

IARPA

BROAD AGENCY ANNOUNCEMENT

IARPA-BAA-16-03



I A R P A  
BE THE FUTURE

SUPERTOOLS

IARPA-BAA-16-03

**Release Date: June 7, 2016**

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## OVERVIEW INFORMATION

This publication constitutes a Broad Agency Announcement (BAA) and sets forth research of interest in the area of computer aided design tools for superconducting electronics. 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** – SuperTools
- **Announcement Type** – Initial
- **Funding Opportunity Number** – IARPA-BAA-16-03
- **Catalog of Federal Domestic Assistance Numbers (CFDA)** – Not applicable
- **Dates** -
  - Posting Date: June 7, 2016
  - Proposal Due Date for Initial Round of Selections: 5:00 pm Eastern Time, **August 1, 2016**
  - BAA Closing Date: June 8, 2017
- **Anticipated individual awards** – Multiple awards anticipated
- **Types of instruments that may be awarded** – Procurement contracts, grants, cooperative agreements, OTAs are anticipated.
- **Agency Points of contact**  
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- **Program Manager** – Mark Heiligman
- **Program website** – <http://www.iarpa.gov/index.php/research-programs/SuperTools>
- **BAA Summary** – SuperTools seeks to develop a superconducting circuit design flow with a comprehensive set of Electronic Design Automation (EDA) and Technology Computer Aided Design (TCAD) tools for Very-Large-Scale Integration (VLSI) design of Superconducting Electronics (SCE).
- **Questions** – Submit all questions on administrative, technical, or contractual issues by email to [dni-iarpa-BAA-16-03@iarpa.gov](mailto:dni-iarpa-BAA-16-03@iarpa.gov). If e-mail is not available, fax questions to (301) 851-7673, Attention: IARPA-BAA-16-03. All requests must include the full name, e-mail address (if available), and phone number of a point of contact for the requested information. 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/SuperTools/questions.html>). No answers will go directly to the requestor. IARPA will accept questions about the BAA until **June 30, 2016**.

## **FULL TEXT OF ANNOUNCEMENT**

### **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 will appear first on the FedBizOpps website, <http://www.fedbizopps.gov/>, and then a link to the FedBizOpps BAA will be placed on the IARPA website at <http://www.iarpa.gov/>.

This BAA is issued in accordance with the Federal Acquisition Regulation (FAR) section 6.102(d)(2), which provides for the competitive selection of basic and applied research and that part of development not related to the development of a specific system or hardware procurement. Proposals submitted in response to this BAA that are selected for award are to be in full compliance with the Provisions of Public Law 98-369, “The Competition in Contracting Act of 1984 and subsequent amendments.” The following information is provided for those wishing to respond to this Program BAA.

IARPA is seeking innovative solutions for the SuperTools Program. SuperTools intends to develop Electronic Design Automation (EDA) and Technology Computer-Aided Design (TCAD) tools to enable designs of Very-Large-Scale Integration (VLSI) superconducting circuits. The Program is envisioned to begin in January 2017 and end by December 2021.

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

The Intelligence Community (IC) is well known to be a major consumer of high performance computing, but is increasingly finding itself frustrated by limitations in overall power consumption and clock speed. The amazing successes of semiconductor technology embodied in Moore’s Law give the impression that computing power might continue on its exponential growth curve indefinitely. However there are limits of miniaturization and switching speeds imposed by physics as applied to semiconductors, and these limits are now being felt. Clock speeds are starting to stagnate, and device features are now only a few tens of atoms in size, and so the search for alternative high speed and low power technologies must move on to more exotic materials and design concepts.

Superconducting Electronics (SCE) offers a promising alternative to complementary metal-oxide semiconductor (CMOS) technology. However, as with many disruptive technologies, in order to displace the reigning champion, there is a lot of ground to make up. New pulse-based logic families operating at very low power levels are starting to be developed, but if they are to compete with semiconductors, they will have to show performance advantages for highly complex circuits. The semiconductor industry has had the advantage of decades of development of ever more sophisticated design tools that keep creating ever more sophisticated circuits.

The state of SCE design tools lags far behind that of CMOS design tools. Fortunately, there are many lessons learned in the CMOS world that can be directly applied to the SCE world. However there are also several features of SCE that have no direct analog and any suite of SCE design tools will have to accommodate those differences. It is to be expected that some of the current CMOS design tools can be applied with only small changes to the SCE design problem. Other design tools may require major changes or completely innovative approaches.

The overarching goal of the SuperTools program is the creation of a full suite of design tools that will facilitate the design of an SCE central processing unit (CPU) as well as other complex SCE circuits. The art of digital design for SCE has seen very simple handcrafted circuits run with clock speeds in excess of 500 GHz. However, even modestly sized handcrafted circuits sometimes fail to work at all. Whether very fast and low power complex SCE circuits can be designed with suitable modified Computer Aided Design (CAD) tools is the challenge that the SuperTools program must address.

IARPA's SuperTools program is closely coordinated with other IARPA programs in SCE, and in particular with the C3 program. It is expected that software developed for the SuperTools program will be made available to the C3 program for use in that program's Logic Design thrust.

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

The goal of the SuperTools program is to enable very large scale integration (VLSI) design of SCE as a step toward the development of the energy-efficient, scalable high performance computers. The end goal of the SuperTools program is to enable the design of 64-bit Reduced Instruction Set Computer (RISC) microprocessors or circuits of similar complexity.

The SuperTools program seeks to develop a comprehensive set of EDA tools to

- Enable VLSI design of SCE from a behavioral modeling or register-transfer level (RTL) description to mask tooling data,
- Develop physics-based TCAD tools to enable device and process simulations and device parameter extractions for better design-to-hardware fidelity, and
- Establish open, interoperable (cell) library formats to reduce barriers and speed up technology development with a standardized protocol for collaboration between foundry and designers.

The SuperTools program consists of four technical focus areas, and will be executed in three phases over five years. Offerors must propose to all four technical focus areas. Due to the breadth of these areas, it is conceivable that multi-faceted software design teams from multiple institutions may be required.

## 1.A.2. Technical Approach and Focus Areas

The SuperTools program consists of four primary technical focus areas, as illustrated in Figure 1 – SuperTools Technical Focus Areas.

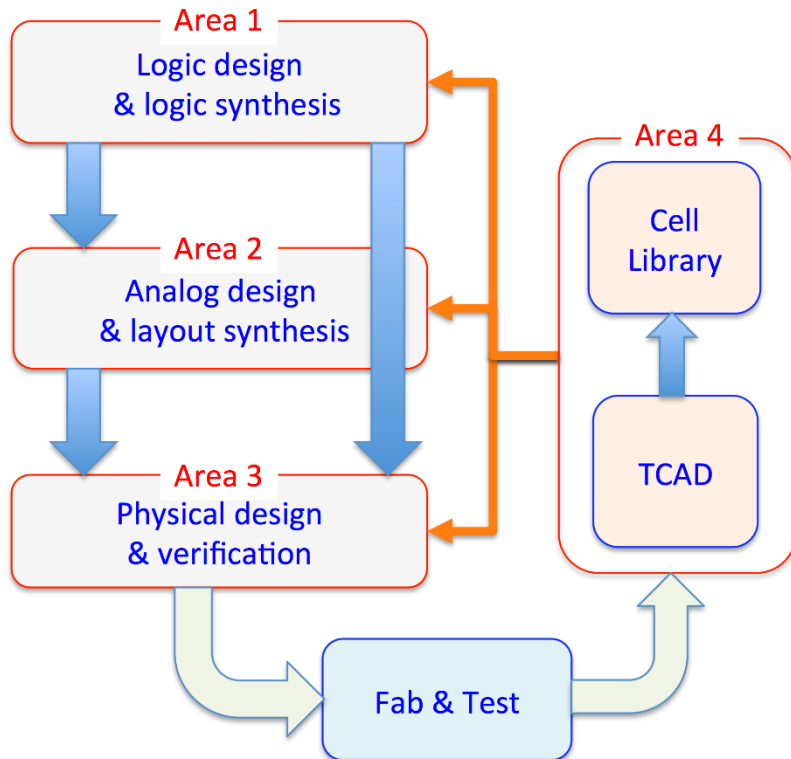


Figure 1 - SuperTools Technical Focus Areas

Each technical focus area addresses either a major step of the EDA flow, or the back-end support. The back-end support comprises the development of physics-based Technology Computer-Aided Design (TCAD) tools and SuperTools Library standards. A SuperTools Cell Library comprises primitive circuit cells, process data, and models found similarly in the CMOS-based Standard Cell Libraries and Process Design Kits (PDKs).

The SuperTools program seeks to concurrently develop all four primary technical focus areas and incorporate SCE-specific design consideration and features. The goal is to develop automated design tools with full capabilities for digital, analog, and mixed circuits. The objectives of developing physics-based simulation and extraction tools in the TCAD focus area are to facilitate library development and to advance design and manufacturing quality. The SuperTools program also aims to develop open and interoperable standard formats of intermediate data between major steps of the design flow.

Each performer team should propose a complete set of design tools, and associated design flows with generic cell libraries of individual proposed logic families. Performers are encouraged to team in order to develop the full design capability. The technical focus areas of the EDA flow illustrated here are merely examples, and alternative approaches capable of VLSI digital, analog, and mixed circuit designs in SCE are also encouraged. Performers may propose a new design flow that covers the RTL-to-GDSII flow, and supports digital-analog mixed design for superconducting electronics.

### **1.A.2.1. SCE-specific Design Considerations and Features**

The proposed efforts shall incorporate SCE-specific design considerations and features in the tool development.

The following are SCE-specific design considerations to be included in tool development:

- Existence of multiple single flux quantum (SFQ) logic families, e.g., rapid single flux quantum (RSFQ), efficient rapid single flux quantum (eRSFQ), efficient single flux quantum (eSFQ), reciprocal quantum logic (RQL), adiabatic quantum flux parametron (AQFP), etc., all of which are pulse-based logics.
- Timing/clocking schemes and distributions.
- Biasing scheme and power distribution: DC- and AC-biased logics.
- Limited fan-out of the gates and the need for splitters.
- Requirement of Josephson junctions for interconnects such as Josephson transmission lines (JTLs), passive transmission lines (PTLs), cross-over cells, etc.
- Non-linearity of Josephson junctions with current and phase dependence in compact models (Berkeley Short-channel IGFET Model (BSIM)-like single flux quantum (SFQ) or Josephson junction models).
- Inherent pipelined architecture for single flux quantum (SFQ) gates and memory elements.
- Destructive state read-out operations.
- Different suite of preferred logic primitives in SCE- than CMOS-based design.
- Parasitic magnetic coupling such as mutual inductance between elements.
- Flux trapping prevention.
- Potential bias current redistribution between cells.

