offeror-defined for each milestone. It is anticipated that this metric will be refined

		in consultation with T&E partners who will use the simulator to evaluate performer operating systems.
TA3	Other Metrics	Milestone 1.1, 1.2, 2.1, and 2.2: Target values are offeror-defined for each milestone. Examples may include bit error rate, interface parallelism, write/read bandwidth, latency, etc.

### 1.B.4 Waypoints

Waypoints are task-driven intermediate steps toward achieving each program milestone. Offerors are not required to propose waypoints in response to the MIST program BAA; however, the development of program waypoints should be proposed as an initial Deliverable to be completed in Month 1 of the program. Waypoints should be quantitative accomplishments reflected in the work plan and depicted on the schedule that indicate progress towards achieving each milestone and reduction of program risk. Waypoints are how the performer clearly explains the quantitative and timely progress that must be made for their overall concept to meet end-of-program milestones. Performance against these waypoints will be reviewed throughout the program, and the MIST Program Manager and advisors will use performance against the waypoints to assess whether course corrections are needed to ensure program success.

### 1.C. Program Timeline and Deliverables

IARPA will use the following timeline in Table 3 to monitor, evaluate, and maintain overall program progress. It also includes a schedule for the key deliverables the offerors shall provide. In addition to technical oversight of progress, technical reviews will assess programmatic progress against proposed work plans. Offerors may add additional deliverables as needed to the minimum set listed in Table 3.

**Table 3: Program Timeline and Deliverables**

Month	Deliverable
Phase 1 (Months 1-24)	
Monthly	[All TAs] Monthly technical report due to Government by the 5 <sup>th</sup> business day of the following month. Monthly financial report due to Government by the 10 <sup>th</sup> business day of the following month
Month 1	[All TAs] Program kickoff meeting (2-days) in Washington DC Metropolitan Area (WMA). Corrected slides provided within 15 days following meeting date.
Month 2	<p>[TA1] Milestone 1.0:</p> <ul style="list-style-type: none"> <li>System specification document (SSD) for version 1 storage device, including TA1 metrics, specifications for operating system interface and physical/logical interface to TA2 device</li> <li>Plan of fabrication &amp; major integration events during hardware development, including a list of design parameters to be optimized and risks at each stage</li> </ul> <p>[TA2] Milestone 1.0:</p> <ul style="list-style-type: none"> <li>SSD for version 1 retrieval device, including TA2 metrics, specifications for operating system interface and physical/logical interface to TA1 device</li> <li>Plan of fabrication &amp; major integration events during hardware development, including a list of design parameters to be optimized and risks at each stage</li> </ul>

	<p>[TA3] Milestone 1.0:</p> <ul style="list-style-type: none"> <li>• SSD version 1 for simulator of TA1 and TA2 devices that includes TA3 metrics and captures planned functionality and failure modes</li> <li>• SSD for version 1 operating system, including specifications for physical/logical interfaces to/from TA1 and TA2 devices</li> </ul>
Offeror-defined	[TA1 and TA2] As appropriate, additional performer-specific waypoints that track fabrication & major integration events, and metrics of success for each.
Month 6	[All TAs] Performer-site technical review. Draft slides due 48 hours before meeting date. Final slides due 5 days following meeting date.
Offeror-defined	[TA3] Suggested Waypoint: Deliver a version 1 simulator of TA1 and TA2 devices that captures planned functionality and failure modes.
Offeror-defined	[TA1] Suggested Waypoint: Stress test: Deliver two copies of a 10 MB archive of randomly accessible files in a small (1 cm <sup>2</sup> ) form factor within 24 hours of receiving data.
Month 12	<p>[TA2] Milestone 1.1:</p> <ul style="list-style-type: none"> <li>• Report demonstrating performance characteristics of version 1 retrieval device.</li> <li>• SSD for version 2 retrieval device, including TA2 metrics, specifications for operating system interface and physical/logical interface to TA1</li> </ul> <p>[TA3] Milestone 1.1:</p> <ul style="list-style-type: none"> <li>• Report demonstrating performance characteristics of version 1 operating system interfaced with simulated version 1 read/write devices.</li> <li>• SSD version 2 for simulator of TA1 and TA2 devices that includes TA3 metrics and captures planned functionality and failure modes</li> <li>• SSD for version 2 operating system, including specifications for physical/logical interfaces to/from TA1 and TA2</li> </ul>
Month 13	[All TAs] Technical program review meeting (2-days) in WMA. Draft slides due 48 hours before meeting date. Final slides due 5 days following meeting date.
Month 15	<p>[TA1] Milestone 1.1:</p> <ul style="list-style-type: none"> <li>• Report demonstrating performance characteristics of version 1 storage device.</li> <li>• Deliver two copies each of three separate 10 MB data archives (60 MB total) in small (1 cm<sup>2</sup>) form factors within 24 hours of receiving data.</li> <li>• SSD for version 2 storage device, including TA1 metrics, specifications for operating system interface, and physical/logical interface to TA2</li> </ul>
Month 18	<p>[TA2] Suggested Waypoint: Demonstrate bulk sequencing of a 10 MB MIST archive (provided by TA1 at Milestone 1.1), with an effective bulk read throughput of 300 GB/day</p> <p>[TA3] Suggested Waypoint: Progress report; updated simulator, operating system, and SSD.</p>
Month 18	[All TAs] Performer-site technical review. Draft slides due 48 hours before meeting date. Final slides due 5 days following meeting date.
Offeror-defined	<p>[TA1] Suggested Waypoint:</p> <ul style="list-style-type: none"> <li>• Demonstrate ability to write 1 GB of decodable data in one day with a reagent cost of \$1k (or equivalent constraint on volume or weight)</li> </ul>

Month 23	<p>[TA1] Milestone 1.2:</p> <ul style="list-style-type: none"> <li>Report demonstrating performance characteristics of version 2 storage device.</li> <li>Write 10 GB of decodable data in one day using a device that satisfies Phase 1 milestone targets for all TA1 metrics.</li> </ul> <p>[TA2] Milestone 1.2:</p> <ul style="list-style-type: none"> <li>Report demonstrating performance characteristics of version 2 retrieval device.</li> <li>Demonstrate random access of files from a 10 MB MIST archive (provided by TA1 at Milestone 1.1), with an effective bulk read throughput of 1 TB/day, using a device that satisfies Phase 1 milestone targets for all TA2 metrics.</li> </ul> <p>[TA3] Milestone 1.2:</p> <ul style="list-style-type: none"> <li>Report demonstrating performance characteristics of version 2 operating system interfaced with simulated version 2 read/write devices</li> <li>Demonstrate an indexing, addressing and error-correcting coding scheme that supports writing and reading of 1 TB/day, and scales efficiently into the exabyte regime, using an updated simulator of TA1 and TA2 devices. Operating system must satisfy Phase 1 milestone targets for all TA3 metrics.</li> </ul>
Phase 2 (Months 25-48)	
Monthly	[All TAs] Monthly technical report due to Government by the 5 <sup>th</sup> business day of the following month. Monthly financial report due to Government by the 10 <sup>th</sup> business day of the following month
Month 25	<p>[All TAs] Program kickoff meeting (2-days) in Washington DC Metropolitan Area (WMA). Corrected slides provided within 15 days following meeting date.</p> <p>[TA1] Milestone 2.0:</p> <ul style="list-style-type: none"> <li>SSD for version 3 storage device, including TA1 metrics, specifications for operating system interface, and physical/logical interface to TA2</li> <li>Plan of fabrication &amp; major integration events during hardware development, including a list of design parameters to be optimized and risks at each stage</li> </ul> <p>[TA2] Milestone 2.0:</p> <ul style="list-style-type: none"> <li>SSD for version 3 retrieval device, including TA2 metrics, specifications operating system interface, and physical/logical interface to TA1</li> <li>Plan of fabrication &amp; major integration events during hardware development, including a list of design parameters to be optimized and risks at each stage</li> </ul> <p>[TA3] Milestone 2.0:</p> <ul style="list-style-type: none"> <li>SSD for version 3 operating system, including TA3 metrics and specifications for physical/logical interfaces to/from TA1 and TA2</li> </ul>
Offeror-defined	[TA1 and TA2] As appropriate, additional performer-specific waypoints that track fabrication & major integration events, and metrics of success for each.
Offeror-defined	[TA3] Performer-specific waypoints that define & track progress toward Milestone 2.1.
Month 30	[All TAs] Performer-site technical review. Draft slides due 48 hours before meeting date. Final slides due 5 days following meeting date.
Offeror-defined	[TA2] Suggested Waypoint: Demonstrate random access of files from a 1 GB MIST archive, with an effective read throughput of 1 TB/day

Offeror-defined	[TA1] Suggested Waypoint: Deliver two copies of a 100 GB archive of randomly accessible data in a small (1 cm <sup>2</sup> ) form factor
Month 36	<p>[TA1] Milestone 2.1:</p> <ul style="list-style-type: none"> <li>• Report demonstrating performance characteristics of version 3 storage device.</li> <li>• Deliver two copies each of three separate 100 GB data archives (600 GB total) in small (1 cm<sup>2</sup>) form factors within 24 hours of receiving data</li> <li>• SSD for version 4 storage device, including TA1 metrics, specifications for operating system interface, and physical/logical interface to TA2</li> </ul> <p>[TA2] Milestone 2.1:</p> <ul style="list-style-type: none"> <li>• Report demonstrating performance characteristics of version 3 retrieval device.</li> <li>• Demonstrate random access of files from a 100 GB MIST archive, with an effective read throughput of 3 TB/day</li> <li>• SSD for version 4 retrieval device, including TA2 metrics, specifications for operating system interface, and physical/logical interface to TA1</li> </ul> <p>[TA3] Milestone 2.1:</p> <ul style="list-style-type: none"> <li>• Report and code demonstrating performance characteristics of version 3 operating system.</li> <li>• Experimentally (i.e. using physical TA1/TA2 devices) demonstrate an indexing, addressing and error-correcting coding scheme that supports writing of 100 GB/day and random-access reading of 300 GB/day, and that satisfies TA3 metrics.</li> <li>• SSD for version 4 operating system, including TA3 metrics and specifications for physical/logical interfaces to/from TA1 and TA2</li> </ul>
Month 37	[All TAs] WMA workshop (2-days). Draft slides due 48 hours before meeting date. Final slides due 5 days following meeting date.
Month 42	<p>[TA1] Suggested Waypoint:</p> <ul style="list-style-type: none"> <li>• Write 500 GB of decodable data in one day with a reagent cost of \$1k (or equivalent constraint on volume or weight)</li> </ul> <p>[TA2] Suggested Waypoint:</p> <ul style="list-style-type: none"> <li>• Demonstrate random access of files from a 500 GB MIST archive, with an effective read throughput of 3 TB/day</li> </ul> <p>[TA3] Suggested Waypoint: Progress report</p> <p>[All TAs] Performer-site technical review. Draft slides due 48 hours before meeting date. Final slides due 5 days following meeting date.</p>
Month 48	<p>[TA1] Milestone 2.2:</p> <ul style="list-style-type: none"> <li>• Report demonstrating performance characteristics of version 4 storage device.</li> <li>• Write 1 TB of decodable data in one day using a device that satisfies Phase 2 milestone targets for all TA1 metrics.</li> </ul> <p>[TA2] Milestone 2.2:</p> <ul style="list-style-type: none"> <li>• Report demonstrating performance characteristics of version 4 retrieval device.</li> <li>• Demonstrate random access of files from a 1 TB MIST archive, with an effective read throughput of 10 TB/day, using a device that satisfies Phase 2 milestone targets for all TA2 metrics.</li> </ul> <p>[TA3] Milestone 2.2:</p> <ul style="list-style-type: none"> <li>• Report demonstrating performance characteristics of version 4 operating system.</li> </ul>

	<ul style="list-style-type: none"> <li>Experimentally (i.e. using physical TA1/TA2 devices) demonstrate an indexing, addressing and error-correcting coding scheme that supports writing of 1 TB/day and random-access reading of 10 TB/day. Operating system must satisfy Phase 2 milestone targets for all TA3 metrics.</li> </ul>
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**1.D. Meeting and Travel Requirements**

Performers are expected to assume responsibility for administration of their projects and to comply with contractual and MIST program requirements for reporting, attendance at program workshops, and availability for site visits. For the purposes of determining costs, plan on estimating travel to the WMA as outlined in Table 3. The trip should include the Principal Investigator (PI) and Project Manager at a minimum.

