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ESSENTIAL SCIENCE CONVERSATIONS:

ARPA AND YOU: RESEARCH PROCESS AND FUNDING OPPORTUNITIES AT ADVANCED RESEARCH PROJECTS AGENCY FOR HEALTH (ARPA-H)

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TRANSCRIPT

Dr. Roxane Cohen Silver: Hello, my name is Roxane Cohen Silver. I am Professor of Psychological Science, Public Health, and Medicine at the University of California Irvine, where I also serve as the Vice Provost for Academic Planning and Institutional Research. I am also the past president of the Federation of Associations in Behavioral and Brain Sciences, or FABBS. For those of you who are unfamiliar with FABBS, we are a coalition of 29 scientific societies with a shared goal to advance our sciences and provide a unified voice for our disciplines in Washington, D.C. I'm delighted to welcome you to today's Essential Science Conversation, ARPA and You - Research Process and Funding Opportunities. This is the third in a series, and we'll focus on opportunities at the recently created Advanced Research Projects Agency in Health, or ARPA-H.

I'm honored to join my co-hosts for this event, Mitch Prinstein, Chief Science Officer with the American Psychological Association, and Robert Gropp, Executive Director of the Association for Psychological Science, who are both collaborators on this series. As many of you may be aware, ARPA-H just celebrated its one-year anniversary this past spring. For the past year, our organizations have been actively engaged in conversations about ARPA-H, both making the case for the importance of including the behavioral and brain sciences in the fabric of ARPA-H and advocating for funding opportunities for our disciplines.

As we thought about ways to engage our members in ARPA-H, we realized that our researchers tend to be more familiar with NIH and NSF funding mechanisms, and then it would be valuable to pull together webinars that to help provide information about IARPA, as we heard back in November, and about DARPA, the original and oldest advanced research projects program, which we heard about in March. FABBS, APA, and APS work to serve as a resource to our members and to increase federal investment in our sciences. This includes both growing the research budgets and supporting our members to compete for federal dollars that they may not know about.

We want you to have the information and tools you need to be successful applicants to bring your research forward to help these agencies achieve their mission. Today, we will hear from two speakers about ARPA-H and then leave ample time for questions.

First, we will hear from Dr. David Bowen. Dr. Bowen is a senior advisor with ARPA-H. He received his PhD in neurobiology from the University of California, San Francisco. He has extensive experience in public health and health policy, having served on the staff of the Senate Health Committee, where he was responsible for developing health legislation, including the Affordable Care Act.

Next, we will hear from Dr. Tyler Best. Dr. Best joined ARPA-H part-time in October 2022 and full-time in May of 2023. He came to ARPA-H from the NIH Office of Strategic Coordination,

also known as the Common Fund. From 2013 to 2019, he was a contractor with Booz Allen Hamilton supporting DARPA, the Defense Advanced Research Projects Agency. He earned his PhD in 2007 from the Uniform Services University of the Health Sciences and did postdocs at Northwestern University and Urogenix Inc.

The chat has been disabled, so please post your questions in the Q&A and we will get to as many as possible after the presentations. First, Dr. Bowen.

Dr. David Bowen: Hi. Good afternoon to those of you in the same time zone that we're in, and good morning to many of you throughout the country. Thank you so much. Thank you so much for inviting us. Thank you so much for giving us the opportunity to discuss ARPA-H with you. Both Tyler and I have-- Our academic training is in neurobiology, and so it's really coming home to be with this audience, and it's particularly enjoyable to speak to this group. We're really delighted to have this be an interactive discussion. What we'd like to do to set that up is initially Tyler is going to go through a relatively small, but I think good, narrative set of slides to give you an overview of what ARPA-H is, what it looks like, how it's structured.

Since you've heard from other ARPAs, or at least some of you have heard from other ARPAs, some elements will be familiar. Other elements will be somewhat different. As someone asked me in a previous presentation, "Are you and DARPA twins?" I said, "No, but we're sort of cousins." I think you'll see that probably pull through in the slide. With that, let me turn it over to Tyler, and I will rejoin you as questions come up at the end of the presentation. Tyler?

