

Foundations Required for Novel Compute (FRANC) BAA
Frequently Asked Questions (FAQ)
Updated: October 24, 2017

1. TA-1 Objective

Q: Within the BAA, the 48th month objective for TA-1a/b is listed as “functional prototype.” What form of prototype is expected? Should an operating system and runtime be provided as part of this package or simply “bare-metal” execution?

A: The objective at the end of the program is a physical instantiation of the proposed circuit that can be measured by the Government to confirm the performance advantages targeted. To that end, firmware and/or software that will enable the Government to evaluate the performance is encouraged.

2. Initial Technology Readiness Level

Q. Does the technology to be considered have to be above TRL2? Can new materials and new devices not demonstrated yet be considered with a possible transition to a foundry? Can devices be fabricated at a university facility?

A. The effort under FRANC is expected to focus on technologies that can be commercialized rather than simply focus on demonstrating feasibility. If, however, you can justify and communicate the path for such rapid progression from new material/device development to transition under the program timeline, such approaches can be considered.

Where the technology is fabricated is less important than providing the commercialization of the technology. Transitioning from a university fabrication approach to commercial approach later in the program under the right partnership is acceptable. The transition plan will be key in using such an approach.

3. Quantum Computing

Q: Does FRANC program encompass quantum computing?

A: Yes, if the proposed approach uses new materials or new approaches to computing. Proposers must show that their approach has the ability to exceed state of the art computing performance by >10X as stated in the BAA (i.e. not just 10X better than other quantum computers). Additionally, cooling requirements have been found to be a problem in size and power of quantum computing implementations and therefore should be included in any comparison. It is incumbent on the performer to show that the proposed technology meets the needs of the FRANC program, including the path to transition the technology, the utility of the approach when benchmarked using different workloads, and the scalability of the approach.

4. Prototyping

Q. Is there no prototyping allowed in Phase 1 and Phase 2 (Option 1)?

A. Phase 1 is six months long and expected to be a means to explore your proposed technology within a limited scope, as such prototype solutions are discouraged. Phase 2 and Phase 3 timelines are intended to guide likely development schedules but proposers are allowed to include prototyping activity where and when appropriate.

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5. TA2 Interest Areas

Q. Does the proposal for TA2 track in FRANC need to encompass all the materials classes (new materials, NVM, Power, Photonics)?

A. No, a single proposal should not address all of these topics. The classes given in the BAA Section I.C.3 are examples and neither all-inclusive nor required for TA2. Note the text “These [TA2] efforts may address, but are not limited to the following topics.” Proposing your own class of new devices or enabling technology is within the scope of TA2.

6. Non-volatile memory

Q. Can we propose just in respect to Non-volatile memory (NVM) components? Demonstration promising new NVM technology for specific uses and providing chip-scale demonstrations of their utility will accelerate their acceptance.

A. Yes, NVM approaches may be responsive if by using different materials or using NVM in different topologies leads to dramatic performance improvements. Creating incremental improvements in existing NVM technologies is not in line with the goals of the FRANC program. Additionally, the goal of FRANC is to push technologies to commercialization, so technology demonstrations alone are unlikely to be competitive.

7. ReRAM

Q. On page 25 of the BAA, it is stated that, “Technologies of interest go beyond current state of the art, hence, solutions such as ReRAM based on conductive bridge or conventional phase change materials (e.g. GeTe) will not be considered responsive.” Does this mean other ReRAM techniques are still in the game?

A. FRANC is not scoped to revisit existing ReRAM technologies, especially when these have been explored and found to be lacking. New ReRAM approaches, if considered, should have clear technology breakthroughs, and the proposed research should show how these technologies enable and meet the BAA criteria.

8. Phase 2 Scope

Q. Regarding Non-Volatile Memory: In the memory industry simulation/emulation are only credible if there are correlated with a tested physical device. Can we propose fabrication and testing of bit-cells and mini arrays as part of Phase 2?

A. Yes.

9. Software emulation (TA-2)

Q: Given a novel device demonstration, does software emulation count as a deliverable for phase one or two?

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A: Software emulation may be appropriate for a device development effort throughout the program. However, emulation alone is unlikely to be a compelling demonstration of technological progress for phase 2 or phase 3 of a device development effort.