**1.D.1 Workshops and Program Reviews / TEMs**

The MIST program intends to hold a program-level Kickoff meeting in the first month of the program and then similar Workshops and/or Kickoff meetings at month 13, 25 and 37. Workshops will focus on technical aspects of the program and on facilitating open technical exchanges, interaction, and sharing among the various program participants to facilitate test and evaluation, and receive input from transition partners. MIST program participants will be expected to present the technical status and progress of their projects to other participants and invited guests. Technical program review meetings are status update meetings with performers and the Government team where each performer will present progress to date on the technical and financial aspects of the program.

**1.D.2. Site Visits**

Site visits by the Contracting Officer Technical Representative and the MIST Program Manager will take place once annually during the life of the program. These visits will occur at the performer’s facility. Reports on technical progress, details of successes and issues, contributions to the program goals, and technology demonstrations will be expected at such visits.

**1.E. Place of Performance**

Performance will be conducted at the performer’s site(s) as described in the performer’s response to the BAA.

**1.F. Period of Performance**

The MIST program is envisioned as a 4 year effort that is intended to begin in late 2018. Phase 1 of the program (the Base Period) will last 24 months, and Phase 2 (Option 1) will last 24 months.

**SECTION 2: AWARD INFORMATION**

The BAA shall result in awards for all phases of the program. Funding for the Option Period shall depend upon performance during the Base Period, as well as program goals, the availability of funding, and IARPA priorities. Funding of Option Period is at the sole discretion of the Government.

Multiple awards are anticipated. The amount of resources made available under this BAA shall

depend on the quality of the proposals received and the availability of funds.

The Government reserves the right to select for negotiation all, some, one, or none of the proposals received in response to this solicitation and to make awards without discussions with offerors. The Government also reserves the right to conduct discussions if determined to be necessary. Additionally, IARPA reserves the right to accept proposals in their entirety or to select only portions of proposals for negotiations for award. In the event that IARPA desires to award only portions of a proposal, negotiations may be opened with that offeror.

Awards under this BAA shall be made to offerors on the basis of the Evaluation Factors listed in Section 5 of the BAA as well as successful completion of negotiations. Proposals selected for negotiation may result in a procurement contract. However, the Government reserves the right to negotiate the type of award instrument it determines appropriate under the circumstances.

The Government shall contact offerors whose proposals are selected for negotiations to obtain additional information required for award. The Government may establish a deadline for the close of fact-finding and negotiations that allows a reasonable time for the award of a contract. Offerors that are not responsive to Government deadlines established and communicated with the request may be removed from award consideration. Offerors may also be removed from award consideration should the parties fail to reach agreement within a reasonable time on contract terms, conditions, and cost/price.

### **SECTION 3: ELIGIBILITY INFORMATION**

#### **3.A. Eligible Applicants**

All responsible sources capable of satisfying the Government's needs may submit a proposal. Historically Black Colleges and Universities (HBCUs), Small Businesses, Small Disadvantaged Businesses and Minority Institutions (MIs) are encouraged to submit proposals and join others in submitting proposals; however, no portion of this announcement shall be set aside for these organizations' participation due to the impracticality of reserving discrete or severable areas for exclusive competition among these entities. Other Government Agencies, Federally Funded Research and Development Centers (FFRDCs), University Affiliated Research Centers (UARCs), Government-Owned, Contractor-Operated (GOCO) facilities, Government Military Academies, and any other similar type of organization that has a special relationship with the Government, that gives them access to privileged and/or proprietary information or access to Government equipment or real property, are not eligible to submit proposals under this BAA or participate as team members under proposals submitted by eligible entities. An entity of which only a portion has been designated as a UARC may be eligible to submit a proposal or participate as a team member subject to an organizational conflict of interest review.

Foreign entities and/or individuals may participate to the extent that such participants comply with any necessary Non-Disclosure Agreements, Security Regulations, Export Control Laws and other governing statutes applicable under the circumstances. Proposers are expected to ensure that the efforts of foreign participants do not either directly or indirectly compromise the laws of the United States, nor its security interests. As such, both foreign and domestic offerors should carefully consider the roles and responsibilities of foreign participants as they pursue teaming

arrangements.

### **3.A.1. Organizational Conflicts of Interest (OCI)**

“Organizational conflict of interest” means that because of other activities or relationships with other persons, a person is unable or potentially unable to render impartial assistance or advice to the Government, or the person’s objectivity in performing the contract work is or might be otherwise impaired, or a person has an unfair competitive advantage.

If a prospective offeror, or any of its proposed subcontractor teammates, believes that a potential conflict of interest exists or may exist (whether organizational or otherwise), the offeror should promptly raise the issue with IARPA and submit a notification by e-mail to the mailbox address for this BAA at [dni-IARPA-BAA-18-03@iarpa.gov](mailto:dni-IARPA-BAA-18-03@iarpa.gov). All notifications shall be submitted through the prime offeror, regardless of whether the notification addresses a potential OCI for the offeror or one of its subcontractor teammates. A potential conflict of interest includes, but is not limited to, any instance where an offeror, or any of its proposed subcontractor teammates, is providing either scientific, engineering and technical assistance (SETA) or technical consultation to IARPA. In all cases, the offeror shall identify the contract under which the SETA or consultant support is being provided. Without a waiver from the IARPA Director, neither an offeror, nor its proposed subcontractor teammates, can simultaneously provide SETA support or technical consultation to IARPA and compete or perform as a Performer under this solicitation.

All facts relevant to the existence of the potential conflict of interest, real or perceived, should be disclosed in the notification. The request should also include a proposed plan to avoid, neutralize or mitigate such conflict. The offeror, or subcontractor teammate as appropriate, shall certify that all information provided is accurate and complete, and that all potential conflicts, real or perceived, have been disclosed. Offerors may submit the above described notification after release of the BAA, however, the Government may not respond prior to the proposal due date. Submission of a proposal is not dependent on a Government response. If, in the sole opinion of the Government, after full consideration of the circumstances, the conflict situation cannot be resolved or waived, any proposal submitted by the offeror that includes the conflicted entity shall be excluded from consideration for award.

As part of their proposal, offerors who have identified any potential conflicts of interest shall include either (a) an approved waiver signed by the IARPA Director, (b) an IARPA Determination letter stating that no conflict of interest exists, or (c) a copy of their notification. Otherwise, offerors shall include in their proposal a written certification that neither they nor their subcontractor teammates have any potential conflicts of interest, real or perceived. A sample certification is provided in Appendix A.

If, at any time during the solicitation or award process, IARPA discovers that an offeror has a potential conflict of interest and no notification has been submitted by the offeror, IARPA reserves the right to immediately withdraw the proposal from further consideration for award.

Offerors are strongly encouraged to read “Intelligence Advanced Research Projects Activity’s (IARPA) Approach to Managing Organizational Conflicts of Interest (OCI)”, found on IARPA’s website at: <http://www.iarpa.gov/index.php/working-with-iarpa/iarpas-approach-to-oci>.



### **3.A.2 Multiple Submissions to the BAA**

Organizations may participate in more than one submission to BAA. However, if multiple submissions to the BAA which include a common team member are selected, IARPA shall, at contract negotiation, ensure that there is no duplicative funding (i.e., no one entity can be paid twice to perform the exact same task).

### **3.B. U.S. Academic Organizations**

According to Executive Order 12333, as amended, paragraph 2.7, “Elements of the Intelligence Community are authorized to enter into contracts or arrangements for the provision of goods or services with private companies or institutions in the United States and need not reveal the sponsorship of such contracts or arrangements for authorized intelligence purposes. Contracts or arrangements with academic institutions may be undertaken only with the consent of appropriate officials of the institution.”

It is **highly** recommended that offerors submit with their proposal a completed and signed Academic Institution Acknowledgement Letter for each U.S. academic institution that is a part of their team, whether the academic institution is serving in the role of a prime, or a subcontractor or a consultant at any tier of their team. A template of the Academic Institution Acknowledgement Letter is enclosed in APPENDIX A of this BAA. It should be noted that an appropriate senior official from the institution (i.e., typically the President, Chancellor, Provost, or other appropriately designated official) shall sign the completed form. Note that this paperwork **shall** be received before IARPA can enter into any negotiations with any offeror when a U.S. academic organization is a part of its team.

### **3.C. Other Eligibility Criteria**

#### **3.C.1. Collaboration Efforts**

Collaborative efforts and teaming arrangements among potential performers are strongly encouraged. Specific content, communications, networking and team formations are the sole responsibility of the participants.

## **SECTION 4: PROPOSAL AND SUBMISSION INFORMATION**

This notice constitutes the total BAA and contains all information required to submit a proposal. No additional forms, kits, or other materials are required.

### **4.A. Proposal Information**

Interested offerors are required to submit full proposals (Volume I, initially and Volume 2, if requested) in order to receive consideration for award. All proposals submitted under the terms and conditions cited in this BAA shall be reviewed. Proposals shall be received by the time and date specified in the General Information section in order to be assured of consideration during the initial round of selections. IARPA may evaluate proposals received after this date, but prior to the BAA Closing Date. Selection remains contingent on the technical evaluation criteria and funding availability. The typical proposal should express a consolidated effort in support of one or more related technical concepts or ideas. Disjointed efforts should not be included in a single

proposal.

The Government intends to use employees of Los Alamos National Laboratory, Sandia National Laboratories, Pacific Northwest National Laboratory, Applied Research Laboratories at the University of Texas, Booz Allen Hamilton, SCITOR/SAIC, TASC/Engility, MIT/LL, Welkin Associates/Mantech, Ops Consulting and BRTC Federal Solutions to provide expert advice regarding portions of the proposals submitted to the Government and to provide logistical support in carrying out the evaluation process. These personnel shall have signed and be subject to the terms and conditions of non-disclosure agreements. By submission of its proposal, an offeror agrees that its proposal information may be disclosed to employees of these organizations for the limited purposes stated above. Offerors who object to this arrangement shall provide clear notice of their objection as part of their transmittal letter. If offerors do not send notice of objection to this arrangement in their transmittal letter, the Government shall assume consent to the use of contractor support personnel in assisting the review of submittal(s) under this BAA.

Only Government personnel will make evaluation and award determinations under this BAA.

All administrative correspondence and questions regarding this solicitation should be directed by email to [dni-IARPA-BAA-18-03@iarpa.gov](mailto:dni-IARPA-BAA-18-03@iarpa.gov). Proposals shall be submitted in accordance with the procedures stated in the BAA.