Dr. Tyler Best: Thank you so much, David, and also thank you APA and the rest of the organizations for inviting us again here. As David mentioned, we really appreciate this opportunity to meet with you all and share some background on what ARPA-H is and some of the things that we are looking for from the community and how to move forward there.

Hopefully, this slide deck will be informative and useful for you all in understanding better what the agency is and will be doing over the coming years. Our mission, if I can -- let's see, how do I-- there we go. ARPA-H's mission is to accelerate better outcomes for everyone, and that means everyone, not just those on the coasts or in metropolitan centers with great hospitals, but in rural areas of America and the United States that are underserved or underprivileged for a number of reasons.

When we say health outcomes, that includes everything in regards to health from mental health, or as President Biden mentioned, I think it was last week, mental health should not be mental health. It's just health in general. Any type of health is health. We want to also include that in our emphasis on our mission objectives.

Back in March of last year is when President Biden launched our agency, and he has been fully supportive. Even last week he tweeted out the announcement of our second program, PSI, Precision Surgical Instrumentation, with a focus on improving surgical outcomes so that surgeries only can happen once. He really wants us to drive the high-risk, high-reward programs that will solve healthcare problems throughout the country and the world.

Our organization is-- David mentioned, "Are we sisters to DARPA?" I think the same questions are, "Are we a sister to the NIH?" and that's a little more nuanced. I think the answer there is, again, that we are our cousins, maybe first cousins twice removed, or whatever type of familial relationship you want to establish there. In effect, though, our director, Dr. Wegrzyn, reports directly to the HHS Secretary, Secretary Becerra, as does the director of the NIH.

We are partners in providing healthcare solutions to the nation, but we do not answer to NIH or any of the institutes or centers there, and we are establishing our separate identity from the NIH there. We have a substantial amount of funding available. We hope and intend that that continues over the coming years and grows as we grow ourselves. We are not funding any internal labs. We are disease agnostic. We are modeling ourselves after the other ARPAs insofar as their business model in that we are lean and nimble. We are driven by program managers and their ideas.

We have a large contractor workforce. We're not focused on grants, providing money with loose ends, but instead on cooperative agreements, contracts, or other transactions with organizations to fund their work. As President Biden wanted, we want these audacious goals to have a high impact that goes along with high-risk type of programs. We intend to engage with all sorts of stakeholders, customers, performers, as we call them, those that do the work for us, those performers, in our health ecosystem. From the patient-centric organizations to healthcare providers, to federal agencies, to nonprofits, et cetera, that goal and our mission of healthcare for everyone, accelerating that healthcare for everyone, we need to include all of these customers and stakeholders and performers in that ecosystem to ensure that that happens.

We have four mission areas that we are focused on, and as I mentioned earlier, these are not disease-specific, but more of capability- and implementation-specific, focused on health science futures, essentially expanding what is technically possible. Scalable solutions, which is trying to make sure that healthcare solutions can reach everyone where they're at rather than having to bring them to the healthcare centers in general. We are also focused on proactive health, trying to make sure that individuals do not become patients, as well as resilient systems. We want to make sure that the systems developed for healthcare and how to provide healthcare are not susceptible to catastrophes, either natural or otherwise, resistant to pandemics or that we have seen in recent years with the COVID pandemic.

In generating programs and ideas, we focus heavily on what are deemed these Heilmeier questions. In the '60s, there was a DARPA director, George Heilmeier, who introduced a series of, at that time, eight questions that were focused on defining what DARPA did, and DARPA later adopted those as a catechism in which they ask these questions of all program managers and how they are developing their programs and what they intend to do. You can read all those here. A lot of it is really trying to distill the idea and concept of what we do down to the very fundamental minimum viable program or project that is done.