Offerors may also include additional design considerations suitable for the design target.

In terms of features, the targeted tools are required to

- Support multiple families of single flux quantum (SFQ) digital logics including DC- and AC-biased logic constructs, and synchronous, asynchronous, and mixed logic constructs.



- Allow circuit design with multiple timing/clocking schemes, e.g., synchronous, asynchronous, and mixed architecture.
- Support design optimization based on metrics such as circuit area, power, energy per operation, number of gates, or speed.
- Accommodate circuit design with clock speeds of 100 GHz or greater.
- Be compatible with an existing CMOS tool chain for hybrid integration.
- Support common library formats with open and inter-operable interfaces for tools developed by different teams such that foundries only need to supply one standardized set to circuit designers without potentially lossy data conversion or scripting.

There will be several technical exchange meetings to define SuperTools Library formats and other interface protocols. Performers and T&E teams from related programs will also be invited to provide suggestions and feedbacks.

### **1.A.2.2. Logic Design Focus Area**

The goal of the logic design focus area is to enable design creation of a schematics or gate-level netlist from a high-level behavioral model or RTL description. The targeted capabilities will include simulation, synthesis, and verification for both high-level and RTL to allow automated design processes for digital circuits. Depending on design approaches and maturity of the technologies, the output of logic design will then be handed off to the analog design or physical design focus area.

Examples of major tasks in the logic design focus area are

- Development of simulation and verification tools at the RTL in hardware description languages (HDL),
- Development of automated logic synthesis and post-synthesis equivalence checking tools,
- Development of simulation and verification tools at the high-level or behavioral level, and
- Development of automated high-level (behavioral) synthesis and functional verification tools.

### **1.A.2.3. Analog Design Focus Area**

The goal of the analog design focus area is to develop tools to enable analog and mixed circuit design. In a modern CMOS design flow, digital circuit design typically skips schematic-level simulation and verification. These steps should not be skipped in the SuperTools program if the proposed design methodology would not support detailed functional checks in the logic design focus area.

Due to the current status of SCE development, the SuperTools program envisions analog design tool development to allow further design validation as an intermediate step. Furthermore, tools developed in this focus area are required to enable library cell and large block development, functional checks of synthesized logic circuits, and post-layout simulations.

The examples of major tasks in the analog design focus area are

- Development of schematic editor or capture tool for design creation.
- Development of SPICE (Simulation Program with Integrated Circuit Emphasis)-like tools for simulation and verification of analog electronic circuit designs at the circuit schematic level.
- Development of interactive or automated layout synthesis capabilities for analog and mixed circuit design, and for library cell development.

#### **1.A.2.4. Physical Design Focus Area**

The goal of the physical design focus area is to complete the design process from logic or analog design to mask sign-off. The major tasks are to automate transformations from a schematics or gate-level netlist to physical layout for circuit fabrication. The tasks also include extracting parameters from the layout, and verification to ensure design fidelity by matching against design and post-layout simulations. A further objective of the focus area is to support metric-driven or application-specific optimization in the design.

#### **1.A.2.5. TCAD and SuperTools Library Focus Area**

This focus area seeks to develop physics-based tools and protocols to enable the development of SuperTools Libraries, which include SCE-specific process design kits (PDKs) and standard cell libraries. Further goals are to enable process control and optimization, and to improve both design and manufacturing robustness from inherent process-induced variations.

The development of Technology Computer-Aided Design (TCAD) tools may leverage existing open-source or commercial-off-the-shelf CMOS TCAD tools for SCE applications. The TCAD focus area also includes the development of compact models for key devices and circuits, and parameter extraction tools. The objective is to develop missing capabilities that address SCE-specific device dynamics and process flows. For the purpose of tool demonstration, the model process flow will initially target existing processes of a government-sponsored foundry, but process simulation tools should be agnostic to specific foundries. Initially the niobium-based SCE technology with aluminum oxide-based Josephson junctions will be used as a pilot for device and circuit model calibrations. However, the applicability of proposed tools shall not be limited to only this superconducting material system. The Government will provide superconducting device foundry parameters and other relevant information to the SuperTools program performers in coordination with the government Test and Evaluation (T&E) teams for device and circuit model calibrations.

The SuperTools program also seeks to establish standards for an open and interoperable SuperTools Library, which includes SCE-specific PDKs and Standard Cell Libraries. The principal goal is the creation of unified protocols between foundries, circuit designers, and EDA tool vendors to facilitate the SCE design flow, and to avoid developing a specific library for a specific foundry process. Offerors are required to construct at least a generic SuperTools Library for each proposed logic family to facilitate the demonstration of the proposed design flow and T&E activities.

Initial device fabrication and measurement by the government T&E teams will be limited to key elements for calibration of device models during Phase II and/or Phase III. Subject to availability of advanced foundry capabilities, the process will be expanded to include primitive cells and test circuits.

## **1.B. Program Phases, Milestones, and Metrics**

The program is anticipated to be divided into three phases. Phase I will last for a period of 24 months. Phase(s) I, II, and III are solicited under this BAA. Phases II and III are anticipated to be approximately 24 months and 12 months duration, respectively. The duration of phases are fixed. Offerors may consider performing tasks listed in later phases in earlier phases however, Offerors must complete at a minimum the tasks listed in each phase below. The Offeror will provide an explanation of the basis for their proposed sequences listed in the phases.

### **1.B.1. Program Phases**

The SuperTools program consists of three phases with the following design targets:

- Phase I: support design of circuits with more than 10,000 gates or 100,000 Josephson junctions.
- Phase II: support design of circuits with more than 100,000 gates or 1 million Josephson junctions.
- Phase III: support design of circuits with more than 1 million gates or 10 million Josephson junctions.

#### **1.B.1.1. Phase I - Initial Tool Development (Month 1-24)**

One of goals in Phase I is to develop a preliminary design flow of VLSI SCE circuits from RTL to GDSII. One approach could be to extend existing CMOS-based tools and to develop missing tools specific to the SCE. Other approaches to achieve the Phase I goals and capabilities will also be considered.

Concurrently, the program will develop specifications of an open and interoperable SuperTools Library (STL), which includes SCE-specific Process Design Kits (PDKs) and Standard Cell Libraries, so as to facilitate the SCE circuit design flow.

To support the development of SuperTools Library and the SCE circuit design flow, the program will undertake the development of physics-based Technology Computer-Aided Design (TCAD) device and process simulation tools, and compact models for circuits and devices. The preliminary approach of TCAD tool development is to leverage existing open-source or commercial off-the-shelf TCAD tools for SCE applications. The focus will be to develop missing capabilities to address SCE-specific device dynamics and process flow that are universal to foundries. For the purpose of tool demonstration, the model process flows will initially target existing processes at a government sponsored foundry, but proposed process simulation tools should be agnostic to specific foundries.

During Phase I, the tool development and generic SuperTools Library construction will mainly rely on existing data from related government programs or from the public domain while scoping out the fabrication and test requirements of better model-to-hardware correlations to be implemented in subsequent program phases.

By the end of Phase I, the program seeks to achieve the SCE circuit design capability target of more than 10,000 gates or 100,000 Josephson junctions suitable for the complexity level of 32-bit RISC-type microprocessors.

In Phase I, proposed efforts must

- Extend or develop Hardware Description Language (HDL) simulators with timing analysis and functional verification capabilities to handle SCE-specific features of logic elements.
- Develop automated logic synthesis and verification tools [subject to timing and/or biasing constraints] for synchronous and asynchronous architecture.
- Develop synthesis tools for clock and bias networks, or integrate same functions to other tools.
- Extend or develop SPICE-type circuit schematic simulator to handle SCE-specific features of circuit elements with capabilities in timing and biasing analysis.
- Develop interactive or automated layout synthesis tool with clock-tree and bias network synthesis capability for small analog, digital, and mixed circuits.
- Develop automated placement and routing tools driven by timing, biasing, or equivalent constraints suitable for SCE-specific circuit design.
- Develop post-layout timing analysis tools.
- Develop or extend layout parameter and parasitic extraction (LPE) tools including inductance or equivalent extraction capability.

- Develop or extend Layout-versus-Schematics (LVS) or layout equivalence check tools for physical design verification.
- Extend or develop Design Rule Check (DRC) or equivalent tools.
- Develop physics-based TCAD device simulation tools.
- Develop or extend compact (SPICE) model parameter extraction tool.
- Extend or develop TCAD process simulation tool to include SCE-specific process flow and materials.
- Develop compact models of circuit elements and electromagnetic environment, including parasitic, crosstalk, magnetic coupling, etc.
- Draft requirements of open, interoperable SuperTools Library, and develop specifications with parameterized cell library entries for synchronous/asynchronous and DC/AC-biased logics.
- Establish requirements of logic and circuit simulation parameters.
- Construct a generic set (or sets) of primitive cells for both logic synthesis and layout.

Alternative approaches capable of achieving the same goal of enabling RTL-to-GDSII design flows will also be considered. The proposed design flows are required to have capabilities for digital, analog, and mixed circuit design, and equivalent verification functions.

#### **1.B.1.2. Phase II – Tool Improvement (Month 25-48)**

The goal of Phase II is to improve EDA and TCAD tools developed in Phase I with higher capabilities, and to improve compact models. Meanwhile, the program will establish standards of an open, interoperable SuperTools Library (STL) so as to achieve the overarching goal of automating the full design flow with standardized interface for all logic families and timing schemes.

Offerors are to participate in scoping out fabrication and measurement of test devices for model calibrations. The focus will initially be limited to calibrate parameters of compact circuit models, TCAD device models, and TCAD process models, (i.e, critical current, resistance, self/mutual inductance, capacitance, etc.).

The scope of fabrication and measurement by the government T&E teams will initially be limited to key circuit elements for model calibrations during Phase II. If advanced foundry processes are established with better stabilities and yields during the program, the government will consider additional runs to further characterize primitive cells, and potentially benchmark circuits.