#### **4.B. Proposal Format and Content**

All proposals shall be in the format given below. Non-compliant proposals may be rejected without review. Proposals shall consist of “Volume 1 - Technical and Management Proposal” and, only if requested (see BAA sections 4.B.2 and 5.B.), “Volume 2 - Cost Proposal.” All pages shall be on 8-1/2 by 11 inch paper and IARPA desires that the font size not be smaller than 12 point. IARPA desires that the font size for figures, tables and charts not be smaller than 10 point. All contents shall be clearly legible with the unaided eye. Excessive use of small font, for other than figures, tables, and charts, or unnecessary use of figures, tables, and charts to present information may render the proposal non-compliant. Foldout pages shall not be used. The page limitation for full proposals includes all figures, tables, and charts. All pages should be numbered. Unnecessarily elaborate brochures or presentations beyond what is sufficient to present a complete and effective proposal are not acceptable and shall be discarded without review.

The Government anticipates proposals submitted under this BAA will be UNCLASSIFIED.

Each proposal submitted in response to this BAA shall consist of the following:

**Volume 1 – Technical & Management Proposal (Page Limit including Summary: 26 pages if proposing to TA3 only, 43 pages if proposing to TA1 and TA2 jointly, and 60 pages if proposing to all three TAs)**

Section 1 - Cover Sheet (see Appendix A) & Transmittal Letter (not included in page count)

Section 2 – Summary of Proposal

Section 3 – Detailed Proposal

Section 4 – Attachments (Not included in page count, but number appropriately for elements

included. Templates are in the Appendices of this BAA)

- 1 – Academic Institution Acknowledgment Letter, if required
- 2 – Intellectual Property Rights, estimated not to exceed 4 pages
- 3 – OCI Waiver, Determination, Notification or Certification
- 4 – Bibliography
- 5 – Relevant Papers (up to three)
- 6 – Consultant Letters of Commitment
- 7 – Human Use Documentation (see Section 6) - **Not applicable** (proposals involving such use will not be accepted)”
- 8 – Animal Use Documentation (see Section 6) - **Not applicable** (proposals involving such use will not be accepted)”
- 9 – A Three Chart Summary of the Proposal
- 10 – Security Plan, estimated not to exceed 5 pages - **Not applicable (proposals involving classified information will not be accepted)**
- 11 – Research Data Management Plan, estimated not to exceed 3 pages (see Section 4 and Template under Appendix A)
- 12 – Biosecurity Plan, not to exceed 3 pages (Required for proposals to TA1-TA2 involving DNA, RNA or peptide synthesis only)

**Volume 2 – Cost Proposal (To be submitted only upon request of the Contracting Officer, See BAA Sections 4.B.2 and 5.B)**

Section 1 – Cover Sheet (see Appendix B)

Section 2 – Estimated Cost Breakdown

Section 3 – Supporting Information

**4.B.1 Volume 1: Technical and Management Proposal**

Volume 1, Technical and Management Proposal, may include an attached bibliography of relevant technical papers or research notes (published and unpublished) which document the technical ideas and approach on which the proposal is based. Copies of not more than three relevant papers can be included with the submission. The submission of other supporting materials along with the proposal is strongly discouraged and shall not be considered for review. Except for the cover sheet, transmittal letter, table of contents (optional), and the required attachments stated in the BAA, **Volume 1 shall not exceed 26 pages if proposing to TA3 only, 43 pages if proposing to TA1 and TA2 jointly or 60 pages if proposing to all three TAs.** Any pages exceeding this limit shall be removed and not considered during the evaluation process. Full proposals should be accompanied by an official transmittal letter, using contractor format. All full proposals shall be written in English.

**4.B.1.a. Section 1: Cover Sheet & Transmittal Letter**

A. Cover sheet: (See Appendix A for template)

B. Transmittal Letter

The transmittal letter shall include the following (**not to exceed one page**):

Introduction of Offeror and team (subcontractors and consultants), the BAA number, IARPA program name, offerors Program name, the proposal validity period, state what type of contract vehicle is being requested for this BAA (either a procurement contract or other transaction) with a

short rationale, any non-negotiable conditions on which your offer is based (such as contract type, IP restrictions, etc.) and provide offeror points of contact: name, email and phone number for both technical and administrative issues.

**Note:** Any information required elsewhere in the proposal must be included in the appropriate section of the proposal (i.e. including the information in the transmittal letter alone may not be sufficient). If there is a conflict between the transmittal letter and the proposal the proposal will control.

**4.B.1.b. Section 2: Summary of Proposal (see below for page limit)**

Section 2 shall provide an overview of the proposed work as well as introduce associated technical and management issues. This section shall contain a technical description of technical approach to the research as well as a succinct portrayal of the uniqueness and benefits of the proposed work. It shall make the technical objectives clear and quantifiable and shall provide a project schedule with definite decision points and endpoints. The summary shall also clearly state the Technical Areas (TAs) to which the offeror is proposing. **The page limit for the Summary is computed as follows: 6 pages if proposing to TA3 only, 8 pages if proposing to TA1 and TA2 jointly and 10 pages if proposing to all three TAs.**

The Summary shall include the elements specified in the sections below:

- A. A technical overview of the proposed research and plan. This section is the centerpiece of the proposal and shall succinctly describe the proposed approach and research. The overview shall provide an intuitive understanding of the approach and design, technical rationale, and constructive plan for accomplishment of technical objectives and deliverable production. The approach shall be supported by basic, clear calculations. Additionally, proposals shall clearly explain the innovative claims and technical approaches that shall be employed to meet or exceed each program metric and provide ample justification as to why approaches are feasible. Proposals must also clearly identify any technical uncertainties and make specific proposals for the resolution of those uncertainties. The use of non-standard terms and acronyms should be avoided. This section shall be supplemented with a more detailed plan in Volume 1, Section 3 of the proposal.
- B. Summary of the products, transferable technology and deliverables associated with the proposed research results. Define measurable deliverables that show progress toward achieving the stated Program Milestones. All proprietary claims to the results, prototypes, intellectual property, or systems supporting and/or necessary for the use of the research, results, and/or prototype shall be detailed in Attachment 2. If there are no proprietary claims, this should be stated. Should no proprietary claims be made, Government rights shall be unlimited.
- C. Schedule and milestones for the proposed research. Summarize, in table form and clearly legible for all activity, the schedule and milestones for the proposed research. Do not include proprietary information with the milestones.
- D. Related research. General discussion of other research in this area, comparing the significance and plausibility of the proposed innovations against competitive approaches to achieve

Program objectives.

- E. Project contributors. Include a clearly defined and clearly legible organizational chart of all anticipated project participants (identify whether subcontractor, consultant, etc.), organized under functional roles for the effort, and also indicating associated task number responsibilities with individuals.
- F. Technical Resource Summary: **(NOTE: The full Cost Volume is not required unless requested by the Contracting Officer; therefore it is critical that offerors address the items below in their technical proposal so the Government can evaluate Resource Realism.)**
- Summarize total level of effort by labor category/technical discipline (i.e., research scientist/chemist/physicist/engineer/administrative, etc.) and affiliation (i.e., prime/subcontractor/consultant). Key Personnel shall be identified by name. Provide a brief description of the qualifications for each labor category/technical discipline (i.e., education, certifications, years of experience, etc.).
  - Summarize level of effort by labor category/technical discipline for each major task.
  - Identify software and intellectual property required to perform, by affiliation (List each item separately).
  - Identify materials and equipment (such as IT) required to perform, by affiliation (List each item separately).
  - Identify any other resources required to perform (i.e., services, data sets, data set repository, facilities, government furnished property, etc.), by affiliation (List each item separately).
  - Estimated travel, including purpose of travel and number of personnel per trip, by affiliation

The above information shall cross reference to the tasks set forth in the offerors statement of work, and shall be supported by the detailed cost and pricing information provided in the offeror's Volume 2 Cost Proposal, the latter of which to be submitted only if requested.

#### **4.B.1.c. Section 3: Detailed Proposal Information**

This section of the proposal shall provide the detailed, in-depth discussion of the proposed research as well as supporting information about the offeror's capabilities and resources. Specific attention shall be given to addressing both the risks and payoffs of the proposed research and why the proposed research is desirable for IARPA to pursue. This part shall provide:

- A. Statement of Work (SOW) - In plain English, clearly define the technical tasks and sub-tasks to be performed, their durations and the dependencies among them. For each task and sub-task, provide:
- A general description of the objective;
  - A detailed description of the approach to be taken, developed in an orderly progression and in enough detail to establish the feasibility of accomplishing the goals of the task;
  - Identification of the primary organization responsible for task execution (prime, sub-

- contractor, team member, etc.) by name;
- The exit criteria for each task/activity (i.e., a product, event or milestone that defines its completion); and
- Definition of all deliverables (e.g., data (including public access), reports, software, etc.) to be provided to the Government in support of the proposed research tasks/activities.

**Note: Do not include any proprietary information in the SOW.**

At the end of this section of the proposal, provide a Gantt chart, showing all the tasks and sub-tasks on the left (grouped by Technical Area) with the performance period (in years/quarters) on the right. All milestones shall be clearly labeled on the chart. If necessary, use multiple pages to ensure legibility of all information.

- B. A detailed description of the objectives, scientific relevance, technical approach and expected significance of the work. The key elements of the proposed work should be clearly identified and related to each other. Proposals should clearly detail the technical methods and/or approaches that shall be used to meet or exceed each program milestone, and should provide ample justification as to why the proposed methods/approaches are feasible. Any anticipated risks should be described and possible mitigations proposed. General discussion of the problem without detailed description of approaches, plausibility of implementation, and critical metrics may be determined not selectable.
- C. State-of-the-art. Comparison with other on-going research, highlighting the uniqueness of the proposed effort/approach and differences between the proposed effort and the current state-of-the-art. Identify advantages and disadvantages of the proposed work with respect to potential alternative approaches.
- D. Data sources. Identification and description of data sources to be utilized in pursuit of the project research goals.

Offerors proposing to use existing data sets shall provide written verification that all data were obtained in accordance with U.S. laws and, where applicable, are in compliance with End User License Agreements, Copyright Laws, Terms of Service, and laws and policies regarding privacy protection of U.S. Persons. Offerors proposing to obtain new data sets shall ensure that their plan for obtaining the data complies with U.S. Laws and, where applicable, with End User License Agreement, Copyright Laws, Terms of Service, and laws and policies regarding privacy protection of U.S. Persons. In Attachment 2 to Offeror's proposal, offerors shall address intellectual property restrictions on the use or transfer of such data sets, as described in Section 4.B.1.d.

The Government reserves the right to reject a proposal if it does not appropriately address all data issues.