When Dr. Wegrzyn joined the agency last fall, questions 9 and questions 10 were added to our version of the Heilmeier questions, or the ARP-H Heilmeier questions. That is entirely driven by the healthcare needs of individuals because we want to have equitable access for all, a low cost and user experience to be beneficial to those, and we want to avoid misperceptions or misuses. We don't want people to think that the capabilities that ARPA-H are developing have ulterior motive and that the healthcare that is provided is solely for the benefit of them. Because we're in ARPA, we are driven nearly entirely by program managers, and this is a depiction of that program manager flywheel in that the program managers are term limited, a set of three-year terms with a maximum renewal of once more after their initial three years for a total of six years.

The programs that they run themselves can be two to four or even five years long, so that, in a way, a program manager may start a program but leave before her program is completed and has seen its fruition come to bear. That is the ARPA/DARPA/IARPA model in that the program managers that start and run programs will leave before they're done, and others with fresh perspectives will come in and take those programs to newer heights and ensure that success is made with fresh perspectives and fresh eyes.

A program manager has many attributes. Within our organization, they are in effect the sun or center of our solar system or the nucleus of our cell in that all the other team members in the agency, the leadership, et cetera, are there to support the program manager, ensure that what the program manager is doing in their programs run smoothly and the healthcare solutions, the technology developed, is going to be successful.

These program managers that come in are proposing ideas and program concepts that are radical, that are not necessarily evolutionary changes but revolutionary changes. We want these programs and program managers to have bold, ambitious ideas that just might be possible but are highly likely to fail, but along the way that they have designed their program in such a way that those failures can be successful in that they can serve as inflection points where on the program itself and the failures therein can serve to inform future research, future projects where success will be the outcome because of those failures.

Program managers have nearly full autonomy and decisions on funding and direction and directives for their program, and the outcomes are driven by the program manager. It's not done by committee. We've found that committees often reduce the risk involved, and so we want to enable and encourage program managers to take on that risk while maintaining the security that a federal government and federal agency can provide.

As I mentioned on the flywheel diagram, these are term limited. Program managers come in for a limited time and have a litmus test to create these programs and then leave and have others take over their programs and ensure that those fresh ideas and fresh perspectives are going to ensure success.

Program managers have many different-- as I mentioned, different attributes and phenotypes. We encourage them to think like a CEO where they are going to be running their, in effect, small company, and that program is like a small organization in which it's trying to solve a problem and deliver a product or end goal. Programs at an ARPA, especially ARPA-H, are different than NIH, where they're hypothesis-driven. Here, the outcomes are deliverables and objectives and capabilities, not necessarily papers or publications, which is a side benefit, but products or technologies or other capabilities that can be implemented in the real world and survive beyond the lifetime of the program itself.

Program managers have these characteristics. They need to be decisive, interdisciplinary. They can't be afraid to fail. They should be experts. We have program managers that come in that are visionaries or dreamers, have big ideas, and don't necessarily get bogged down in the weeds. On the other hand, we have those that are really technically sound and do really thrive in getting deep into the technology and the weeds of things.

The people that really want to solve problems that are engineers in a medical health-related field, those that care about the application, but not the theory of how things are done. Many, many different approaches and career stages for our program managers. Programs are formed based on a program manager's idea and how he or she sees a problem or challenge in the healthcare field, and that these challenges and problems aren't readily solved through incremental advances or more traditional approaches, but that through the creativity of the program manager and insights that recent technologies are enabling solutions that wouldn't otherwise be possible without ARPA-H investment, and that the time is ripe for these programs.

Program managers then develop the program, answer those Heilmeier questions that we went through earlier, and launches the program and funds a group of performers of various teams in which they're doing the work to carry out the solutions to that healthcare challenge.

The program has a life cycle over its three to four to five years where the program manager designs it based on the proposals that come into the solicitation for proposals through the BAA, Broad Agency Announcement. They build a portfolio and performer teams that are going to do the work. They've established metrics and milestones to measure success and failures of the teams they fund so that they can make decisions on what projects to pursue as time and phases of each program goes by.