The Phase II capability target is to support circuit design with more than 100,000 gates or 1 million Josephson junctions suitable for the complexity level of 32/64-bit RISC-type microprocessors.

In Phase II, proposed efforts must

- Establish standards of SuperTools Library scalable to more complex design and advanced technology nodes, and compatible for multiple SFQ logic families and clocking schemes with consensus from SuperTools program participants and T&E teams.
- Further extend the cell parameter sets to include process variations/spreads and noises in the generic SuperTools Library for each SFQ logic family.
- Develop or extend floor-planning tool.
- Improve physics-based TCAD device simulation tools with fab-assisted model calibrations.
- Improve TCAD process simulation tool with fab-assisted model calibrations.
- Improve model parameter extraction tools with respect to requirements of the established SuperTools Library standards.
- Improve compact models of circuit elements and electromagnetic environment.
- Extend EDA tool capability to handle the established SuperTools Library standards and the targeted scale of circuit complexity.
- Enhance convergence of numerical solvers for all EDA and TCAD tools.
- Integrate TCAD-derived models into EDA simulation tools for higher fidelity.
- Develop metric-driven optimization, physically-aware layout estimation, or equivalent capabilities for logic synthesis tools.
- Develop metric-driven optimization capability for physical design tools.
- Enhance design tool capability to include margin and yield analysis.
- Develop capability for power analysis.
- Develop capability for static and/or dynamic thermal analysis.

### **1.B.1.3. Phase III – Integration and Extension (Month 49-60)**

The goal of Phase III is to optimize and further increase capabilities to support design of circuits with more than 1 million gates suitable for the complexity level of 64-bit RISC-type microprocessors, and to establish interface to other technologies for full system integration.

In Phase III, proposed efforts must

- Develop Integrated Development Environment (IDE) for the EDA tool chain and improve User Interface (UI).
- Optimize EDA tools to increase fidelity and speed.
- Add Built-in Self-Test (BIST) feature.
- Develop tool capability in test pattern generation.
- Add Design for Testability (DFT) and Design for Manufacturability (DFM) features.
- Develop fault simulation capabilities with fault models and model validation of circuits.

- Develop capabilities to interface with non-SCE and memory design tools for hybrid integration without developing non-SCE tools or memory compilers.
- Develop interface to (multi-chip) system integration and analysis tools.
- Enhance fidelity of compact models for device, circuit, and electromagnetic environment.
- Improve TCAD device and process simulation tools with better fidelity and speed.
- Extend or develop high-level or behavioral simulation, synthesis, and verification tools for SCE-specific applications.
- Develop capability of dynamic thermal analysis.
- Develop efficient architectures for SFQ-based circuits incorporating logic and cache memory.

### **1.B.2. Out of Scope**

The following are examples of topics or approaches considered out of scope for this program.

- Research or methods that are not scalable to very-large-scale integrated circuit design.
- Individual components that cannot be integrated into a complete design flow.
- Manual or semi-automatic translations of CMOS design elements through tabulation or other similar mapping schemes.
- Fabrication and measurement of benchmark devices or circuits.
- Tools and associated design flows for transistors or transistor-like circuit elements, e.g., nanocryotron (nTron), superconductor-normal metal-superconductor transistors, etc., or non-SFQ based circuit elements, e.g., magnetic tunnel junctions (MTJ), magnetic memory elements, etc.
- Specific memory technologies or designs are out of scope but SCE based drivers to memory may be in scope.
- The Government does not intend to fund the acquisition of high performance computers or equivalent hardware.

### **1.B.3. Program Milestones and Metrics**

The Government Team will use the following Program Milestones and Metrics to evaluate the effectiveness of the proposed solutions in achieving the stated program objectives, and to determine whether satisfactory progress is being made to warrant continued funding of the program. Offerors may propose additional Milestones and Metrics within each performance year as indicated in Table 1. Additional program Milestones and Metrics provide evidence that the technical and programmatic risks associated with the proposed approach are being addressed. Additional Milestones and Metrics must be clear and well-defined, with a logical connection to enabling the government program execution decisions. The milestones and metrics are intended to bind the scope of effort, while affording maximum flexibility, creativity, and innovation in proposing solutions to the stated problem.

The milestones constitute a progression of deliverables to assess success; and the metrics measure progress toward achieving the required performance at each phase. Offerors may be asked to submit revised milestones and metrics and statements of technical approaches after award. It is anticipated that revisions may be requested at the end of Phases I and/or II.

### 1.B.3.1. Milestones and Waypoints

Table 1 – SuperTools Milestones and Waypoints lists the minimum set of milestones to be included in the work plan, which also constitutes a reference timeline for major deliverables. For deliverables without a fixed timeline, e.g., Month 12 - 18, the offerors shall propose appropriate timelines within the specified time period. Offerors may propose additional milestones relevant to their approach to achieve the program goals. However, the program goal to demonstrate a full EDA design flow with progressive increase of capabilities at the end of each phase CANNOT be changed.

Proposals may also include offeror-defined waypoints in the work plan as intermediate steps toward each milestone.

All offerors are expected to demonstrate their proposed tool-chain according to the schedule listed in proposed milestones and waypoints.

Table 1 - SuperTools Milestones and Waypoints:

Phase I	
Month	Milestones and Waypoints
12	<ul style="list-style-type: none"> <li>• Demonstrate HDL/logic simulators to handle SCE-specific feature of logic elements.</li> <li>• Generate generic parameterized cell library for logic synthesis with extrapolated parameters and for synchronous and/or asynchronous logics.</li> <li>• Demonstrate SPICE-type circuit simulator to handle SCE specific feature in circuit elements with timing and biasing analysis capabilities.</li> <li>• Generate a generic parameterized cell library for layout synthesis and Place-and-Route for DC- and/or AC-biased logics.</li> </ul>
12 - 18	<ul style="list-style-type: none"> <li>• Generate compact (SPICE) models of circuit elements and electromagnetic environment (e.g. parasitic and mutual coupling).</li> <li>• Demonstrate compact (SPICE) model parameter extraction tools including passive and parasitic circuit elements.</li> </ul>
18	<ul style="list-style-type: none"> <li>• Demonstrate automated logic synthesis and post-synthesis</li> </ul>



	<p>verification tools, e.g., logic equivalence checking (LEC).</p> <ul style="list-style-type: none"> <li>• Demonstrate clock-tree and bias network synthesis capabilities.</li> <li>• Demonstrate clock and bias distribution analysis tools.</li> </ul>
18 - 23	<ul style="list-style-type: none"> <li>• Demonstrate TCAD process simulations to include SCE-specific process flows and materials.</li> <li>• Demonstrate interactive or automated layout synthesis tool with clock-tree and bias network synthesis capability for small analog, digital, and mixed circuits.</li> <li>• Demonstrate Layout versus Schematics (LVS) or layout equivalence checking tools.</li> <li>• Demonstrate Design Rule Check (DRC) tool or equivalent for SCE applications.</li> <li>• Demonstrate layout parameter and parasitic extraction capabilities including inductance extraction or equivalent.</li> <li>• Demonstrate post-layout timing analysis capability.</li> </ul>
23	<ul style="list-style-type: none"> <li>• Demonstrate automated placement and routing tool subject to timing and/or biasing constraints.</li> <li>• Demonstrate physics-based TCAD device simulation tools.</li> </ul>

Phase II	
Month	Milestones and Waypoints
30	<ul style="list-style-type: none"> <li>• Establish standards of SuperTools Library scalable to more complex design and advanced technology nodes, and compatible for multiple SFQ logic families (consensus from performers).</li> <li>• Generate enlarged model parameter set to include process variations/spreads and noises.</li> <li>• Demonstrate post-layout power analysis capability.</li> </ul>
36	<ul style="list-style-type: none"> <li>• Demonstrate improved TCAD process simulation tools with fab-assisted parameter calibration.</li> <li>• Demonstrate advanced compact models of circuit elements and electromagnetic environment.</li> <li>• Demonstrate tool capability to handle the established SuperTools Library formats.</li> <li>• Demonstrate interactive or automated layout synthesis tool with clock-tree and bias network synthesis capability for large analog, digital, and mixed circuits.</li> </ul>

42	<ul style="list-style-type: none"> <li>• Demonstrate advanced and optimized model parameter extraction tools with respect to extended requirements of SuperTools Library.</li> <li>• Demonstrate enhanced convergence of numerical solvers while extending the capability (scaling to higher numbers of gates or JJs).</li> <li>• Demonstrate integrating TCAD-derived models into simulation tools for higher fidelity.</li> <li>• Demonstrate floor-planning tools.</li> </ul>
42-47	<ul style="list-style-type: none"> <li>• Demonstrate tool capability for static thermal analysis.</li> </ul>
47	<ul style="list-style-type: none"> <li>• Demonstrate improved physics-based TCAD device simulation tool with fab-assisted parameter calibration.</li> <li>• Demonstrate metric-driven optimization, physically-aware layout estimation, or equivalent capabilities for logic synthesis tools.</li> <li>• Demonstrate metric-driven optimization capability for physical design tools.</li> <li>• Demonstrate enhanced design tool capability to include margin and yield analysis.</li> </ul>

Phase III	
Month	Milestones and Waypoints
54	<ul style="list-style-type: none"> <li>• Demonstrate Built-in Self-Test (BIST) feature.</li> <li>• Demonstrate test pattern generation capabilities.</li> <li>• Demonstrate Design for Testability (DFT) and Design for Manufacturability (DFM) features.</li> <li>• Demonstrate enhanced compact models for devices, circuits, and electromagnetic environment.</li> <li>• Demonstrate fault simulation capabilities with fault modeling and model validation of circuits.</li> <li>• Demonstrate capability for both static and dynamic thermal analysis.</li> <li>• Demonstrate efficient architectures for SFQ-based circuits incorporating logic and cache memory.</li> </ul>
60	<ul style="list-style-type: none"> <li>• Demonstrate Integrated Development Environment (IDE) for the design tool-chain and improve user Interface.</li> <li>• Demonstrate capabilities to interface with non-SCE and memory elements for hybrid integration capability.</li> <li>• Establish interface to (multi-chip) system integration and analysis tools.</li> <li>• Demonstrate optimized design tools with increased fidelity and speed.</li> <li>• Demonstrate improved TCAD device and process simulation tools</li> </ul>

	<p>with better fidelity and speed.</p> <ul style="list-style-type: none"> <li>• Demonstrate SCE-specific high-level or behavioral simulation, synthesis, and verification capabilities.</li> </ul>
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### 1.B.3.2. Metrics

To measure progress toward achieving the required performance at each program phase, the proposed metrics will include the following principal quantities:

- Scale:
  - Progressively increasing capability in terms of the number of gates or Josephson junctions that are supported,
  - Progressively increasing capability in terms of clock speed with increasing number of gates or Josephson junctions.
- Quality of results:
  - Accuracy of logic functions with no error within targeted operational regimes.
  - Timing accuracy in terms of acceptable ranges of skew or delay, which tighten as the program progresses.
  - Accuracy of device and circuit parameters.
  - Optimization with respect to circuit area, power consumption, operation margins, and performance trade-offs.
- Speed
  - Using average performance of Phase I results and/or similar CMOS tools as the benchmark.
  - Offeror shall propose measurable figures of merit appropriate to the proposed approaches.
- Flexibility
  - Support of open, interoperable input and output standards or protocols.
  - Support of multiple logic families and biasing schemes.
  - Support of multiple timing/clocking schemes.
  - Support of interfacing with non-SCE and memory components.