Deliverables. Deliverables are identified in Section 1 of the BAA. Offerors must clearly identify all data it proposes to deliver, including technical data and computer software. In

Attachment 2 to Offeror’s proposal, offerors shall address intellectual property rights in such data, as described in Section 4.B.1.d

- E. Cost, schedule, milestones. Cost, schedule, and milestones for the proposed research, including cost estimates by cost element for base period, the option period and the total program summary, and company cost share, if any, as well as costs by Technical Area and task (see tables below for example format). The milestones shall not include proprietary information (offeror can use own format for milestones). **(Note: The full Volume 2 - Cost Proposal is not required unless requested by the Contracting Officer; therefore it is critical that offerors address this element in their technical proposal so the Government can evaluate funding availability. See BAA Sections 4.B.2, 5.A., and 5.B).**

Cost Element (burdened)	Base - 24 Months	Option – 24 Months	Total Program Summary
Labor			
Subcontracts/Consultant			
Materials & Equipment			
Travel			
Other Direct Costs			
(Cost Share, if any)			
Total			

Technical Area 1	Base - 24 Months	Option – 24 Months	Total Program Summary
Task 1			
Task 2			
Total TA1			
<b>Technical Area 2</b>			
Task 1			
Task 2			
Total TA2			
<b>Technical Area 3</b>			
Task 1			
Task 2			
Total TA3			

- F. Offeror’s previous accomplishments. Discuss previous accomplishments and work in this or closely related research areas and how these shall contribute to and influence the current work.
- G. Facilities. Describe the facilities that shall be used for the proposed effort, including computational and experimental resources.
- H. Detailed Management Plan. The Management Plan should identify both organizations and individuals within organizations that make up the team, and delineate the expected duties, relevant capabilities, and task responsibilities of team members and expected relationships

among team members. Expected levels of effort (percentage time, or fraction of an FTE) for all key personnel and significant contributors should be clearly noted. A description of the technical, administrative and business structure of the team and the internal communications plan should be included. Project/function/sub-contractor relationships (including formal teaming agreements), Government research interfaces, and planning, scheduling, and control practices should be described. The team leadership structure should be clearly defined. Provide a brief biography of the key personnel (including alternates, if desired) who shall be involved in the research along with the amount of effort to be expended by each person during the year. Participation by key personnel and significant contributors is expected to exceed 25% of their time. A compelling explanation is required for any variation from this figure.

If the team intends to use consultants, they shall also be included in the organizational chart. Indicate if the person shall be an “individual” or “organizational” consultant (i.e., representing themselves or their organization), and organizational affiliation.

A table such as the following (see **Table 8**) is recommended.

Table 8: Team Organization

Participants	Org	Role	Unique, Relevant Capabilities	Role: Tasks	Clearance Level *	Time
Jane Wake	LMN Univ.	PI/Key Personnel	Electrical Engineering	Program Mgr & Electronics: 10		100%
John Weck, Jr.	OPQ Univ.	Key Personnel	Mathematical Physics	Programming: 1-5		50%
Dan Wind	RST Univ.	Key Personnel	Physics	Design, Fab, and Integration: 6-8		90%
Katie Wool	UVW Univ.	Contributor	Quantum Physics	Enhancement witness design: 4		25%
Rachel Wade	XYZ Corp.	Co-PI/Key Personnel	Graph theory	Architecture design: 6		55%
Chris West	XYZ Corp.	Significant Contributor	EE & Signal Processing	Implementation & Testing: 8-9		60%
Julie Will	JW Cons.	Consultant (Individual)	Computer science	Interface design: 10		200 hours
David Word	A Corp.	Consultant (A. Corp.)	Operations Research	Applications Programming: 2-3		200 hours

\* If applicable

- I. Resource Share. Include the type of support, if any, the offeror might request from the Government, such as facilities, equipment or materials, or any such resources the offeror is willing to provide at no additional cost to the Government to support the research effort. Cost sharing is not required from offerors and is not an evaluation criterion, but is encouraged where there is a reasonable probability of a potential commercial application related to the proposed research and development effort.



- J. The names of other federal, state or local agencies or other parties receiving the proposal and/or funding the proposed effort. If none, so state. Concurrent submission of the proposal to other organizations will not prejudice its review but may impact IARPA's decision to fund the effort. See 5.A.2.a.
- K. Research Data Management Plan. (RDMP). Offerors must submit a Research Data Management Plan which outlines how they will manage and preserve the research data collected or produced in their work. The Research Data Management Plan need not require the preservation of all research data: offerors should consider the cost and benefits of managing and preserving the research data in determining whether to preserve it. At a minimum, all research data associated with a peer-reviewed manuscript or final published article (hereinafter "Publications") must be made publicly accessible by the award recipient before, on or at a reasonable time after the publication date. The Publications whose data must be covered by the Data Management Plan are deliverables as described in Section 1. Privacy, confidentiality, and security concerns must be protected, and intellectual property rights and commercial interests must be taken into account and protected accordingly.

"Research data" is defined herein as "the digital recorded factual material commonly accepted in the scientific community as necessary to validate research findings including data sets used to support scholarly publications, but does not include laboratory notebooks, preliminary analyses, drafts of scientific papers, plans for future research, peer review reports, communications with colleagues, or physical objects, such as laboratory specimens."

The RDMP must address the following:

- Describe the types of research data collected or produced in the course of the project. Include standards to be used for research data and metadata content and format.
- A plan for making the research data that underlie Publications digitally accessible to the public before, at the time of publication/conference or within a reasonable time after publication. The requirement could be met by including the data as supplementary information to the Publication or by depositing the data in searchable, machine-readable and digitally accessible form suitable for repositories available to the public free of charge. Such repositories could be discipline-specific repositories, general purpose research data repositories or institutional repositories. The published article or conference paper should indicate how the public may access research data underlying the paper's results and findings. Offerors should attempt to make the data available for at least three years after published article or conference. (NOTE: Offerors shall make a best effort in identifying research data sets that may be used for Publications that occur after contract end. The offeror must deliver these data sets to the Government and should also make them available in depositories available to the public prior to the end of the period of performance, if not included as supplementary information to Publications.)
- Policies and provisions for sharing and preservation, including a) policies and provisions for appropriate protection of privacy, confidentiality, security, and

intellectual property, b) descriptions of tools, including software, which may be needed to access and interpret the data, and c) policies and provisions for re-use, re-distribution, and production of derivatives.

- If, for legitimate reasons (e.g., privacy, confidentiality, security, intellectual property rights considerations; size of data sets, cost; time), the data underlying the results of peer-reviewed publications or conference papers cannot be shared and preserved, the plan must include a justification citing such reasons.

In addressing these elements (e.g., types of data to be shared and preserved, standards to be used for data and metadata, repositories to be used for archiving data, timeframes for sharing and preservation), the Research Data Management Plan should reflect the best practices of the relevant scientific discipline and research community. At a minimum, research data underlying Publications and associated metadata should include acknowledgement of IARPA support and a link to the associated Publication.

#### **4.B.1.d. Section 4: Attachments**

[NOTE: The attachments listed below shall be included with the proposal, if applicable, but do not count against the Volume 1 page limit.]

Attachment 1: Signed Academic Institution Acknowledgement Letter(s) (if applicable).  
Template provided in Appendix A.

Attachment 2: Intellectual Property Rights. Template provided in Appendix A. This attachment is estimated not to exceed 4 pages and shall address the following:

Representation as to Rights. An Offeror shall provide a good faith representation that they either own or possess appropriate licensing rights to all intellectual property that shall be utilized under their proposal for the program.

Program-Specific Intellectual Property Approach. IARPA requires sufficient rights to intellectual property developed or used in the conduct of the proposed research to ensure that IARPA can successfully (a) communicate program information across Government organizations and (b) support transition to and further use and development of the program results by Intelligence Community users and others. IARPA anticipates that achieving these goals may necessitate a minimum of Government Purpose Rights in all data deliverables and license rights to patentable inventions incorporated into deliverables or used in creating deliverables, including the possibility of the right to make/practice such. However, there may be any number of other intellectual rights approaches to achieve IARPA's program goals. Therefore, in addressing their approach to intellectual property rights, offerors should ensure they carefully (1) describe the intended use of the patented invention(s) or data, including, technical data and computer software, in the conduct of the proposed research; (2) describe the rights being offered; (3) explain how IARPA will be able to reach its program goals (including transition) with the rights offered; (4) identify the cost to the Government to acquire additional or alternative rights beyond those being offered, if applicable; and (5) provide possible alternatives in any area in which the offered rights would likely be insufficient for IARPA to achieve its program goals (e.g., existing licensing regimes

available to Intelligence Community partners via separate agreements).

**Patented Inventions.** Offerors shall include documentation using the format provided in Appendix A, proving ownership of or possession of appropriate licensing rights to all patented inventions (or inventions for which a patent application has been filed) that shall be utilized under the proposal for the IARPA program. If a patent application has been filed for an invention that the proposal utilizes, but the application has not yet been made publicly available and contains proprietary information, the offeror may provide only the patent number, inventor name(s), assignee names (if any), filing date, filing date of any related provisional application, and a summary of the patent title, together with either: (1) a representation that the offeror owns the invention, or (2) proof of possession of appropriate licensing rights in the invention. Offerors shall also indicate their intention to incorporate patented technology into any deliverable- i.e., if offerors intend for any deliverable to embody any invention covered by any patent or patent application the offerors list in Volume 1, Attachment 2, offerors should also specify in the Attachment the deliverable into which the offerors expects it to be incorporated. In doing so, the Government requests that offerors further specify any license rights they are offering to provide the Government for patented inventions that shall be utilized under the proposal for the IARPA program (beyond the implied license that accompanies a patent owner's sale of a patented product).

**Noncommercial Data.** Offerors shall identify all noncommercial data, including technical data and computer software, that it plans to generate, develop and/or deliver under any proposed award instrument in which the Government shall acquire less than unlimited rights. In doing so, Offerors must assert (a) the specific restrictions on those deliverables, (b) the basis for such restrictions, (c) the intended use of the technical data and noncommercial computer software in the conduct of the proposed research and development of applicable deliverables, and (d) a supporting rationale of why its approach to data rights is in the Government's best interest (please see program specific goals above). If no restrictions are intended, then the offeror should state "NONE."

**Commercial Data.** Offerors shall identify all commercial data, including technical data and commercial computer software, that may be included in any deliverables contemplated under the research effort and assert any applicable restrictions on the Government's use of such commercial data (please see program specific goals above). If no restrictions are intended, then the offeror should state "NONE."

**Data Developed with Mixed Funding.** If mixed funding is anticipated in data generated, developed, and/or delivered under the research effort, the Government seeks at minimum Government Purpose Rights for all noncommercial data deliverables; offering anything less shall be considered a weakness in the proposal. "Government Purpose Rights" (or "GPR") means the rights to use, modify, reproduce, release, perform, display, or disclose data, including technical data and computer software, within the Government without restriction; and to release or disclose data, including technical data and computer software, outside the Government and authorize persons to whom release or disclosure has been made to use, modify, reproduce, release, perform, display, or disclose that data or software for any United States Government purpose. United States Government purposes include any activity in which the United States Government is a party, including cooperative agreements with

international or multi-national defense organizations, or sales or transfers by the United States Government to foreign governments or international organizations. Government purposes include competitive procurement, but do not include the rights to use, modify, reproduce, release, perform, display, or disclose technical data or computer software for commercial purposes or authorize others to do so. Government Purpose Rights continue for a five-year period upon execution of the contract, and upon expiration of the five-year period, the Government obtains Unlimited Rights in the data.

Open Source. If offerors propose the use of any open source data or freeware, any conditions, restrictions or other requirements imposed by that software shall also be addressed. Offerors should leverage the format in Appendix A for their response.

Identification of Relevant Government Contracts. For all technical data and computer software that an Offeror intends to deliver with other than unlimited rights that are identical or substantially similar to technical data and computer software that the offeror has produced for, delivered to, or is obligated to deliver to the Government under any contract or subcontract, the offeror shall identify (a) the contract number under which the data, software, or documentation were produced; (b) the contract number under which, and the name and address of the organization to whom, the data and software were most recently delivered or shall be delivered; and (c) any limitations on the Government's rights to use or disclose the data and software, including, when applicable, identification of the earliest date the limitations expire.