That process of measuring quantitatively and sometimes qualitatively helps us learn and grow and the community to learn and grow based on those outcomes and those successful failure points, and ultimately-- hold on. This is covering my screen. The pictures of the people is covering that screen. I'll minimize. Eventually transition to the real world.

We have a team, P-A-T-I-O, a patio team, Project Accelerator Transition and Innovation Office that is focused on making sure that the developments, the objectives of a program can survive in the wild and transition beyond the funding of a program that ARPA-H funds.

As a program manager, you have the ability to cut off or supplement teams, performer teams, based on their progress, based on those metrics and milestones and the success criteria you outline at the beginning of the program, and that some [inaudible audio] if they aren't successful at completing the work, or if that risky endeavor ended up being a dead end, then the program manager has the option to defund them and reduce the level of funding for that project, or on the other hand, if things are wildly successful, the program manager has the opportunity to supplement funding and increase and expand what is being funded so that those successes are amplified beyond what was originally proposed.

As I mentioned, our PATIO, our Project Accelerator Transition Innovation Office, is trying to make sure that these products, these capabilities graduate and survive in the wild so that our solutions don't just end up dead on a lab bench somewhere or in a small market or niche example of a solution, but that they can be transitioned to those stakeholders and ensure success throughout the country and potentially the world.

This is an older slide. I will skip over it as far as the dash and the site selection goes, but we currently have our Open BAA available right now. In that regard, you can submit an abstract, and whether or not it's deemed of interest and has the scientific and technical merit meeting the requirements in the BAA, a full proposal from various teams may be requested.

This is a favorite slide of Dr. Wegrzyn, our agency director in the museum here in downtown in DC at the Renwick. This is her focus, and wanting to ensure that what we do at ARPA-H becomes miraculous, that what used to be seemingly impossible or unimaginable becomes the present state of things, and that the healthcare system, the health care solutions and overcoming those challenges can actually be accomplished in the present day.

These other slides are really focused on the real-world impact of a program manager, and I think I'll go over them quickly because I want to really get to some of the questions that you all have. I do want to emphasize that being a program manager is a full-contact sport. It's not a hands-off but a hands-on endeavor. As a CEO of your program, so to speak, the outcomes, the metrics and milestones will be highly dependent on your involvement and engagement with the teams that you

are funding. You won't be doing the work in their labs, but engaging with them on a regular basis, engaging with the stakeholders, engaging with patient advocacy groups will be very important. This image here of Adam Russell was our first acting deputy director. He was a rugby player back in the day before he became a program manager at DARPA and our acting director.

With that, we want to make sure that we take advantage of this moment in time. There's many, many advancements in technologies, and insights, and in just revolutionary ideas that we want to take advantage of. We want to identify people that can drive those solutions in such ways that are going to be revolutionary and not evolutionary to provide successful outcomes for health for everyone.

With that, we have some websites here that you can talk with us and information on how to become a program manager. Again, all of this information is on the website, and if you do have questions about details on this, you can feel free to reach out to David or myself at any time. With that, I think I will stop sharing and hand that time back over to our colleagues, Roxane or whoever is leading our conversation.

Dr. Roxane Cohen Silver: Thank you so much, Tyler. David, did you have anything you wanted to add before I move on to questions?

Dr. David Bowen: No, I see some already really interesting questions in the chat, or in the Q&A, so it'd be great to move on to those and to spare Tyler's vocal cords. Maybe I'll take the first couple of those and see how we go. Now, do you want [crosstalk]

Dr. Roxane Cohen Silver: Okay, if you-- I'm sorry. If you don't mind, before we go to the audience, I wanted to give my colleagues from APA and APS the chance to jump in before we go to the questions. Is that okay [crosstalk]?

Dr. David Bowen: Of course.

Dr. Roxane Cohen Silver: Thank you again, Dr. Best and Dr. Bowen for your very, very informative presentation. I'd like to turn to Mitch Princeton, the Chief Science Officer of APA, to kick off our questions.