A minimum set of metrics is listed in Table 2 – SuperTools Metrics to be included in the proposal. Offerors may propose advanced and/or additional metrics appropriate to their approaches.

Table 2 - SuperTools Metrics

Overall Design Capability				
Milestones/Tasks	Figure of Merit	Phase I	Phase II	Phase III
Model design RISC processor or circuits of similar	Design Complexity Target (# of logic gates)	10k (100k JJs)	100k (1M JJs)	1M (10M JJs)

complexity	Clock frequency (GHz)	20	50	100
	Processor bit-size	32-bit	32/64-bit	64-bit

Logic Design and Synthesis				
Milestones/Tasks	Figure of Merit	Phase I	Phase II	Phase III
Speed	% of design cycle-time*	< 20%	< 10%	< 5%
RTL-level HDL simulator	% of errors in HDL simulations	0%	0%	0%
Automated Logic Synthesis tool	% of error in clock skew, and path-to-path delay versus targets	< 10%	< 5%	< 1%

Note: Metrics with ‘\*’ are examples, and offerors are to specify in their proposal.

Analog Design and Synthesis				
Milestones/Tasks	Figure of Merit	Phase I	Phase II	Phase III
Circuit simulator, layout synthesis tools, and timing, yield and power analysis tools.	Capacity of circuit simulators	> 10 <sup>4</sup> JJs,	> 10 <sup>5</sup> JJs	> 10 <sup>6</sup> JJs
	% of error in timing prediction with respect to a reference simulation	< 5%	< 2%	< 1%
	% of error in gate performance prediction for a given amount of fab process variation	< 5%	< 2%	< 1%
	% of error in prediction of circuit electromagnetic environment	< 5%	< 2%	< 1%

Physical Design and Verification				
Milestones/Tasks	Figure of Merit	Phase I	Phase II	Phase III
Automated place-and-route (P&R) tools, circuit	Design cycle time reduction (benchmarked at Phase	Benchmark Reference	2x	4x

optimization tools, and verification tools	I)			
	P&R data path timing tolerance (skew/delay)	< 10%	< 5%	< 2%
	P&R clock distribution tolerance (skew)	< 10%	< 5%	< 2%
	% of errors in parameter/parasitic extraction (L, R, C) with respect to a reference structure	< 10%	< 5%	< 2%
	Reduction in area and interconnect length (P&R Optimization benchmarked at Phase I)	Benchmark Reference (averaged)	> 10%	> 20%

Note: P&R data path timing tolerance: variation of end-to-end or local data path delays vs targets.

TCAD and Compact model extraction				
Milestones/Tasks	Figure of Merit	Phase I	Phase II	Phase III
Tools for device dynamics and process flow simulation, constructing cell libraries, and extracting model parameters.	% of error in predicting device dynamics	< 10%	< 5%	< 1%
	% of error in process flow simulations	< 10%	< 5%	< 1%
	Run time in reference to CMOS TCAD tools	< 10x	< 5x	< 2x

EDA Tool-Chain Features				
Milestones/Tasks	Figure of Merit	Phase I	Phase II	Phase III
Flexibility of EDA tool-chain and TCAD tools.	Support of open/interoperable input and output	Desired	Required	Required

	standards			
	Support of multiple logic families and biasing schemes	Desired	Required	Required
	Support of multiple timing/clocking schemes	Required	Required	Required
	Support of interfacing with non-SCE components	-	Optional	Required

#### **1.B.4. Government Furnished Information/Equipment (GFI/GFE)**

At the kickoff of each program phase, the Government will provide performers with a list of benchmarks and background information as Government Furnished Information (GFI).

The followings are examples of GFI:

- Design entry of benchmark logic circuits (RTL or high-level HDL codes),
- Benchmark analog or mixed circuits,
- Examples of primitive (gate) cells and preliminary data for PDKs,
- Preliminary information of fabrication process flows and design rules based on government-sponsored foundries, and
- Preliminary information of device structures based on the results from other government-sponsored programs or from the public domain.

The performers are responsible to construct at least a generic SuperTools Library, based on GFI and public domain data for each proposed logic family to facilitate the demonstration of associated design flows and T&E activities. The generic SuperTools Libraries shall conform to the standards established by the program.

Initially, the SuperTools program requires the use of niobium-based systems with aluminum oxide-based Josephson junctions for model calibrations of devices and optionally primitive circuits. But the applicability of developed tools shall not be limited to only niobium-based systems or aluminum oxide-based junctions. Additional junction materials such as niobium silicide will be added once the process is established. The Government will provide superconducting device and/or circuit foundry services for the SuperTools performers in coordination with the government T&E teams.

### 1.B.5. Program Test and Evaluation (T&E)

At each program phase kickoff, the Government will select benchmark devices and circuits as the specific design implementation targets for each technical focus area. Government T&E Teams will assist the Program Manager to assess program progress and performance against specified milestones and metrics, and to facilitate the establishment of SuperTools Library standards.

All offerors are required to coordinate with Government T&E Teams to demonstrate proposed tool capabilities on benchmark devices and circuits according to the schedule listed in the program milestones. As parts of T&E activities, Government T&E Teams will further conduct tests using alternative, undisclosed reference designs to validate the technical claims of the program deliverables.

### 1.C. Program Timelines and Deliverables

The Government will use the timeline listed in Table 3 – SuperTools Timelines with programmatic gates to help program maintain its program schedule. Offerors shall support program kickoff, technical exchange, and technical review meetings listed in Table 3 – SuperTools Timelines with key technical and programmatic personnel.

Table 3 – SuperTools Timelines

Date	Event
<b>Program Phase I</b>	
<b>Month 1</b>	Program Kick-off Meeting
<b>Month 3 - 4</b>	Annual Site Visits (Year 1)
<b>Month 6</b>	Technical Exchange Meeting (TX1) First exchange on formats of SuperTools Library (STL)
<b>Month 10</b>	Annual Principal Investigators (PI) Program Review Meeting (Year 1) Second exchange on formats of SuperTools Library (STL)
<b>Month 12</b>	Performers deliver Month-12 Deliverables and Annual Research Report
<b>Month 14</b>	Technical Exchange Meeting (TX2) Third exchange on formats of SuperTools Library (STL)
<b>Month 15 - 16</b>	Annual Site Visits (Year 2)
<b>Month 18</b>	Performers deliver Month-18 Deliverables
<b>Month 18</b>	Technical Exchange Meeting (TX3) Fourth exchange on formats of SuperTools Library (STL), and first exchange with T&E teams on targeted device fabrication and model

	calibration (Fab)
<b>Month 22</b>	Annual PI Program Review Meeting (Year 2) Fifth exchange on formats of SuperTools Library (STL), and second exchange with T&E teams on targeted device fabrication and model calibration (Fab).
<b>Month 23</b>	Performers deliver Month-23 Deliverables
<b>Month 24</b>	Phase I Final Report

Date	Event
<b>Program Phase II</b>	
<b>Month 25</b>	Program Phase II Kick-off Meeting Coordination of Performers and T&E teams on Test Device Fabrication and Calibration (Fab), and final exchange on formats of SuperTools Library (STL)
<b>Month 27</b>	Tape-out of Test Devices for model calibration (Run 1)
<b>Month 27 - 28</b>	Annual Site Visits (Year 3)
<b>Month 30</b>	Performers deliver Month-30 Deliverables
<b>Month 30</b>	Technical Exchange Meeting (TX4) Finalization on standards of SuperTools Library (STL), and follow-up exchange on Test Device Fabrication (Fab).
<b>Month 34</b>	Annual PI Program Review Meeting (Year 3) Follow-up exchange on Test Device Fabrication (Fab).
<b>Month 36</b>	Performers deliver Month-36 Deliverables and Annual Research Report
<b>Month 36</b>	Tape-out of Test Devices for model calibration (Run 2)
<b>Month 38</b>	Technical Exchange Meeting (TX5) Follow-up exchange on Test Device Fabrication (Fab).
<b>Month 39 - 40</b>	Annual Site Visits (Year 4)
<b>Month 42</b>	Performers deliver Month-42 Deliverables
<b>Month 42</b>	Technical Exchange Meeting (TX6) Discussion of BIST and DFT features for DFM, and follow-up discussion of Test Devices for model calibration (Fab)
<b>Month 42</b>	Tape-out of Test Devices for model calibration (Optional Run)
<b>Month 46</b>	Annual PI Program Review Meeting (Year 4)
<b>Month 47</b>	Performers deliver Month-47 Deliverables
<b>Month 48</b>	Phase II Final Report

Date	Event
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<b>Program Phase III</b>	
<b>Month 49</b>	Program Phase III Kick-off Meeting Final discussion on BIST and DFT features for DFM and Test Devices for model calibrations (Fab)
<b>Month 50</b>	Tape-out of Test Chips (Run 3)
<b>Month 51 - 52</b>	Annual Site Visits (Year 5)
<b>Month 54</b>	Performers deliver Month-54 Deliverables
<b>Month 54</b>	Technical Exchange Meeting (TX7)
<b>Month 58</b>	Annual PI Program Review Meeting
<b>Month 60</b>	Performers deliver Month-60 Deliverables and Phase III Final Report

By the end of each program phase, offerors are required to deliver all program deliverables specified below and additional proposed deliverables relevant to the proposed approaches. Except noted, the timeline of individual program deliverables is required to follow the milestone schedule listed in Table 1 - Milestones and Waypoints, or the proposed schedule.