Definitions. For this solicitation, IARPA recognizes only the definitions of intellectual property rights in accordance with the terms as set forth in the Federal Acquisition Regulation (FAR) part 27 or as defined herein. If offerors propose intellectual property rights that are not defined in FAR part 27 or herein, offerors shall clearly define such rights in the "Intellectual Property Rights" Attachment of their proposal. Offerors are reminded of the requirement for prime contractors to acquire sufficient rights from subcontractors to accomplish the program goals.

Evaluation. The Government may use the asserted data rights during the evaluation process to evaluate the impact of any identified restrictions. The technical content of the "Intellectual Property Rights" Attachment shall include only the information necessary to address the proposed approach to intellectual property; any other technical discussion in the attachment shall not be considered during the evaluation process.

Attachment 3: OCI Waiver/Determination/Notification or Certification. Template provided in Appendix A.

Attachment 4: Bibliography. A brief bibliography of relevant technical papers and research notes (published and unpublished) which document the technical ideas on which the proposal is based.

Attachment 5: Relevant Papers. Copies of not more than three relevant papers may be included in the submission. The proposers should include a one page technical summary of each paper provided, suitable for individuals who are not experts in the field.

Attachment 6: Consultant Commitment Letters. If needed.

Attachment 7: Attachment 7: Human Use Documentation. Not applicable

Attachment 8: Animal Use Documentation. Not applicable

Attachment 9: A Three Chart Summary of the Proposal. A PowerPoint summary that quickly and succinctly indicates the concept overview, key innovations, expected impact, and other unique aspects of the proposal. The format for the summary slides is included in APPENDIX A to this BAA and does not count against the page limit. Slide 1 should be a self-contained, intuitive description of the technical approach and performance. These slides may be used during the evaluation process to present a summary of the proposal from the proposer's view.

Attachment 10: Security Plan. (Not to exceed 5 pages). Not applicable

Attachment 11: Research Data Management Plan (estimated as two to three pages). Template provided in Appendix A.

Attachment 12: Biosecurity Plan, not to exceed 3 pages, (Required for all TA1 proposals involving DNA, RNA, or peptide synthesis only).

#### **4.B.2. Volume 2: Cost Proposal (No Page Limit)**

**NOTE: This Volume is only required to be submitted if the offeror's proposal has been selected for negotiation (see BAA Section 5.B and 5.C). The notification of selection for negotiation will be issued in writing by the contracting officer and will include a request to submit the full Cost Volume within 10 business days or as otherwise authorized by the contracting officer.**

IARPA anticipates awarding cost-type procurement contracts however, offerors requesting other than a cost-type procurement contract may be directed by the contracting officer to provide "other than certified cost or pricing data" (reference FAR Part 15.4) and/or cost supporting information in a different format than described below. The contracting officer will determine whether to grant the request for other than a cost-type procurement contract. Examples of requests that would be considered for approval include those from non-traditional contractors such as commercial entities that do not accept FAR- based cost contracts, small businesses, start-up companies, consortia that may include universities and non-profits or foreign companies; where cost-sharing or government participation in the work is appropriate; where flexibility not available under a procurement contract is needed; or where commercialization by industry is deemed advantageous to the government.

Regardless of the type of instrument determined to be appropriate by the contracting officer, the offeror's cost proposal shall contain sufficient factual information to establish the offeror's understanding of the project, the perception of project risks, the ability to organize and perform the work and to support the realism and reasonableness of the proposed cost, to the extent appropriate. IARPA recognizes that undue emphasis on cost may motivate offerors to offer low-risk ideas with minimum uncertainty and to staff the effort with junior personnel in order to be in a more

competitive posture. IARPA discourages such cost strategies. Cost reduction approaches that shall be received favorably include innovative management concepts that maximize direct funding for technology and limit diversion of funds into overhead.

#### **4.B.2.a. Section 1: Cover Sheet.**

See Appendix B for the Cover Sheet Template

#### **4.B.2.b. Section 2: Estimated Cost Breakdown.**

Offerors shall submit numerical cost and pricing data using Microsoft Excel. The Excel document, in the format provided in Appendix B, shall include intact formulas and shall not be hard numbered. The base and option period cost data should roll up into a total cost summary. The Excel files may be write-protected but shall not be password protected. The Cost/Price Volume shall include the following:

- A. Completed Cost/Price Template - Offerors shall submit a cost element breakdown for the base period, each option period and the total program summary in the format provided in Appendix B<sup>3</sup>.
- B. Total cost broken down by major task.
- C. Major program tasks by fiscal year.
- D. A summary of projected funding requirements by month.
- E. A summary table listing all labor categories used in the proposal and their associated direct labor rates, along with escalation factors used for each base and option period of the acquisition.
- F. A summary table listing all indirect rates used in the proposal for each for each base and option period of the acquisition.

#### **4.B.2.c. Section 3: Supporting Information**

In addition to the above, supporting cost and pricing information shall be provided in sufficient detail to substantiate the offeror's cost estimates. Include a description of the basis of estimate (BOE) in a narrative for each cost element and provide supporting documentation, as applicable:

Direct Labor – Provide a complete cost breakout by labor category, hours and rates (template available in Appendix B). Specify all key personnel by name and clearly state their labor category and proposed rate. Describe the basis of the proposed rates and provide a copy of the most recent Forward Pricing Rate Agreement (FPRA) with the Government. If offerors do not have a current FPRA with the Government, provide payroll records or contingency hire letters with salary data to support each proposed labor category, including those for key individuals, and the most recent Forward Pricing Rate Proposal Submission, if applicable. Offeror should also address whether any portion of their labor rates is attributable to uncompensated overtime.

Labor Escalation Factor – State the proposed escalation rate and the basis for that rate (e.g., based upon Global Insight indices, Cost Index or historical data). If the escalation rate is based upon historical data, provide data to demonstrate the labor escalation trend. Provide a sample calculation demonstrating application of the factor to direct labor.

Subcontracts (to include consultants and IOTs) – The offeror is responsible for

compiling and providing full subcontractor proposals with the Cost Volume. Subcontractor cost element sheets shall be completed for the base period, each option period and the total summary using the same format required for the prime contractor (See Appendix B). Consultant letter(s) of commitment shall also be attached.

Information shall be presented in Excel with intact formulas using the format provided in Appendix B and addressing the supporting cost information as outlined in Section 4 of the BAA. In addition to the full and complete subcontractor cost proposals, the offeror shall also provide its analysis of each subcontractor's proposal including justification for why the subcontractor was selected and its determination that the cost/price is fair and reasonable (Reference FAR Part 44 and FAR clause 52.244-2). **If subcontractors have concerns about proprietary cost information, subcontractors can submit their detailed cost proposals directly to the Contracting Officer.**

Materials and Equipment – Provide copies of quotes, historical data or any other information including offeror's analysis to support proposed costs.

#### Travel

The proposed travel supporting detail shall include destination and purpose of the trip, number of trips, number of travelers and days per trip and price per traveler in sufficient detail to verify the BOE. Proposed travel costs shall comply with the limitations set forth in FAR Part 31.

Proposed conference travel must have an immediate, direct, and tangible benefit to the Government such as providing a deliverable at the conference (e.g., gives a presentation, presents a paper or research findings that are sponsored in whole or in part by IARPA). Travel for personnel to simply attend a conference will not be approved as a direct charge to the contract.

Other Direct Costs (ODCs) – ODCs shall be listed separately and supported by quotes, historical data or any other information including the offeror's analysis.

Indirect Costs – The offeror shall show indirect cost calculations, identify the proposed indirect rate by contractor fiscal year and program period (base, option period) and provide information on indirect cost pools and allocation bases for each year and program period involved. If a Government agency recently audited the offeror's indirect rates, the offeror shall state by which agency the audit was conducted, when the rates were approved and the period for which they are effective. Include a copy of this rate agreement. Absent current Government rate recommendations, it is incumbent on the offeror to provide some other means of demonstrating indirect rate realism (e.g., 3 years of historical actual costs with applicable pools and bases). If proposed rates vary significantly from historical experience, the offeror shall provide an explanation of the variance.

Cost sharing – Describe the source, nature and amount of cost-sharing, if any. Reference Resource Share from Section 4 of the BAA.

Other Pricing Assumptions - Identify pricing assumptions which may require incorporation into

the resulting award instrument (e.g., use of Government Furnished Property/Facilities/Information, access to Government Subject Matter Experts, etc.). Reference Resource Share from Section 4 of the BAA.

Facilities Capital Cost of Money (FCCM) – If proposing FCCM, the offeror shall show FCCM cost calculations, identify the proposed FCCM factors by contractor fiscal year and program year and provide a copy of the FPRA, FPRS or FPRR, if available.

Profit/Fee - Identify the proposed profit/fee percentage and the proposed profit/fee base. Provide justification for your proposed profit/fee.

Systems - For the Systems listed below, provide a brief description of the cognizant federal agency and audit results. If the system has been determined inadequate, provide a short narrative of the steps your organization has taken to address the inadequacies and the current status. If a formal audit has been performed by a Government Agency, please provide a complete copy of the audit report or adequacy determination letter. If the system has never received a formal Government review/approval include a statement to that effect. Address whether your organization has contracts that are Cost Accounting Standards (CAS) covered and if so, whether they are subject to full or modified CAS coverage.

- Accounting system
- Purchasing system

Certified “cost or pricing data” may be requested for procurement contract awards of \$750,000 or greater, unless the Contracting Officer approves an exception from the requirement to submit cost or pricing data. (Reference FAR Part 15.403.)

#### **4.C. Submission Details**

##### **4.C.1. Due Dates**

See BAA General Information Section for proposal due dates and times.

##### **4.C.2. Proposal Delivery**

Proposals (Volume 1 **initially**) shall be submitted electronically through the IARPA Distribution and Evaluation System (IDEAS). Offerors interested in providing a submission in response to this BAA shall first register by electronic means in accordance with the instructions provided on the following web site: <https://iarpa-ideas.gov>. Offerors who plan to submit proposals for evaluation in the first round are strongly encouraged to register at least one week prior to the due date for the first round of proposals. Offerors who do not register in advance do so at their own risk, and IARPA shall not extend the due date for the first round of proposals to accommodate such offerors. Failure to register as stated shall prevent the offeror’s submission of documents.

After registration has been approved, offeror’s should upload proposal, (initially Volume 1 **only**), scanned certifications and permitted additional information in ‘pdf’ format, or as otherwise directed (Excel, PowerPoint, etc.). Offerors are responsible for ensuring compliant and final submission of their proposals to meet the BAA submittal deadlines. Time management to upload and submit is wholly the responsibility of the offeror. **Note: IDEAS will require offerors to**



**complete a proposal cover sheet within the IDEAS system at the time of Volume 1 – Technical and Management Proposal submission. This is separate than the Technical and Cost Volume cover sheets referenced in 4.B.1.a. and 4.B.2.a. and provided in Appendices A and B respectively. Information requested within the IDEAS system will include basic cost information (total funds requested from IARPA, proposed costs by option period and validity period). Please complete the requested information but DO NOT upload your Volume 2 – Cost Proposal. Directions for submittal of Volume 2 – Cost Proposal will be provided by the contracting officer when offerors are notified of selection for negotiations.**

Upon completing the proposal submission the offeror shall receive an automated confirmation email from IDEAS. Please forward that automated message to [dni-IARPA-BAA-18-03@iarpa.gov](mailto:dni-IARPA-BAA-18-03@iarpa.gov). IARPA strongly suggests that the offeror document the submission of their proposal package by printing the electronic receipt (time and date stamped) that appears on the final screen following compliant submission of a proposal to the IDEAS website.