10. Software solutions

Q. Can we develop software solutions under FRANC?

A. The effort to develop whatever software is required to test and demonstrate your device may be included in your FRANC proposal. Other software development is out of scope. Nevertheless, the development of required support software may be an important focus of your transition plan.

11. Thermal Solutions

Q. Are better heat dissipation solutions considered relevant under FRANC?

A. Technologies that address heat dissipation are not, by themselves, responsive to FRANC. However, heat dissipation is often a limiting factor in high-performance computing, and thus FRANC performers are expected to have solutions that satisfy thermal constraints under proposed usage scenarios. Novel thermal solutions, in this case, can be part of the overall technology proposed, but not the primary focus of it.

12. Cost matching

Q. Cost matching is challenging for Universities and FFRDCs, but more common among industry-led research outfits. Does the level of cost matching take the context of the proposer into account, or is cost matching a crucial element of a response?

A. Cost share is not a required part of the proposal. We will take into account the nature of the project being proposed, the teaming approach (mix of for-profit, universities, non-profit organizations, small and large businesses, etc.) when assessing cost share. However, the transition plan is a key piece of the program, and proposers may have a more challenging time demonstrating a clear and invested transition plan in the absence of cost share.

13. Other Transactions

Q. Can we meet "cost sharing" by sharing at commercialization by royalties or through similar obligations?

A. It is understandable that some performers may not have the financial capability/resources to put in cost share and that such organizations may choose to propose contributions other than cash contributions that may be considered by the Government as an indicator of the proposer's commitment to and self-interest in the success of the project. Such alternate contribution approaches are primarily applicable when proposing an Other Transaction (OT). As noted in Part 37 of the DoD Grant and Agreement Regulations (DoDGARs), a proposer's self-interest might be driven, for example, by a research project's potential for fostering technology to be incorporated into products and processes for the commercial marketplace. As such, for example, assuming the award instrument is an OT, it is possible for the proposer to offer some form of recoupment (recovery of funds) to the Government based on commercial sales of the resulting technology. Although not as desirable as a direct cost share

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Frequently Asked Questions (FAQ)
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contribution by the performer, returning funds to the Government via a recoupment arrangement is an available alternative that can be taken into consideration when the award instrument will be an OT. It is noted, however, that a recoupment approach would not be possible under a procurement contract.

14. Transition Accelerator

Q. What are the levels of funding available for participation in the Transition Accelerator?

A. There are two stages in the Transition Accelerator (Accelerator). In stage 1, the Accelerator can support one full time employee (FTE) for 6-12 months during the program execution. Stage 2 supports a larger effort of \$1M to \$15M after the program conclusion to enable transition with the size dependent on the circumstances. IMPORTANT NOTE: The Accelerator is not part of the BAA, and it should not be included in any proposals submitted to this BAA. Any invitation to participate in the Accelerator will come later in the program via a formal request for proposal with either a subsequent change in the existing contract or an entirely new contract.

15. Recordings and Slides

Q. Will a recording of the proposer's day webinar and/or the slides for FRANC be made available?

A. Yes. Information available is posted at <https://www.darpa.mil/work-with-us/electronics-resurgence-initiative>. On the right side under Timeline of Events is the link to the FRANC Proposers Day video.

16. Bibliography

Q. Can patents and patent applications be part of, "include a brief bibliography?"

A. Yes.

17. Foreign research institutes and foundries

Q. Are we allowed to partner with foreign research institutions/foundries?

A. Yes. From the BAA (III.A.1.C.1): "Non-U.S. organizations and/or individuals may participate to the extent that such participants comply with any necessary nondisclosure agreements, security regulations, export control laws, and other governing statutes applicable under the circumstances."

18. Timeline

Q. The FRANC timeline in the Proposers Day presentation (slide #26) shows Phase 2 lasting 24 months. The BAA solicitation states (on page 25) that Phase 2 lasts 18 months. Which is correct?

A. The BAA is correct (18 months).

19. Prototyping

Q. What satisfies the definition of "functional prototype" in TA-2? Is this a device-level demonstration or a circuit-level demonstration? Our interpretation of the intent of TA-2 is that it is closer to more

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fundamental materials research, so “component” would include individual novel devices based on novel materials at nanometer scale, while circuit demonstration could be achieved by fitting a SPICE model to the device data, and performing circuit simulations showing the advantage over current technologies. Is our interpretation correct, and would it be considered responsive to the BAA?