### **1.C.1. Phase I Deliverables**

By the end of Phase I, offerors are required to deliver the following:

- Logic design tools with HDL simulation capabilities. (EDA)
- Logic synthesis and verification tools including logic equivalency check (LEC), timing analysis, or equivalent set of tools. (EDA)
- Clock tree synthesis and analysis tools, or integrated same functions into other tools. (EDA)
- Bias network synthesis and analysis tools, or integrated same functions into other tools. (EDA)
- Circuit schematic editor or schematic capture tool. (EDA)
- Circuit schematic simulator with capabilities in timing and biasing analysis. (EDA)
- Interactive or automated layout synthesis tools and layout editor. (EDA)
- Place-and-route tools. (EDA)
- Physical design verification tools including design rule check (DRC), layout-versus-schematics (LVS), layout equivalence check, post-layout timing analysis, or equivalent set of tools. (EDA)
- Layout parameter and parasitic extraction tools with inductance, capacitance, and resistance extraction capabilities. (EDA)
- Compact models of device, circuit, and electromagnetic environment for schematic simulation and parameter extraction. (TCAD and EDA)
- Device and circuit parameter extraction tools. (TCAD)
- Physics-based TCAD device simulation tools. (TCAD)

- TCAD process simulation tools. (TCAD)
- Generic SuperTools Library with logic and non-logic primitives for each proposed logic family. (Library)
- Tool instruction manuals in PDF electronic form is required and wiki is optional.
- Detailed statement of technical approaches to achieve goals of Phases II and III, and revised milestones and metrics by Month 22.
- Monthly technical and financial reports by the 10<sup>th</sup> day of the following month except Months 12 and 24.
- Annual Research Report by Month 12
- Phase I Final Report by Month 24.

Note that the deliverable “generic SuperTools Library” should provide a complete set of primitives for each proposed SFQ logic family capable of implementing any logic function.

If alternative design flows with the same program goals are proposed, the proposed deliverables are required to have equivalent design and verification capabilities listed above for digital, analog, and mixed circuits.

### **1.C.2. Phase II Deliverables**

Offerors are required to deliver deliverables similar to Phase I but with improved and scaled-up capabilities appropriate for Phase II, as specified in Section 1.B.1.2 and Table 1 – Milestones and Waypoints. In addition, offerors are further required to deliver the following:

- Floor planning tools.
- Power and thermal analysis tools, or same functions integrated into design tools.
- Margin and yield analysis tools, or same functions integrated into design tools.
- Updated tool instruction manuals in PDF electronic form is required and wiki is optional.
- Detailed statement of technical approaches to achieve goals of Phase III, and revised milestones and metrics by Month 46.
- Monthly technical and financial reports by the 10<sup>th</sup> day of the following month except Months 36 and 48.
- Annual Research Report by Month 36.
- Phase II Final Report by Month 48.

If alternative design flows with the same program goals are proposed, the proposed deliverables are required to have equivalent design and verification capabilities listed above for digital, analog, and mixed circuits.

### **1.C.3. Phase III Deliverables**

Offerors are required to deliver deliverables of both Phase I and II, but with advanced and scaled-up capabilities appropriate for Phase III, as specified in Section 1.B.1.3 and Table 1 Milestones and Waypoints. In addition, offerors are further required to deliver the following:

- Logic design tools with high-level or behavioral synthesis and functional verification capabilities.
- Test pattern generation tool or capability.
- Tools with Built-in Self-Test (BIST) capability.
- Tools with capabilities in Design for Testability (DFT) and Design for Manufacturability (DFM).
- Fault simulation tool or capability with fault models and model validation of circuits.
- Interface to non-SCE design tools for hybrid and system integration.
- Graphic User Interface and Integrated Development Environment for design tool-chain.
- Efficient architectures for SFQ-based circuits incorporating logic and cache memory.
- Updated tool instruction manuals in PDF electronic form is required and wiki is optional.
- Monthly technical and financial reports by 10<sup>th</sup> day of following month except Month 60.
- Phase III Final Report by Month 60.

If an alternative approach with the same program goals is proposed, the proposed deliverables are required to have equivalent capabilities and features listed above.

#### **1.C.4. Test-bed and Access Requirements for Program Deliverables**

The Government expects to execute software deliverables on a cloud-based test bed, with an Enterprise or Long Term Support (LTS) grade Linux distribution as the computer operating system. The details of the test-bed specification will be released at the program kick-off. Proposed efforts must include options for a cloud-based approach. The Offerors are required to grant the government full software access to conduct test and evaluation on deliverables.

## **SECTION 2: AWARD INFORMATION**

The SuperTools Program is envisioned as a 5-year effort that is intended to begin by January 2017. The Base Period is 12 months and there are four Option Periods at 12 months each.

This BAA may result in awards for the Base Period. The number of awards and the amount of resources made available under this BAA will depend upon the quality of proposals received and the availability of funds. Potential future funding awards for the Option Years within the Option Period will depend on prior year performance relative to Program goals, availability of funding, and IARPA priorities.

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 the Source Selection Authority determines them 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 will be made to offerors on the basis of the Evaluation Criteria listed in Section 5, program balance, and availability of funds. Proposals selected for negotiation may result in a procurement contract, grants, cooperative agreements, or OTAs. However, the Government reserves the right to negotiate the type of award instrument it determines appropriate under the circumstances.

Offerors whose proposals are selected for negotiations will be contacted before award to obtain additional information required for award. The Government may establish a deadline for the close of the fact-finding and negotiations period 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 will 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 described in section 3.A.1.

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, offerors should carefully consider the roles and responsibilities of foreign participants as they pursue teaming arrangements to propose to the SuperTools BAA.

### **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-16-03@iarpa.gov](mailto:dni-iarpa-BAA-16-03@iarpa.gov). All notifications must be submitted through the 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. It is recommended that an offeror submit this notification as soon as possible after release of the BAA before significant time and effort are expended in preparing a proposal. 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 will be excluded from consideration for award.

As part of their proposal, offerors who have identified any potential conflicts of interest shall include either an approved waiver signed by the IARPA Director, an IARPA Determination letter stating that no conflict of interest exists, or 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 D.

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.B. US Academic Institutions**

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 prime, or a subcontractor or 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, must sign the completed form. Note that this paperwork **must** 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. Content and Form of Application Submission**

#### **4.A.1. Proposal Information**

Interested offerors are required to submit full proposals in order to receive consideration for funding. All proposals submitted under the terms and conditions cited in this BAA will be reviewed. Proposals must be received by the time and date specified in section 4.C.1 in order to be assured of consideration during the initial round of selections. IARPA may evaluate proposals received after this date but prior to BAA closing. Selection remains contingent on the evaluation criteria, program balance and availability of funds. 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.

Offerors shall submit proposals for a Base Period of 12-months and four 12-month Option Periods for a total of 60 months.

The Government intends to use employees from Booz Allen Hamilton, Berberian & Company LLC, Parsons, Ops Consulting LLC, TeleCommunication Systems Inc. (TCS), MIT-Lincoln Labs, and BRTRC 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 will 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 purpose stated above. Offerors who object to this arrangement must 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 will 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-16-03@iarpa.gov](mailto:dni-iarpa-BAA-16-03@iarpa.gov). Proposals must be submitted in accordance with the procedures provided in Section 4.C.2.

#### **4.A.2. Proposal Format**

All proposals must be in the format given below. Non-compliant proposals may be rejected without review. Proposals shall consist of two volumes: "Volume 1 - Technical and Management Proposal" and "Volume 2 - Cost Proposal." All pages shall be printed 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 must 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 must be numbered. Unnecessarily elaborate brochures or presentations beyond what is sufficient to present a complete and effective proposal are not acceptable and will be discarded without review.

#### **4.A.3 Proposal Classification**

The Government anticipates that proposals submitted under this BAA will be unclassified. In the event that an offeror chooses to submit a classified proposal or submit any documentation that may be classified, contact the IARPA Chief of Security, Terry Gillum for further guidance and instructions:

ATTN: IARPA-BAA-16-03-SECURITY  
Office of the Director of National Intelligence  
Intelligence Advanced Research Projects Activity (IARPA)  
Washington, DC 20511  
dni-iarpa-BAA-16-03@iarpa.gov

Unless absolutely necessary for proper evaluation of the offeror's proposal, classified submissions are discouraged. The most likely reason for submission of a classified addendum is expected to be discussion of performance in previous classified activities to support an offeror's claim of relevant experience.

#### **4.B. Proposal Content Specifics**

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

##### **Volume 1 – Technical & Management Proposal (Limited to 45 pages)**

Section 1 - Cover Sheet & Transmittal Letter

Section 2 – Summary of Proposal (Limited to 10 pages)

Section 3 – Detailed Proposal

Section 4 – Attachments (number appropriately for elements included)

1. Academic Institution Acknowledgment Letter Template, if required
2. Restrictions on Intellectual Property Rights
3. OCI Waiver, Determination, Notification or Certification
4. Bibliography
5. Relevant Papers (up to three)
6. Consultant Letters of Commitment

##### **Volume 2 – Cost Proposal**

Section 1– Cover Sheet

Section 2 – Detailed Estimated Cost Breakdown

##### **4.B.1. Volume 1, Technical and Management Proposal {Limit of 45 pages}**

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 will not be considered for review. Except for the cover sheet, transmittal letter, table of contents (optional), and the attachments included in Volume 1, Section 4, Volume 1 shall not exceed **45** pages. Any pages exceeding this limit will be removed and not considered during the evaluation process. Full proposals must be accompanied by an official transmittal letter, using contractor format. All full proposals must be written in English.