Volume 1 submitted by any means other than IDEAS (e.g., hand-carried, postal service, commercial carrier and email) shall not be considered unless the offeror attempted electronic submission, but was unsuccessful. Should an offeror be unable to complete the electronic submission, the offeror shall employ the following procedure. The offeror shall send an e-mail [dni-IARPA-BAA-18-03@iarpa.gov](mailto:dni-IARPA-BAA-18-03@iarpa.gov), prior to the first round proposal due date and time specified in the BAA, and indicate that an attempt was made to submit electronically but that the submission was unsuccessful. This e-mail shall include contact information for the offeror. Following this email contact, additional guidance shall be provided.

Volume 1 shall be submitted by the time and date specified in the BAA in order to be assured of consideration during the first round of selections. IARPA may evaluate proposals received after this date until the closing date of the BAA. Selection remains contingent on the technical and funding availability evaluation factors. Failure to comply with the submission procedures may result in the submission not being evaluated.

#### **4.D. Funding Restrictions**

Facility construction costs are not allowable under this activity. Funding may not be used to pay for commercialization of technology.

### **SECTION 5: PROPOSAL REVIEW INFORMATION**

#### **5.A. Technical and Funding Availability Evaluation Factors**

The factors to be used to evaluate and select proposals for negotiation for this Program BAA are described in the following paragraphs. Because there is no common statement of work, each proposal shall be evaluated on its own merits and its relevance to the Program goals rather than against other proposals responding to this BAA. The proposals shall be evaluated on the basis of technical and funding availability factors. These are of equal importance. Within the technical evaluation factor, the specific technical criteria are in descending order of importance, as follows: Overall Scientific and Technical Merit, Effectiveness of Proposed Work Plan, Contribution and Relevance to the IARPA Mission and Program Goal, Relevant Expertise and Experience, and Resource Realism. Specifics about the evaluation criteria are provided below.

Award(s) shall be made to offerors on the basis of the technical and funding availability factors listed below, and subject to successful negotiations with the Government. Award shall not be made to offeror(s) whose proposal(s) are determined not to be selectable. Offerors are cautioned that failure to follow submission instructions may negatively impact their proposal evaluation or may result in rejection of the proposal for non-compliance.

#### **5.A.1. Technical Evaluation Factor (technical criteria listed below)**

##### **5.A.1.a. Overall Scientific and Technical Merit**

Overall scientific and technical merit of the proposal is substantiated, including unique and innovative methods, approaches, and/or concepts. The offeror clearly articulates an understanding of the problem to be solved. The technical approach is credible, and includes a clear assessment of primary risks and a means to address them. The proposed research advances the state-of-the-art.

##### **5.A.1.b. Effectiveness of Proposed Work Plan**

The feasibility and likelihood that the proposed approach shall satisfy the Program's milestones and metrics are explicitly described and clearly substantiated along with risk mitigation strategies for achieving stated milestones and metrics. The proposal reflects a mature and quantitative understanding of the Program milestones and metrics, and the statistical confidence with which they may be measured. Any offeror-proposed milestones and metrics are clear and well-defined, with a logical connection to enabling offeror decisions and/or Government decisions. The schedule to achieve the milestones is realistic and reasonable.

The roles and relationships of prime and sub-contractors is clearly delineated with all participants fully documented. Work plans shall demonstrate the ability to provide full Government visibility into and interaction with key technical activities and personnel, and a single point of responsibility for contract performance. Work plans shall also demonstrate that key personnel have sufficient time committed to the Program to accomplish their described Program roles.

The requirement and rationale for and the anticipated use or integration of Government resources, including but not limited to all equipment, facilities, information, etc., is fully described including dates when such Government Furnished Property (GFP), Government Furnished Equipment (GFE), Government Furnished Information (GFI) or other similar Government-provided resources shall be required.

The offeror's Research Data Management Plan is complete, addressing the types of data to be collected or produced, describing how each type of data will be preserved and shared, including plans to provide public access to peer reviewed publications and the underlying research data, or provides justifiable rationale for not doing so.

##### **5.A.1.c. Contribution and Relevance to the IARPA Mission and Program Goal**

The proposed solution meets the letter and intent of the stated program goals and all elements within the proposal exhibit a comprehensive understanding of the problem. The offeror clearly addresses how the proposed effort shall meet and progressively demonstrate the Program goals. The offeror describes how the proposed solution contributes to IARPA's mission to invest in

high-risk/high-payoff research that can provide the U.S. with an overwhelming intelligence advantage

The offeror's proposed intellectual property and data rights are consistent with the Government's need to be able to effectively manage the program and evaluate the technical output and deliverables, communicate program information across Government organizations and support transition and further use and development of the program results to Intelligence Community users and others at an acceptable cost. The proposed approach to intellectual property rights is in the Government's best interest.

**5.A.1.d Relevant Experience and Expertise**

The offeror's capabilities, related experience, facilities, techniques, or unique combination of these, which are integral factors for achieving the proposal's objectives, shall be evaluated, as well as qualifications, capabilities, and experience of the proposed principal investigator, team leader, and key personnel critical in achieving the proposal objectives.

**5.A.1.e Resource Realism**

The proposed resources demonstrates a clear understanding of the project, a perception of the risks and the ability to organize and perform the work. The labor hours and mix are consistent with the technical approach and are realistic for the work proposed. Material, equipment, software, data collection and management, and travel, especially foreign travel, are well justified, reasonable, and required for successful execution of the proposed work.

**5.A.2. Funding Availability Factor**

**5.A.2.a. Budget Constraints**

The Government will seek to maximize the chance of meeting program objectives within program budget constraints. This may involve awarding one, two or multiple contracts. **Note:** If the offeror has submitted the proposal to other federal, state or local agencies or other parties that may fund the proposed effort, it may impact IARPA's decision to fund the effort.

**5.A.2.b. Program Balance**

The Government will consider IARPA's overall mission and program objectives which may include but is not limited to the following: broadening the variety of technical approaches to enhance program outcomes, ability to transition the technology, the priorities of the intelligence community and national security.

**5.B. Method of Evaluation and Selection Process**

IARPA's policy is to ensure impartial, equitable, comprehensive proposal reviews and to select the source (or sources) whose offer meets the Government's technical, policy and programmatic goals. For evaluation purposes, a proposal is the document described in Section 4 of the BAA. Other supporting or background materials submitted with the proposal shall not be considered.

The contract award process for this BAA has two steps. The first step is selection for negotiations and is made on the basis of review of the technical and funding availability

factors (See BAA Section 5.A.). The second step is negotiations and contract award. Contract award is contingent on contracting officer determination of a fair and reasonable cost/price and agreement on terms and conditions.

Selection for negotiation, the first step, will be conducted through a peer or scientific review process led by the Program Manager. This process entails establishing a Scientific Review Panel (SRP) made up of qualified Government personnel who will review and assess each proposal's strengths and weaknesses against the technical evaluation criteria. If necessary, non-Government technical experts with specialized expertise may advise Government panel members and the Program Manager. However, only Government personnel will make selection determinations under this BAA.

Proposals will be reviewed individually and will not be reviewed against each other as they are not submitted in accordance with a common work statement. When SRP reviews are complete, the Program Manager will prepare a recommendation to the IARPA Scientific Review Official (SRO) identifying proposals as selectable, selectable with modification, or not selectable based on consideration of all stated factors (technical and funding availability factors). The SRO will make the final decision as to selectability for negotiations. At this point, offerors will be notified in writing as to whether they have been determined selectable, selectable with modification, or not selectable.

#### **5.C. Negotiation and Contract Award**

After selection and before award, the contracting officer will contact offerors whose proposals were selected or selected with modifications to engage in negotiations. At that time, the contracting officer will also request a full cost proposal, as described in BAA Section 4.B.2. The contracting officer will review the cost proposal using the proposal analysis techniques described in FAR 15.404-1, as appropriate, to determine a fair and reasonable cost. The contracting officer's evaluation will include review of proposed anticipated costs/prices of the offeror and those of associate, participating organizations, to ensure the offeror has fully analyzed the budget requirements, provided sufficient supporting information, has adequate systems for managing the contract (accounting, purchasing), and that data is traceable and reconcilable. The contracting officer will also determine whether the prospective contractor meets the responsibility standards of FAR Section 9.104. Additional information and supporting data may be requested.

If proposed costs submitted are substantially different than the estimates provided in the technical proposal, then a contract may not be awarded.

In addition to the above, the contracting officer will review and negotiate other terms and conditions of the contract. If the parties cannot reach mutually agreeable terms, a contract will not be awarded. Award of a contract is contingent on successful negotiations.

#### **5.D. Proposal Retention**

Proposals shall not be returned upon completion of the source selection process. The original of each proposal received shall be retained at IARPA and all other non-required copies shall be destroyed. A certification of destruction may be requested, provided that the formal request is sent to IARPA via e-mail within 5 days after notification of proposal results.



## **SECTION 6: AWARD ADMINISTRATION INFORMATION**

### **6.A. Award Notices**

As soon as practicable after the evaluation of a proposal is complete, the offeror shall be notified that: (1) its proposal has been selected for negotiations, or, (2) its proposal has not been selected for negotiations.

### **6.B. Administrative and National Policy Requirements**

#### **6.B.1. Proprietary Data**

It is the policy of IARPA to treat all proposals as competitive information, and to disclose their contents only for the purpose of evaluation. All proposals containing proprietary data should have the cover page and each page containing proprietary data clearly marked as containing proprietary data. It is the offeror's responsibility to clearly define to the Government what the offeror considers proprietary data.

#### **6.B.2. Intellectual Property**

**General.** The Government may request additional information from the proposer, as may be necessary, to evaluate the proposer's intellectual property rights assertions. If offerors do not identify any restrictions with respect to a particular deliverable, the Government shall assume in its review of the proposal that there are no restrictions on the Government's use of such deliverables. Further, failure to provide full information may result in a determination that the proposal is not compliant with the solicitation, and the Government reserves the right to reject a proposal if it does not appropriately address all required intellectual property rights issues.

**Intellectual Property Ownership.** Proposers should note that the Government generally does not own the intellectual property in data, including technical data and computer software developed under Government contracts; it acquires the right to use the technical data/computer software. Regardless of the scope of the Government's rights, performers may usually freely use their data for their own commercial purposes (unless restricted by U.S. export control laws or security classification). Therefore, data including technical data and computer software developed under this solicitation will remain the property of the performers, though IARPA seeks the rights to technical data/computer software described in Section 4.B.1.d. For inventions first conceived or actually reduced to practice under a grant, contract, or cooperative agreement for this effort, IARPA will obtain a nonexclusive, nontransferable, irrevocable, paid-up license to practice, or have practiced for or on its behalf, such invention throughout the world; Offeror may elect to retain title as described in the award instrument.

**Indemnification.** Proposers expecting to use, but not to deliver, data or patentable inventions, including commercial open source tools in implementing their approach may be required to indemnify the Government against legal liability arising from such use.