A. The objective at the end of the program is a physical instantiation of the proposed technology that can be measured by the Government to confirm the performance advantages targeted. The exact specification of that prototype is left to the performer to provide for a reasonable demonstration of claimed performance benefits. The closer the targeted device is to practical use cases, the easier it will be for the Government to assess its impact.

20. Calculation of device metrics

Q. Does the initial device we develop have to demonstrate a 10X performance benefit compared to the state of the art, or is it possible to demonstrate benefit on a smaller scale with a methodology and implementation that can be scaled? For example, the performance of parallel computing solutions are dependent on the number of instances, and at what point do we compute the performance benefit?

A. The 10x performance benefit must be demonstrated in a hardware implementation by the end of the program, although the path to such benefit (simulations, small hardware demonstrations, etc.) is flexible. The more closely the demonstration realizes one or more use cases, the more clearly the Government can assess the value of the technology.

21. Proposing to multiple areas

Q. If I am applying to TA-1, under what circumstances (if any) might I want to also apply to TA-1b?

A. TA-1b is intended as a smaller sub-thrust effort within TA-1 to capture accelerator technology that could work in tandem with conventional von Neumann architectures. A larger, TA-1 technology is likely to include development of any of sub-element technology, and thus it is likely that proposing to both will not make sense.

22. Proposing to material discovery, development, and component optimization (TA-2).

Q. I would like to propose to the area of rapid material discovery and development. I would like design material deposition and fabrication experiments that can be used in predictive models for device design. Is such an approach responsive to the FRANC BAA?

A. Yes, if tied to a transition effort or as part of a related proposal. TA-2 will consider proposals targeting such an area, “in whole or in part.” In other words, proposals that focus on methods to predict in-situ material behavior using data-driven models are considered responsive as well as methods that are developed to support specific device designs under TA-2. Note that separate proposals are required for each technical area (i.e., TA-1 and TA-2). Thus, models developed under TA-2 cannot be used for TA-1 development in the same proposal, although two separate proposals in this case are allowed.

23. Computing methods

Foundations Required for Novel Compute (FRANC) BAA
Frequently Asked Questions (FAQ)
Updated: October 24, 2017

Q. Is approximate or stochastic computing acceptable for the proposal as a non-von Neumann approach?

A. Yes, if it leverages new materials or integration methods. In other words, efforts that consist solely of a monolithic design of a stochastic computing approach will not be considered responsive. For responsive proposals, the impact of accuracy reduction using such methods should be clearly explained in contrast to conventional computing solutions.

24. Programmable vs. non-programmable approaches

Q. Does TA1 need to support a programmable processor system or could it just be a different, but efficient, way of implementing ASICs? Do “non-programmable” implementations only qualify as TA1b ?

A. TA1 does not specifically require programmability, but “the proposers should describe the broad based nature of the performance benefits of any new architecture.” Performers should be able to justify the performance advantages of any approach, programmable or non-programmable. Also note, “monolithic designs that do not leverage new materials or integration processes will not be considered responsive.”

25. Nanoscale systems

Q. Can we use quantum, nanoscale systems to generate novel hardware components under FRANC?

A. Yes.

26. US vs. offshore fabrication

Q. For FRANC development circuits is it necessary to fabricate in a US location fab and if so, would a pathway to onshore fabrication be an acceptable solution (i.e., initial designs may run offshore while later designs would target a domestic foundry)?

A. On shore fabrication is not required; however, section V.A.2 of the BAA, “Potential Contribution and Relevance to the DARPA Mission,” states as an evaluation criterion whether the “potential contributions of the proposed effort are relevant to the national technology base.”

27. Contracting

Q. Can a prime propose a traditional DFAR contract with OTA subcontractors?

A. No, subcontractors under a procurement contract must receive a subcontract that is fully compliant with the terms and conditions of the prime contract (FAR and DFARS clauses), to include all of the mandatory flow-down clauses. Traditional defense contractors intending to propose as a prime contractor, with a non-traditional defense contractor as a subcontractor, could mitigate the procurement contract flow-down concerns by proposing use of an OT as the prime award instrument. The prime contractor would have to be mindful of the statutory requirements associated with use of an OT (such as non-federal cost share) but, as discussed during the proposers day event, the amount of such cost share - even in the case of a TIA - is negotiable (after selection) given the unique circumstances associated with each proposal/project.