#### **4.B.1.1 Section 1: Cover Sheet & Transmittal Letter**

A. Cover sheet: (*See APPENDIX B for Cover Sheet Template*)

B. Official Transmittal Letter.

#### **4.B.1.2. Section 2: Summary of Proposal (Limit the summary to 10 pages)**

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. Offerors must address:

- A. A technical overview of the proposed research and plan: This section is the centerpiece of the proposal and must succinctly describe the proposed approach and research. The overview must provide an intuitive understanding of the approach and design, technical rationale, and constructive plan for accomplishment of technical goals and deliverable production. The approach must be supported by basic, clear, calculations. Additionally, proposals must clearly explain the innovative claims and technical approaches that will be employed to meet or exceed each program metric and provide ample justification as to why approaches are feasible. The use of non-standard terms and acronyms should be avoided. This section will 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. Detail in Attachment 2 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. If there are no proprietary claims, this should be stated. Should no proprietary claims be made, Government rights will 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 goals.
- E. Project contributors. Include a clearly defined and clearly legible organizational chart of all anticipated project participants, organized under functional roles for the effort, and also indicating associated task number responsibilities with individuals.
- F. A three chart summary of the proposal in PowerPoint 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 I 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 proposers view.
- G. Technical Resource Summary:
- Summarize total level of effort by labor category and technical discipline (i.e. research scientist/chemist/physicist/engineer/administrative, etc.) and affiliation (prime/subcontractor/consultant). Key Personnel shall be identified by name. Provide a brief description of the qualifications for each labor category (i.e. education, certifications, years of experience, etc.)
  - Summarize level of effort by labor category and technical discipline for each major task, by affiliation
  - 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, 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, as described in BAA section 4.B.1.3, and shall be supported by the detailed cost and pricing information provided in the offeror's Volume 2 Cost Proposal.

#### **4.B.1.3. 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 must 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;
  - Definition of all deliverables (e.g., data, 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, provide a Gantt chart, showing all the tasks and sub-tasks on the left 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 will 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 will result in an unacceptable rating.
- 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 must 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 shall identify any restrictions on the use or transfer of data sets being used, and, if there are any restrictions, the potential cost to the Government to obtain at least Government Purpose Rights in such data sets.<sup>1</sup>

Offerors proposing to obtain new data sets must 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.

It is not expected that the research will involve human subjects. Proposals that include such research will be rejected.

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

E. Deliverables. Deliverables are identified in Section 1.C.

The Government requires at a minimum Government Purpose Rights for all deliverables; anything less will be considered a weakness in the proposal. However, if limited or restricted rights are asserted by the offeror in any deliverable or component of a deliverable, the proposal must identify the potential cost associated with the Government obtaining Government Purpose Rights in such deliverables. Proposals that do not include this information will be considered non-compliant and may not be reviewed by the Government.

In Attachment 2 of the proposal, offerors must describe the proposed approach to intellectual property for all deliverables, together with a supporting rationale of why this approach is in the Government's best interest. This shall include 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, and a brief explanation of how the offerors may use these materials in their program.

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<sup>1</sup> "Government Purpose Rights" (or "GPR") means the rights to use, modify, reproduce, release, perform, display, or disclose technical data and computer software within the Government without restriction; and to release or disclose 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.

To the greatest extent feasible, offerors should not include background proprietary technical data and computer software as the basis of their proposed technical approach. Although IARPA seeks original solutions from offerors to this BAA, IARPA recognizes that offerors may determine that they need to use technology covered by one or more U.S. patents. The Government is prepared to rely upon its authorities under applicable statutes, including 28 U.S.C. § 1498, to manufacture and use, and allow its contractors to manufacture and use, patented inventions in executing the SuperTools program.

If offerors (including their proposed teammates) desire to use in their proposed approach, in whole or in part, technical data or computer software or both that is proprietary to offeror, any of its teammates, or any third party, in Attachment 2 they should: (1) clearly identify such data/software and its proposed particular use(s); (2) identify and explain any and all restrictions on the Government's ability to use, modify, reproduce, release, perform, display, or disclose technical data, computer software, and deliverables incorporating such technical data and computer software; (3) identify the potential cost to the Government to acquire GPR in all deliverables that use the proprietary technical data or computer software the offeror intends to use; (4) explain how the Government will be able to reach its program goals (including transition) within the proprietary model offered; and (5) provide possible nonproprietary alternatives in any area in which a Government entity would have insufficient rights to transfer, within the Government or to Government contractors in support of a Government purpose, deliverables incorporating proprietary technical data or computer software, or that might cause increased risk or cost to the Government under the proposed proprietary solutions.

Offerors also shall identify all commercial technical data and/or computer software that may be embedded in any noncommercial deliverables contemplated under the research effort, along with any applicable restrictions on the Government's use of such commercial technical data and/or computer software. If offerors do not identify any restrictions, the Government will assume that there are no restrictions on the Government's use of such deliverables. Offerors shall also identify all noncommercial technical data and/or computer software that it plans to generate, develop and/or deliver under any proposed award instrument in which the Government will acquire less than unlimited rights. If the offeror does not submit such information, the Government will assume that it has unlimited rights to all such noncommercial technical data and/or computer software. Offerors shall provide a short summary for each item (commercial and noncommercial) asserted with less than unlimited rights that describes the nature of the restriction and the intended use of the intellectual property in the conduct of the proposed research.

During negotiation of awards, the Government intends to negotiate terms in the award instrument or using other instruments under which the awardee will modify its deliverables to function with future versions of the awardee's proprietary software that awardee has incorporated in the deliverables for a specified period of time. The Government will also negotiate terms in the award instrument or using other instruments

that will provide the Government rights to use proprietary software the awardee has incorporated in its deliverables for a specified period of time.

Additionally, if offerors propose the use of any open source or freeware, any conditions, restrictions or other requirements imposed by that software must also be addressed in Attachment 2. Offerors should leverage the format in APPENDIX G for their response. (See also section 6.B.2. Intellectual Property). The technical content of Attachment 2 shall include only the information necessary to address the proposed approach to intellectual property; any other technical discussion in Attachment 2 will not be considered during the evaluation process. Attachment 2 is limited to 4 pages.

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 the Department of Defense FAR Supplement (DFARS) Part 227. If offerors propose intellectual property rights that are not defined in FAR part 27 or DFARS Part 227, offerors must clearly define such rights in Attachment 2 of their proposal. Offerors are reminded of the requirement for prime contractors to acquire sufficient rights from subcontractors to accomplish the program goals.

- F. Cost, schedule, milestones. Cost, schedule, milestones. Cost, schedule, and milestones for the proposed research, including estimates of cost by task, total cost, and company cost share, if any. Where the effort consists of multiple portions that could reasonably be partitioned for purposes of funding, these should be identified as options with separate cost estimates for each. The milestones must not include proprietary information.
- G. Offeror's previous accomplishments. Discuss previous accomplishments and work in this or closely related research areas and how these will contribute to and influence the current work.
- H. Facilities. Describe the facilities that will be used for the proposed effort, including computational and experimental resources.
- I. 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 will 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 must also be included in the organizational chart. Indicate if the person will be an “individual” or “organizational” consultant (i.e., representing themselves or their organization), and organizational affiliation. Each consultant shall make a written commitment they are available to the team for the work proposed, and the commitment should be attached to the Cost Volume.

A Table such as the following is recommended.

Table 1 Key Personnel

Participants	Org	Role	Unique, Relevant Capabilities	Role: Tasks	Time Commitment
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

- J. 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.
- K. 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.

**4.B.1.4.** Section 4: Attachments [NOTE: The attachments listed below must be included with the proposal, if applicable, but do not count against the Volume 1 page limit.]

Attachment A: Signed Academic Institution Acknowledgement Letter(s) (if applicable).  
Template provided as APPENDIX A. See paragraph 3.B, US Academic Institutions.

Attachment 2: Restrictions on Intellectual Property Rights (if applicable). Template provided as APPENDIX G. This attachment is likely to be 4 pages.

Attachment 3: OCI Waiver/Determination/Notification or Certification. Template, provided as APPENDIX D. See paragraph 3.A.1., Organizational Conflicts of Interest (OCI)

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 applicable. If the offeror intends to utilize any consultant, each consultant must make a written commitment of its participation on the team using his/her preferred format.

#### **4.B.2. Volume 2: Cost Proposal {No Page Limit}**

The Offeror's 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.

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 will 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 C for 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 E, shall include intact formulas and shall



not be hard numbered. The base and option period cost data should rollup into a total summary. The Excel files may be write-protected but must not be password protected. The Cost/Price Volume must include the following:

- A. Completed Cost/Price Template - Offerors must submit a cost element breakdown for the base period, each option period and the total program summary in the format provided in APPENDIX E<sup>1</sup>.
- B. Subcontractor/Inter-organizational Transfers (IOTs) and Consultants summary in the format provided in APPENDIX F. (After selection, offerors may be required to submit full cost proposals, see 4.B.2.c. Subcontracts.)
- C. Total cost broken down by major task.
- D. Major program tasks by fiscal year.
- E. A summary of projected funding requirements by month.
- F. 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.
- G. A summary table listing all indirect rates used in the proposal for each base and option period of the acquisition.

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<sup>1</sup> 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 E and APPENDIX F when estimating the direct labor portion of the proposal to allow for 2 CFR Part 220 guided accounting methods that are used by their institutions. The methodology must be clear and provide sufficient detail to substantiate proposed labor costs. For example, each labor category must be listed separately; identify key personnel, and provide hours/rates or salaries and percentage of time allocated to the project.)

#### **4.B.2.c Section 2: Supporting information**

In addition to the above, supporting cost and pricing information must 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 (APPENDIX E). 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 or Forward Pricing Rate Recommendation (FPRR), 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 all subcontractor proposals with the Cost Volume. Subcontractor cost element sheets shall be completed for the base period, each option period and the total summary in the format provided in APPENDIX F (Excel is not required for initial submittal, see paragraph below). Consultant letter(s) of commitment shall also be attached.

If a proposal is selected for negotiations, the prime must be prepared to present full subcontractor cost proposals (if applicable per subcontract type) for the base period, each option period and total program summary including all direct and indirect costs immediately upon request by the Contracting Officer. Information shall be presented in Excel with intact formulas using the format provided in APPENDIX E and addressing the supporting cost information as outlined in 4.B.2.b. and 4.B.2.c. In addition to the full and complete subcontractor cost proposal, the offeror shall also provide its analysis of the 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 un-sanitized 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.

Other Direct Costs (ODCs) and Travel- ODCs shall be listed separately and supported by quotes, historical data or any other information including the offeror's analysis. The proposed travel supporting detail shall include destination and purpose of the trip, number of travelers per trip and price per traveler in sufficient detail to verify the BOE. Proposed travel costs must comply with the limitations set forth in FAR Part 31.