**Technical Data--Withholding of Payment.** If technical data specified to be delivered under a contract awarded under this solicitation is not delivered within the time specified by the contract or is deficient upon delivery (including having restrictive markings not specifically authorized by the

contract), the Contracting Officer is permitted, until such data are accepted by the Government, to withhold payment to the contractor of ten percent (10%) of the total contract price or amount unless a lesser withholding is specified in the contract. Payments may not be withheld nor any other action taken pursuant to this paragraph when the contractor's failure to make timely delivery or to deliver such data without deficiencies arises out of causes beyond its control and without fault or negligence of the contractor. The withholding of any amount or subsequent payment to the contractor shall not be construed as a waiver of any rights accruing to the Government under the contract.

### **6.B.3 Human Use**

No research proposals involving human subjects shall be accepted under this BAA.

### **6.B.4 Animal Use**

No research proposals involving animal subjects shall be accepted under this BAA.

### **6.B.5 Publication Approval**

It is anticipated that research funded under this Program shall be unclassified research that shall not require a pre-publication review. However, performers should note that pre-publication approval of certain information may be required if it is determined that its release may result in the disclosure of sensitive intelligence information. A courtesy soft copy of any work submitted for publication shall be provided to the IARPA Program Manager and the Contracting Officer Representative (COR) a minimum of 5 days prior to release in any forum.

### **6.B.6 Export Control**

(1) The offeror shall comply with all U.S. export control laws and regulations, including the International Traffic in Arms Regulations (ITAR), 22 C.F.R. Parts 120 through 130, and the Export Administration Regulations (EAR), 15 C.F.R. Parts 730 through 799, in the performance of this contract. In the absence of available license exemptions/exceptions, the offeror shall be responsible for obtaining the appropriate licenses or other approvals, if required, for exports of (including deemed exports) hardware, technical data, and software, or for the provision of technical assistance.

(2) The offeror shall be responsible for obtaining export licenses, if required, before utilizing non-U.S. persons (as defined in the ITAR and EAR, as applicable) in the performance of this contract, including instances where the work is to be performed on-site at any Government installation (whether in or outside the United States), where the foreign person shall have access to export-controlled technologies, including technical data or software.

(3) The offeror shall be responsible for all regulatory record keeping requirements associated with the use of licenses and license exemptions/exceptions.

(4) The offeror shall appropriately mark all contract deliverables controlled by ITAR and/or EAR.

(5) The offeror shall be responsible for ensuring that the provisions of this section apply to its sub-contractors.

(6) The offeror may be required to certify knowledge of and intended adherence to these requirements in the representations and certifications of the contract.

#### **6.B.7. Subcontracting**

It is the policy of the Government to enable small business and small disadvantaged business concerns to be considered fairly as sub-contractors to contractors performing work or rendering services as prime contractors or sub-contractors under Government contracts and to assure that prime contractors and sub-contractors carry out this policy. Each offeror that is selected for negotiation for award and is expected to be awarded a contract which exceeds the simplified acquisition threshold may be asked to submit a sub-contracting plan before award in accordance with FAR 19.702(a) (1). The plan format is outlined in FAR 19.704.

Offerors shall declare teaming relationships in their Technical and Cost proposals and shall specify the type of teaming arrangement in place, including any exclusive teaming arrangements. IARPA neither promotes nor discourages the establishment of exclusive teaming agreements within offeror teams. Individuals or organizations associated with multiple teams shall take care not to over-commit those resources being applied.

#### **6.B.8. Reporting**

Fiscal and management responsibility are important to the Program. Although the number and types of reports shall be specified in the award document, all performers shall, at a minimum, provide the Contracting Office, Contracting Officer Representative and the Program Manager with monthly technical reports and monthly financial reports. The reports shall be prepared and submitted in accordance with the procedures contained in the award document and mutually agreed upon before award. Technical reports shall describe technical highlights and accomplishments, priorities and plans, issues and concerns, evaluation results, and future plans. Financial reports shall present an on-going financial profile of the project, including total project funding, funds invoiced, funds received, funds expended during the preceding month, and planned expenditures over the remaining period. Additional reports and briefing material may also be required, as appropriate, to document progress in accomplishing program metrics.

The performer shall prepare and provide a research report of their work annually by month 12. The reports shall be delivered to the Contracting Officer, Contracting Officer Representative and the Program Manager. The reports shall include:

- Problem definition
- Findings and approach
- System design
- Possible generalization(s)
- Information on performance limitations and potential mitigation
- Anticipated path ahead
- Final identification of all commercial, third-party, or proprietary hardware, software, or technical data integrated into any deliverable and all applicable use restrictions.
- Any research products, including publications, data, and software, resulting from the project during the reporting period. The final report shall list in-progress scientific manuscripts and other research products.



**6.B.9. System for Award Management (SAM)**

Selected offerors not already registered in the Systems for Award Management (SAM) may be required to register in SAM prior to any award under this BAA. Information on SAM registration is available at <http://www.sam.gov>.

**6.B.10. Representations and Certifications**

Selected offerors may be required to complete electronic representations and certifications at <http://www.sam.gov> and may also be required to complete additional representations and certifications prior to award.

**6.B.11. Lawful Use and Privacy Protection Measures**

All data gathered by the performer shall be obtained in accordance with U.S. laws and in compliance with the End User License Agreement, Copyright Laws, Terms of Service, and laws and policies regarding privacy protection of U.S. Persons. Before using such data, the performer shall provide proof that the data was acquired in accordance with U.S. laws and regulations.

**6.B.12. Public Access to Results**

IARPA is committed to making the results of this research available and maximally useful to the public, industry, government, and the scientific community, in accordance with the policy set forth in the White House Office of Science and Technology Policy’s memorandum “Increasing Access to the Results of Federally Funded Scientific Research,” dated February 22, 2013, consistent with all other applicable law and policy; agency mission; resource constraints; and U.S. national, homeland, and economic security.

([https://www.obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/ostp\\_public\\_access\\_memo\\_2013.pdf](https://www.obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/ostp_public_access_memo_2013.pdf))

Upon acceptance for publication, the author’s final peer-reviewed manuscript(s) or conference paper(s) must be submitted to the IARPA-designated repository for public access, in accordance with the instructions on IARPA’s website at [www.iarpa.gov](http://www.iarpa.gov). The Government will make the Publication available to the public through the repository at no charge, following a one-year embargo to preserve the rights of the publisher. The author must inform the publisher of rights that will be retained by the author and IARPA by including in the publishing/transfer of copyright agreement a provision substantially as follows:

“Journal acknowledges that Author retains the right to provide a copy of the final peer-reviewed manuscript (“Work”) to the Federal agency funding the research on which the Work is based upon acceptance for Journal publication, for public archiving as soon as possible but no later than 12 months after publication by Journal. Journal further acknowledges that the Federal Government, having funded the research upon which the Work is based, has certain irrevocable and non-exclusive contractual rights in the Work, which are not affected or altered in any way by this Agreement.”

Additionally, awardee must deposit the data underlying the results and findings in the publication in a suitable public repository, in accordance with the project’s Data Management Plan. If the metadata describing the underlying or supporting research data is not included in the Publication,

the awardee must provide the metadata to the IARPA-designated public access repository, in accordance with the instructions on IARPA's website at [www.iarpa.gov](http://www.iarpa.gov).

IARPA will accept a final published article in lieu of a final peer-reviewed manuscript, provided the author has the right to provide the article and authorize IARPA to release the article publicly. Data produced under the program, reports to IARPA, and program-related publications should be consistent with the Transparency and Openness Promotion Guidelines of the Center for Open Science, including preregistration of studies and analysis plans. (<https://cos.io/our-services/top-guidelines/>)

To the extent possible, all reports to IARPA and all program-related publications should be consistent with statistical best practices described in (Psychological Science (2014) <http://pss.sagepub.com/content/25/1/3>). For example, wherever appropriate, effect sizes and confidence intervals (or the Bayesian equivalents) should be reported, and the data and methodology must be presented so that it is easily used for meta-analysis and independent re-analysis of the data. All offerors must describe plans to ensure that the above requirements are satisfied.

#### **6.B.13. Cloud Compatibility**

Software deliverables must be deployable to cloud platforms for testing and must be approvable for production use in the cloud. Technical approaches should generally avoid the following: requiring high-performance, special-purpose, or excessive quantities of virtual hardware not readily available in the cloud; requiring an obscure operating system, middleware, or plug-in code not readily available for use in the cloud or on the desktops used to access the cloud; leveraging inherently risky protocols, e.g., Telnet, or software packages, e.g., FOCI-relevant; or including custom code that is not inspectable by Information System Security professionals.

**APPENDIX A: Templates for Volume 1: Technical Proposal**

### Cover Sheet for Volume 1: Technical Proposal

(1) BAA Number	<b>IARPA-BAA-18-03</b>
(2) Technical Area	
(3) Lead Organization Submitting Proposal	
(4) Type of Business, Selected Among the Following Categories: “Large Business”, “Small Disadvantaged Business”, “Other Small Business”, “HBCU”, “MI”, “Other Educational”, or “Other Nonprofit”	
(5) Contractor’s Reference Number (if any)	
(6) Other Team Members (if applicable) and Type of Business for Each	
(7) Proposal Title	
(8) Technical Point of Contact to Include: Title, First Name, Last Name, Street Address, City, State, Zip Code, Telephone, Fax (if available), Electronic Mail (if available)	
(9) Administrative Point of Contact to Include: Title, First Name, Last Name, Street Address, City, State, Zip Code, Telephone, Fax (if available), Electronic Mail (if available)	
(10) Volume 1 no more than the specified page limit	Yes/No
(11) Restrictions on Intellectual property rights details provided in Appendix A format?	Yes/No
(12) Research Data Management Plan	Yes/No
(13) OCI Waiver Determination, Notification or Certification [see Section 3 of the BAA] Included?	Yes/No
(13a) If No, is written certification included (Appendix A)?	Yes/No
(14) Are one or more U.S. Academic Institutions part of your team?	Yes/No
(14a) If Yes, are you including an Academic Institution Acknowledgement Statement with your proposal for each U.S. Academic Organization that is part of your team (Appendix A)?	Yes/No
(15) Total Funds Requested from IARPA and the Amount of Cost Share (if any)	\$
(16) Date Proposal as Submitted.	

**Academic Institution Acknowledgement Letter**

**-- Please Place on Official Letterhead --**

<Insert date>

To: Contracting Officer  
ODNI/IARPA  
Office of the Director of National Intelligence  
Washington, D.C. 20511

Subject: Academic Institution Acknowledgement Letter

Reference: Executive Order 12333, As Amended, Para 2.7

This letter is to acknowledge that the undersigned is the responsible official of <insert name of the academic institution>, authorized to approve the contractual relationship in support of the Office of the Director of National Intelligence’s Intelligence Advanced Research Projects Activity and this academic institution.

The undersigned further acknowledges that he/she is aware of the Intelligence Advanced Research Projects Activity’s proposed contractual relationship with <insert name of institution> through IARPA-BAA-18-03 and is hereby approved by the undersigned official, serving as the president, vice-president, chancellor, vice-chancellor, or provost of the institution.

---

<Name> Date  
<Position>

## Intellectual Property Rights

[Please provide here your good faith representation of ownership or possession of appropriate licensing rights to all intellectual property that shall be utilized under the proposal.]