Government Purpose Rights - If the offeror asserts limited or restricted rights in any deliverable or component of a deliverable, the cost proposal must separately identify the estimated cost associated with the Government obtaining Government Purpose Rights in such deliverables (reference sections 4.B.1.c.D. and 4.B.1.c.E).

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 must provide an explanation of the variance.

Cost sharing - Describe the source, nature and amount of cost-sharing, if any.

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.).

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 or FPRS or FPRR, if available.

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

Systems - For the Systems listed below, provide a brief description, 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 - Certified cost or pricing data may be requested after selection 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**

Proposals must be received by or before 5:00 pm Eastern Time **August 1, 2016**, in order to be assured consideration during the initial round of selections.

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

Proposals must be submitted electronically through the IARPA Distribution and Evaluation System (IDEAS). Offerors interested in providing a submission in response to this BAA must 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 so register in advance do so at their own risk, and IARPA will not extend the due date for the first round of proposals to accommodate such offerors. Failure to register as stated will prevent the offeror's submission of documents.

After registration has been approved, offeror's should upload proposals, including Volume 1, Volume 2, scanned certifications and permitted additional information in 'pdf' format. 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.

Upon completing the proposal submission the offeror will receive an automated confirmation email from IDEAS. Please forward that automated message to **[dni-iarpa-BAA-16-03@iarpa.gov](mailto:dni-iarpa-BAA-16-03@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.

Proposals submitted by any means other than IDEAS t (e.g., hand-carried, postal service, commercial carrier and email) will not be considered unless the offeror attempted electronic submission, but was unsuccessful. Should an offeror be unable to complete the electronic submission, the offeror must employ the following procedure. The offeror must send an e-mail to **[dni-iarpa-BAA-16-03@iarpa.gov](mailto:dni-iarpa-BAA-16-03@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 must include contact information for the offeror. Following this email contact, additional guidance will be provided.

Proposals must 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 proposal evaluation, program balance and availability of funds. 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 Programmatic Evaluation Criteria**

The criteria to be used to evaluate and select proposals for this Program BAA are described in the following paragraphs. Because there is no common statement of work, each proposal will be evaluated on its own merits and its relevance to the Program goals rather than against other proposals responding to this BAA. Specifics about the evaluation criteria are provided below, in descending order of importance.

Award(s) will be made to offerors on the basis of the evaluation criteria listed below in paragraphs 5.A.1 through 5.A.5, program balance, and availability of funds and subject to successful negotiations with the Government. Award recommendations will not be made to offeror(s) whose proposal(s) are determined not to be selectable. Offerors are cautioned that evaluation ratings may be lowered or proposals rejected if submission instructions are not followed.

##### **5.A.1. 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.2. Effectiveness of Proposed Work Plan**

The feasibility and likelihood that the proposed approach will 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 must 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 must also demonstrate that key personnel have sufficient time committed to the Program to accomplish their described Program roles.

The requirement 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 will be required.

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 at an acceptable cost. The proposed approach to intellectual property rights is in the Government's best interest.

#### **5.A.3. 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 will meet and progressively demonstrate SuperTools 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 over its future adversaries.

#### **5.A.4. 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, will 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. Time commitments of key personnel must be sufficient for their proposed responsibilities in the effort.

#### **5.A.5. Resource Realism**

The proposed resources are well justified and consistent with the unique technical approach and methods of performance described in the offeror's proposal. Proposed resources reflect 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 and management proposal and are realistic for the work proposed. Material, equipment, software, data collection and travel, especially foreign travel, are well justified, reasonable, and required for successful execution of the proposed work.

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

IARPA’s policy is to ensure impartial, equitable, comprehensive proposal evaluations and to select the source (or sources) whose offer meets the Government's technical, policy and programmatic goals. In order to provide the desired evaluation, qualified Government personnel will conduct reviews and (if necessary) convene panels of experts in the appropriate areas.

IARPA will only review proposals against the criteria described under Paragraph 5.A above, and will not evaluate them against other proposals, since they are not submitted in accordance with a common work statement. For evaluation purposes, a proposal is the document described in Sections 4.A and 4.B. Other supporting or background materials submitted with the proposal will not be considered. Only Government personnel will make evaluation and award determinations under this BAA. Selections for award will be made on the basis of the evaluation criteria listed in paragraphs 5.A.1 through 5.A.5, program balance and the availability of funds. Selections for award will not be made to offeror(s) whose proposal(s) are determined to be not selectable.

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

Award of a contract is contingent on successful negotiations. After selection and before award, the contracting officer will determine cost/price realism and reasonableness, to the extent appropriate, and negotiate the terms of the contract.

The contracting officer will review anticipated costs, including those of associate, participating organizations, to ensure the offeror has fully analyzed the budget requirements, provided sufficient supporting cost/price information, and that cost data are traceable and reconcilable. Additional information and supporting data may be requested.

If the parties cannot reach mutually agreeable terms, a contract will not be awarded.

**5.D. Proposal Retention**

IARPA’s policy is to treat all proposals as competitive information and to disclose their contents only for the purpose of evaluation. Proposals will not be returned upon completion of the source selection process. The original of each proposal received will be retained at IARPA and all other non-required copies will 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 will 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.

The performer may use their own data for development purposes as long as they follow the guidelines in 6.B.13 Lawful Use and Privacy Protection Measures.

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

#### **6.B.2.a. Noncommercial Items (Technical Data and Computer Software)**

Offerors responding to this BAA requesting a procurement contract shall identify in Volume 1, Attachment 2 of the proposal all noncommercial technical data and noncommercial computer software that it plans to generate, develop and/or deliver under any proposed award instrument in which the Government will acquire less than unlimited rights and to assert specific restrictions on those deliverables, the basis for such restrictions, the potential cost to the Government to acquire GPR in all deliverables incorporating such noncommercial technical data and computer software, and the intended use of the technical data and noncommercial computer software in the conduct of the proposed research and development of applicable deliverables. If offerors intend to incorporate noncommercial, proprietary technical data or computer software into any deliverable, offerors should provide in Volume 1, Attachment 2 of their proposals all of the information regarding such proprietary technical data or computer software as described in sections 4.B.1.3(D) and 4.B.1.3(E) of this BAA.

In the event that offerors do not submit such information, the Government will assume that it automatically has unlimited rights to all noncommercial technical data and noncommercial computer software generated, developed, and/or delivered under any award instrument, unless it is substantiated that development of the noncommercial technical data and noncommercial computer software occurred with mixed funding. If mixed funding is anticipated in the development of noncommercial technical data and noncommercial computer software generated, developed and/or delivered under any award instrument, then offerors should identify the data and software in question and that the Government will receive GPR in such data and software. The Government will automatically assume that any such GPR restriction is limited to a period of five years, at which time the Government will acquire unlimited rights unless the parties agree otherwise. A sample format for complying with this request is shown in APPENDIX G. If no restrictions are intended, then the offeror should state "NONE."



Offerors are advised that the Government will use this information during the source selection evaluation process to evaluate the impact of any identified restrictions and may request additional information from the offeror, as may be necessary, to evaluate the offeror's assertions.

For all technical data and computer software that the 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 the contract number under which the data, software, or documentation were produced; the contract number under which, and the name and address of the organization to whom, the data and software were most recently delivered or will be delivered; and 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.

**6.B.2.b. Commercial Items (Technical Data and Computer Software)**

Offerors shall identify in Section 4 (Attachment 2, template provided as APPENDIX G) of its proposal all commercial technical data and commercial computer software that may be incorporated in any noncommercial deliverables contemplated under the research effort, along with any applicable restrictions on the Government's use of such commercial technical data and/or commercial computer software. In the event that offerors do not submit the list, the Government will assume that there are no restrictions on the Government's use of such commercial items. The Government may use the list during the source selection evaluation process to evaluate the impact of any identified restrictions and may request additional information from the offeror, as may be necessary, to evaluate the offeror's assertions. A sample format for complying with this request is shown in APPENDIX G. If no restrictions are intended, then the offeror should state "NONE."

**6.B.2.c. All Offerors – Patents**

Include documentation using the format provided in APPENDIX G, proving ownership of or possession of appropriate licensing rights to all patented inventions (or inventions for which a patent application has been filed) that will 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.

If offerors intend 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 APPENDIX G, offerors should also provide in Volume 1, Attachment 2 of their proposals all of the information described in section 4.B.1.3(E) of this BAA.

#### **6.B.2.d. All Offerors – Intellectual Property Representations**

The offeror shall provide a good faith representation that they either own or possess appropriate licensing rights to all other intellectual property that will be utilized under their proposal for the SuperTools program.

#### **6.B.3. Meeting and Travel Requirements**

Performers are expected to assume responsibility for administration of their projects and to comply with contractual and Program requirements for reporting, attendance at Program workshops, and availability for site visits.

##### **6.B.3.a. Workshops**

The SuperTools Program intends to hold a Program-level Kick-Off meeting by the first month of the Program and then similar Workshops annually thereafter. The dates and location of these are to be specified at a later date by the Program Manager. The three- to four-day annual Workshops will focus on technical aspects of the Program and on facilitating open technical exchanges, interaction, and sharing among the various Program participants. Program participants will be expected to present the technical status and progress of their projects to other participants and invited guests.

##### **6.B.3.b. Site Visits**

Site visits by the Contracting Officer Representative and the SuperTools Program Manager will generally take place up to twice yearly during the life of the Program and will occur during the period between Program-level Workshops. These visits will occur at the Contractor'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.

#### **6.B.4. Human Use**

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

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

It is anticipated that research funded under this Program will be unclassified research that will 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 must be provided to the IARPA Program Manager and the Contracting Officer Representative (COR) a minimum 5 days prior release to 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 CFR Parts 120 through 130, and the Export Administration Regulations (EAR), 15 CFR 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 will 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 funding (pending negotiations) 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 must declare teaming relationships in their proposals and must 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 must take care not to over-commit those resources being applied.

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

Fiscal and management responsibility are important to the SuperTools Program. Although the number and types of reports will be specified in the award document, all performers will, at a minimum, provide the Contracting Office, Contracting Officer Representative and the SuperTools 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 will describe technical

highlights and accomplishments, priorities and plans, issues and concerns, evaluation results, and future plans. Financial reports will 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 will 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 SuperTools Program Manager. The reports will 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.

**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. Wide Area Work Flow**

Unless using another approved electronic invoicing system, the performer may be required to submit invoices for payment directly via the Internet/WAWF at <https://wawf.eb.mil>. Registration to WAWF may be required prior to any award under this BAA.

**6.B.12. Lawful Use and Privacy Protection Measures**

All data gathered by the performer must 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 must provide proof that the data was acquired in accordance with U.S. laws and regulations.

### **6.B.13 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<sup>2</sup>, consistent with all other applicable law and policy; agency mission; resource constraints; and U.S. national, homeland, and economic security.

Awardees will be required to submit to IARPA the final version of peer-reviewed publication manuscripts related to research funded under awards made under this BAA. Awardees will be required to authorize IARPA to release these manuscripts to the public no later than twelve (12) months after the manuscript’s official publication date in a journal or other publication. In addition, IARPA intends to make unclassified data sets, samples, and other supporting materials developed or delivered under awards available to the public, unless IARPA stipulates otherwise or to the extent that such public release would compromise the ability to file for intellectual property protection on any invention arising from the data.

Insofar as possible, all data produced for SuperTools, all reports to IARPA, and all SuperTools-based publications must follow the suggestions of the Center for Open Science. Insofar as possible, all SuperTools publications should qualify for Open Science’s<sup>3</sup> Open Data and Open Materials badges.

To the extent possible, all awardee reports to IARPA and all SuperTools-based publications should be consistent with the statistical and methodological requirements for publication found in the 2014 Psychological Science editorial “Not Business as Usual”<sup>4</sup>. 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 are encouraged to include statisticians and methodologists who are expert in these areas. All offerors must describe the plans to ensure that the above requirements are satisfied.

### **6.B.14 Cloud Compatibility**

Software deliverables must be deployable to cloud platforms for testing and must be approvable

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<sup>2</sup>

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

<sup>3</sup> Open Science (2013). Badges to acknowledge open practices.

<https://openscienceframework.org/project/TVyXZ/>

<sup>4</sup> Psychological Science (2014) <http://pss.sagepub.com/content/25/1/3>

for production use in the cloud. Technical approaches should generally avoid the following: requires high-performance, special-purpose, or excessive quantities of virtual hardware not readily available in the cloud; requires 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; leverages inherently risky protocols, e.g., Telnet, or software packages, e.g., FOCI-relevant; or includes custom code that cannot be inspected by Information System Security professionals.

**APPENDIX A**

**Academic Institution Acknowledgement Letter  
Template**

**IARPA Broad Agency Announcement**

**SuperTools**

**(IARPA-BAA-16-03)**

-- Please Place on Official Letterhead --

<insert date>

To: Mr. Tarek Abboushi  
Chief Acquisition 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-16-03 and is hereby approved by the undersigned official, serving as the president, vice-president, chancellor, vice-chancellor, or provost of the institution.

\_\_\_\_\_  
<Name>  
<Position>

Date



**APPENDIX B**

**SAMPLE COVER SHEET**

**for**

**VOLUME 1: Technical/Management Details**

**BROAD AGENCY ANNOUNCEMENT (BAA)**

**SuperTools**

**(IARPA-BAA-16-03)**

(1) BAA Number	<b>IARPA-BAA-16-03</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 45 pages?	Yes/No
(11) Restrictions on Intellectual property rights details provided in APPENDIX G format?	Yes/No
(12) OCI Waiver Determination, Notification or Certification [see Section 3.A.1] Included?	Yes/No
(12a) If No, is written certification included (APPENDIX D)?	Yes/No
(13) Are one or more U.S. Academic Institutions part of your team?	Yes/No
(13a) 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
(14) Total Funds Requested from	\$

IARPA and the Amount of Cost Share (if any)	
(15) Date Proposal as Submitted.	

**APPENDIX C**

**SAMPLE COVER SHEET**

**for**

**VOLUME 2: Cost Proposal**

**BROAD AGENCY ANNOUNCEMENT (BAA)**

**SuperTools**

**(IARPA-BAA-16-03)**

(1) BAA Number	<b>IARPA-BAA-16-03</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 E and APPENDIX F)	
(21) Size of Business in accordance with NAICS Code 541712	

**APPENDIX D**

**Letter Template**

**For**

**Organizational Conflicts of Interest Certification Letter  
Template**

**IARPA Broad Agency Announcement (BAA)**

**SuperTools**

**(IARPA-BAA-16-03)**

(Month DD, YYYY)

Office of the Director of National Intelligence  
Intelligence Advanced Research Projects Activity (IARPA)  
SuperTools  
ATTN: Mark Heiligman  
Washington, DC 20511

Subject: OCI Certification

Reference: <Insert Program Name>, IARPA-BAA-16-03, (Insert assigned proposal ID#, if received)

Dear Dr. Heiligman,

In accordance with IARPA Broad Agency Announcement IARPA-BAA-16-03, Section 3.A.1, *Procurement Integrity, Standards of Conduct, Ethical Considerations, and 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 (insert Program name) program.

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) (Must be signed by an official that has the authority to bind the organization)

(Insert signature)

(Insert name of signatory)

(Insert title of signatory)

**APPENDIX E**

**Sample Prime Contractor Cost Element Sheet**

**For**

**VOLUME 2: Cost Proposal**

**IARPA Broad Agency Announcement (BAA)**

**SuperTools**

**(IARPA-BAA-16-03)**



PRIME CONTRACTOR COST ELEMENT SHEET [SAMPLE]					
Complete a Cost Element Sheet for the Base Period and <u>each</u> Option Period					
COST ELEMENT	BASE	RATE	AMT		
DIRECT LABOR (List each labor category separately. Identify Key Personnel by name.)	# of Hours	\$	\$		
TOTAL DIRECT LABOR			\$		
FRINGE BENEFITS	\$	%	\$		
TOTAL LABOR OVERHEAD	\$	%	\$		
SUBCONTRACTORS, IOTS, CONSULTANTS (List separately. See below table.)			\$		
MATERIALS & EQUIPMENT (List each material and equipment item separately.)	Quantity	\$ unit price	\$		
SOFTWARE & INTELLECTUAL Property (List separately. See table below.)	\$	\$	\$		
TOTAL MATERIALS & EQUIPMENT			\$		
MATERIAL OVERHEAD	\$	%	\$		
TRAVEL (List each trip separately.)	# of travelers	\$ price per traveler	\$		
TOTAL TRAVEL			\$		
OTHER DIRECT COSTS (List each item separately.)	Quantity	\$ unit price	\$		
TOTAL ODCs			\$		
G&A	\$	%	\$		
SUBTOTAL COSTS			\$		
COST OF MONEY	\$	%	\$		
TOTAL COST			\$		
PROFIT/FEE	\$	%	\$		
TOTAL PRICE/COST			\$		
GOVERNMENT SHARE, IF APPLICABLE			\$		
RECIPIENT SHARE, IF APPLICABLE			\$		
SUBCONTRACTORS/INTERORGANIZATIONAL TRANSFERS (IOT) & CONSULTANTS PRICE SUMMARY					
A	B	C	D	E	F
SUBCONTRACTOR IOT & CONSULTANT NAME	SOW TASKS PERFORMED *	TYPE OF AWARD	SUBCONTRACTOR, IOT & CONSULTANT QUOTED PRICE	COST PROPOSED BY PRIME FOR THE SUBCONTRACTOR, IOT & CONSULTANT	DIFFERENCE (Column D - Column E) IF APPLICABLE
TOTALS					
*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> (List)	<b>Cost</b>	<b>Date of Expiration</b>

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 E and APPENDIX F when estimating the direct labor portion of the proposal to allow for OMB guided accounting methods that are used by their institutions. The methodology must be clear and provide sufficient detail to substantiate proposed labor costs. For example, each labor category must be listed separately; identify key personnel, and provide hours/rates or salaries and percentage of time allocated to the project.

**APPENDIX F**

**Sample Subcontractor Cost Element Sheet**

**For**

**VOLUME 2: Cost Proposal**

**IARPA Broad Agency Announcement (BAA)**

**SuperTools**

**(IARPA-BAA-16-03)**

<b>SUBCONTRACTOR COST ELEMENT SHEET [SAMPLE]</b>			
<b>Complete a Cost Element Sheet for each applicable period</b>			
<b>COST ELEMENT</b>	<b>BASE</b>	<b>BURDENED RATE</b>	<b>AMT</b>
<b>DIRECT LABOR (List each labor category separately. Identify Key Personnel by name.)</b>	# hrs	\$	\$
<b>TOTAL DIRECT LABOR</b>			\$
<b>SUBCONTRACTORS, IOTS, CONSULTANTS</b>			\$
<b>MATERIALS &amp; EQUIPMENT (List each material and equipment item separately.)</b>	qty	\$ unit price	\$
<b>TOTAL MATERIALS &amp; EQUIPMENT</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>	qty	\$ unit price	\$
<b>TOTAL OTHER DIRECT COSTS</b>			\$
<b>TOTAL PRICE/COST</b>			\$

<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 E and APPENDIX F when estimating the direct labor portion of the proposal to allow for OMB guided accounting methods that are used by their institutions. The methodology must be clear and provide sufficient detail to substantiate proposed labor costs. For example, each labor category must be listed separately; identify key personnel, and provide hours/rates or salaries and percentage of time allocated to the project.

**APPENDIX G**

**Restrictions on Intellectual Property Rights**

**For**

**VOLUME 1: Technical and Management Proposal**

**IARPA Broad Agency Announcement (BAA)**

**SuperTools**

**(IARPA-BAA-16-03)**

**Noncommercial Items (Technical Data and Computer Software)**

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

**Description of 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:**

**Potential cost to the Government to acquire GPR in all deliverables incorporating the technical data and computer software listed above:**

**Intended use of the technical data and computer software listed above in the conduct of the proposed research:**

**Commercial Items (Technical Data and Computer Software)**

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

**Patents**

<b>PATENTS</b>			
<b>Patent number (or application number)</b>	<b>Patent name</b>	<b>Inventor name(s)</b>	<b>Patent owner(s)</b>
(LIST)	(LIST)	(LIST)	(LIST)

**APPENDIX H**

**Templates for Three Chart Summary of the Proposal**

**For**

**VOLUME 1: Technical and Management Proposal; Sections 2 and 4**

**IARPA Broad Agency Announcement (BAA)**

**SuperTools**

**(IARPA-BAA-16-03)**



### 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