### Patents

PATENTS				
Patent number (or application number)	Patent name	Inventor name(s)	Patent owner(s)	Incorporation into deliverable
(LIST)	(LIST)	(LIST)	(LIST)	(Yes/No; applicable deliverable)

- (1) Intended use of the patented invention(s) listed above in the conduct of the proposed research:
- (2) Description of license rights to make, use, offer to sell, or sell, if applicable, that are being offered to the Government in patented inventions listed above:
- (3) How the offered rights will permit the Government to reach its program goals (including transition) with the rights offered:
- (4) Cost to the Government to acquire additional or alternative rights, if applicable:
- (5) Alternatives, if any, that would permit IARPA to achieve program goals:

### Data (Including Technical Data and Computer Software)

NONCOMMERCIAL ITEMS			
Technical Data, Computer Software To be Furnished With Restrictions	Basis for Assertion	Asserted Rights Category	Name of Person Asserting Restrictions
(LIST)	(LIST)	(LIST)	(LIST)

COMMERCIAL ITEMS			
Technical Data, Computer Software To be Furnished With Restrictions	Basis for Assertion	Asserted Rights Category	Name of Person Asserting Restrictions
(LIST)	(LIST)	(LIST)	(LIST)

- (1) Intended use of the data, including, technical data and computer software, listed above in the conduct of the proposed research:**
- (2) Description of Asserted Rights Categories, specifying restrictions on Government's ability to use, modify, reproduce, release, perform, display, or disclose technical data, computer software, and deliverables incorporating technical data and computer software listed above:**
- (3) How the offered rights will permit the Government to reach its program goals (including transition) with the rights offered:**
- (4) Cost to the Government to acquire additional or alternative rights, if applicable:**
- (5) Alternatives, if any, that would permit IARPA to achieve program goals:**

## Organizational Conflicts of Interest Certification Letter

(Month DD, YYYY)

Office of the Director of National Intelligence  
Intelligence Advanced Research Projects Activity (IARPA)  
MIST Program  
ATTN: David Markowitz  
Washington, DC 20511

Subject: OCI Certification

Reference: <Insert Program Name>, IARPA-BAA-18-03, (Insert assigned proposal ID#, if received)

Dear David Markowitz,

In accordance with IARPA Broad Agency Announcement IARPA-BAA-18-03, *Organizational Conflicts of Interest (OCI)*, and on behalf of (offeror name) I certify that neither (offeror name) nor any of our subcontractor teammates has as a potential conflict of interest, real or perceived, as it pertains to the MIST program. Please note the following subcontractors and proposed involvement, as currently planned:

[Please list all proposed contractors by name with a brief description of their proposed involvement, as currently planned.]

If you have any questions, or need any additional information, please contact (Insert name of contact) at (Insert phone number) or (Insert e-mail address).

Sincerely,

(Insert organization name) (Shall be signed by an official that has the authority to bind the organization)

(Insert signature)

(Insert name of signatory)  
(Insert title of signatory)



## Three Chart Summary of the Proposal

### Chart 1: Overview

- Self-contained, intuitive description of the technical approach and performance
  - Avoid acronyms! Especially those that are contractor specific.

### Chart 2: Key Innovations

- Innovation 1
- Innovation 2
- Innovation 3

Graphics / Data

### Chart 3: Expected Impact

- Deliverable 1; Performance and Impact
- Deliverable 2; Performance and Impact
- Unique aspects of the proposal

## Research Data Management Plan (RDMP)

**The offeror must address each of the elements noted below in red text. Upon completion of the Plan, no red text should remain.**

The RDMP shall comply with the requirements stated in Section 4 of the BAA. In doing so, it will support the objectives of the ODNI Public Access Plan at <https://www.iarpa.gov/index.php/working-with-iarpa/public-access-to-iarpa-research>

1. **Sponsoring IARPA Program** (required):
2. **Offeror** (i.e., lead organization responding to BAA) (required):
3. **Offeror point of contact** (required):  
*The point of contact is the proposed principal investigator (PI) or his/her Designee.*
  - a. **Name and Position:**
  - b. **Organization:**
  - c. **Email:**
  - d. **Phone:**
4. **Research data types** (required):  
*Provide a brief, high-level description of the types of data to be collected or produced in the course of the project.*
5. **Standards for research data and metadata content and format** (required):  
*Use standards reflecting the best practices of the relevant scientific discipline and research community whenever possible.*
6. **Plans for making the research data that underlie the results in peer-reviewed journal articles and conference papers digitally accessible to the public** at the time of publication/conference or within a reasonable time thereafter (required):  
*The requirement could be met by including the data as supplementary information to a peer reviewed journal article or conference paper or by depositing the data in suitable repositories available to the public.*
  - a. **Anticipated method(s) of making research data publicly accessible:**  
 Provide dataset(s) to publisher as supplementary information (if publishers allow public access)  
 Deposit dataset(s) in Data Repository  
 Other (specify) \_\_\_\_\_
  - b. **Proposed research data repository or repositories** (for dataset(s) not provided as supplementary information):  
*Suitable repositories could be discipline-specific repositories, general purpose research data repositories, or institutional repositories, as long as they are publicly accessible.*
  - c. **Retention period, at least three years after publication of associated research results:**  
*State the minimum length of time the data will remain publicly accessible.*
  - d. **Submittal of metadata to IARPA:**  
*Offerors are required to make datasets underlying the results published in peer-reviewed journal or conferences digitally accessible to the public to the extent feasible. Here, the offeror should state a commitment to submit metadata on such datasets to IARPA in a timely manner. Note: This does not supersede any requirements for deliverable data, as the award document may include metadata as a deliverable item.*
7. **Policies and provisions for sharing and preservation** (as applicable):
  - a. Policies and provisions for appropriate protection of privacy, confidentiality, security, and intellectual property:
  - b. Descriptions of tools, including software, which may be needed to access and interpret the data:

c. Policies and provisions for re-use, re-distribution, and production of derivatives:

8. **Justification for not sharing and/or preserving data underlying the results of peer-reviewed publications** (as applicable):

*If, for legitimate reasons, the data cannot be shared and preserved, the plan must include a justification detailing such reasons. Potential reasons may include privacy, confidentiality, security, intellectual property rights considerations; size of data sets; cost of sharing and preservation; time required to prepare the dataset(s) for sharing and preservation.*

## **APPENDIX B: Templates for Volume 2: Cost Proposal**

## Cover Sheet for Volume 2: Cost Proposal

(1) BAA Number	<b>IARPA-BAA-18-03</b>
(2) Technical Area	
(3) Lead organization submitting proposal	
(4) Type of Business, Selected Among the Following Categories: “Large Business”, “Small Disadvantaged Business”, “Other Small Business”, “HBCU”, “MI”, “Other Educational”, or “Other Nonprofit”	
(5) Contractor’s Reference Number (if any)	
(6) Other Team Members (if applicable) and Type of Business for Each	
(7) Proposal Title	
(8) Technical Point of Contact to Include: Title, First Name, Last Name, Street Address, City, State, Zip Code, Telephone, Fax (if available), Electronic Mail (if available)	
(9) Administrative Point of Contact to Include: Title, First Name, Last Name, Street Address, City, State, Zip Code, Telephone, Fax (if available), Electronic Mail (if available)	
(10) Contract type/award Instrument Requested: specify	
(11) Place(s) and Period(s) of Performance	
(12) Total Proposed Cost Separated by Basic Award and Option(s) (if any)	
(13) Name, Address, Telephone Number of the Offeror’s Defense Contract Management Agency (DCMA) Administration Office or Equivalent Cognizant Contract Administration Entity, if Known	
(14) Name, Address, Telephone Number of the Offeror’s Defense Contract Audit Agency (DCAA) Audit Office or Equivalent Cognizant Contract Audit Entity, if Known	
(15) Date Proposal was Prepared	
(16) DUNS Number	
(17) TIN Number	
(18) CAGE Code	
(19) Proposal Validity Period [minimum of 180 days]	
(20) Cost Summaries Provided (Appendix B)	
(21) Size of Business in accordance with NAICS Code 541712	

**Prime Contractor/Subcontractor Cost Element Sheet for Volume 2: Cost Proposal**

<b>Prime Contractor/Subcontractor Cost Element Sheet for Volume 2: Cost Proposal</b>					
<b>Complete a Cost Element Sheet for the Base Period and each Option Period</b>					
<b>COST ELEMENT</b>	<b>BASE</b>	<b>RATE</b>	<b>AMT</b>		
<b>DIRECT LABOR (List each labor category separately. Identify Key Personnel by name.)</b>	# of Hours	\$	\$		
<b>TOTAL DIRECT LABOR</b>			\$		
<b>FRINGE BENEFITS</b>	\$	%	\$		
<b>TOTAL LABOR OVERHEAD</b>	\$	%	\$		
<b>SUBCONTRACTORS, IOTS, CONSULTANTS (List separately. See below table.)</b>			\$		
<b>MATERIALS &amp; EQUIPMENT (List each material and equipment item separately.)</b>	Quantity	\$ unit price	\$		
<b>SOFTWARE &amp; INTELLECTUAL Property (List separately. See table below.)</b>	\$	\$	\$		
<b>TOTAL MATERIALS &amp; EQUIPMENT</b>			\$		
<b>MATERIAL OVERHEAD</b>	\$	%	\$		
<b>TRAVEL (List each trip separately.)</b>	# of travelers	\$ price per traveler	\$		
<b>TOTAL TRAVEL</b>			\$		
<b>OTHER DIRECT COSTS (List each item separately.)</b>	Quantity	\$ unit price	\$		
<b>TOTAL ODCs</b>			\$		
<b>G&amp;A</b>	\$	%	\$		
<b>SUBTOTAL COSTS</b>			\$		
<b>COST OF MONEY</b>	\$	%	\$		
<b>TOTAL COST</b>			\$		
<b>PROFIT/FEE</b>	\$	%	\$		
<b>TOTAL PRICE/COST</b>			\$		
<b>GOVERNMENT SHARE, IF APPLICABLE</b>			\$		
<b>RECIPIENT SHARE, IF APPLICABLE</b>			\$		
<b>SUBCONTRACTORS/INTERORGANIZATIONAL TRANSFERS (IOT) &amp; CONSULTANTS PRICE SUMMARY</b>					
<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>
<b>SUB-CONTRAC-TOR IOT &amp; CONSULTANT NAME</b>	<b>SOW TASKS PERFORMED*</b>	<b>TYPE OF AWARD</b>	<b>SUB-CONTRAC-TOR, IOT &amp; CONSULTANT QUOTED PRICE</b>	<b>COST PROPOSED BY PRIME FOR SUBCONTRAC-TOR, IOT &amp; CONSULTANT</b>	<b>DIFFERENCE (Column D - Column E) IF APPLICABLE</b>
<b>TOTALS</b>					
*Identify Statement of Work, Milestone or Work Breakdown Structure paragraph, or provide a narrative explanation as an addendum to this Table that describes the effort to be performed.					

<b>Software and Intellectual Property Costs</b>		
<b>Item</b>	<b>Cost</b>	<b>Date of Expiration</b>
(List)		

NOTE: Educational institutions and non-profit organizations as defined in FAR part 31.3 and 31.7, respectively, at the prime and subcontractor level may deviate from the cost template in Appendix B when estimating the direct labor portion of the proposal to allow for OMB guided accounting methods (2 CFR 220) that are used by their institutions. The methodology shall be clear and provide sufficient detail to substantiate proposed labor costs. For example, each labor category shall be listed separately; identify key personnel, and provide hours/rates or salaries and percentage of time allocated to the project.