Dr. Mitch Prinstein: Hi, thank you all so much and thanks so much for this really, really helpful presentation. In the way that you're talking about it, you're talking about thinking about the program manager role. I know one of the questions that we've had from the field is the extent to which somebody is coming with a proposal in mind, and in particular with a multidisciplinary team that they're already working with in order to carry out that ambitious proposal.

That's a stumbling block for some folks because everyone's kept locked up in our little silos in academia, and it's sometimes hard to have those pre-existing connections. Can you speak a little bit to your expectations or any assistance you can offer to help turn a great idea into the multidisciplinary proposal that would be a good fit?

Dr. David Bowen: Maybe I'll take the first crack at that. I think the slide deck is terrific. I think that one impression it may leave is that the program managers are sort of-- they are captain of the ship, but they're not sailing the thing on their own. There is a crew that assists them, whether that's the PATIO office, whether that's-- to take one example, I'm working with one program manager directly in an area that I have technical expertise in, and there's a small group of us that are working at various levels - some of us have worked at a senior level in this area before, some of them are

more junior - to provide that program manager with the team that he needs to get a good idea fully fleshed out and able to be launched as a program.

I mentioned that not because it's exceptional, I mentioned that because it's the norm. All of the program managers have teams around them. I think it's in recognition of the fact that, no matter how talented someone is, no one has all the talents they need to run all the aspects of all the things that they're doing. I think the trick of really good managers is to figure out, "Well, here are the things that I'm good at, and here are the things that I need someone else to be good at with me," and to build a team around them.

Now, that in and of itself, to get really to the heart of your question, that in and of itself is a skill, figuring out what you're good at and what you're maybe not so good at. It's also possible to help people with that kind of management skill as well.

Dr. Tyler Best: If I might add, that's what my primary role was while I was at DARPA as a contractor. We have contract vehicles and contract mechanisms to hire these great people that can serve as support staff for each program manager to ensure that they can bounce their ideas off, they can talk through things, they can work together to make the best of what their ideas are and ensure success.

Dr. Roxane Cohen Silver: Thank you very much. I'd now like to turn to Rob Gropp, executive director of APS, to ask a question. Rob?

Dr. Robert Gropp: Thank you very much. Great presentation, and it's wonderful to see how much is happening so quickly at ARPA-H. One thought that I've had and question that we get from some of our members is, I'm wondering if you could speak a bit to the global dimensions of ARPA-H and what the opportunities are for global collaboration, if there's-- what kind of priority is given toward US-centric research or global research or non-North American, non-US research. How does the global dimension of science fit in with ARPA-H?

Dr. David Bowen: Yes, again, maybe I'll take a start at that. There was a decision taken early on to-- just in terms of sequencing with the idea that an agency setting itself up can't do everything it wants to do all on the first day. There was a conscious decision taken in terms of sequencing to prioritize US-based assets first, but that is not to the exclusion of all ex-US assets or collaborators. It was just that for the first part of this year, the decision was made, I think very sensibly, to focus on the US. As we go forward, evidenced most directly by the fact that ARPA is bringing on board someone to work on global collaborations, as we go forward, that balance will begin to shift.

It's already begun to shift somewhat informally with ad hoc discussions between ARPA and ARIA in the UK, the Wellcome Trust, the Korean group that's thinking of potentially setting up what they sort of tongue-in-cheek called KARPA, and a range of those other collaborations, and lots of our program managers themselves have collaborators across the world. I think the short answer is, initially, the focus was on the US, but I think you can expect it to broaden as time goes by.

Dr. Roxane Cohen Silver: Perfect. Thank you. We got a number of questions by registrants really focused on the question that Rob's asking, "Who's eligible for funding?" In addition to the several questions about whether non-US citizens or international collaborations was possible, we were asked questions like, are graduate students eligible for receiving funds? Are postdocs? Are early career researchers? Could you speak a little bit to who you're looking for to do the research?

Dr. David Bowen: Sure.

Dr. Roxane Cohen Silver: [crosstalk] the program managers.

Dr. David Bowen: Sure. The answer that at least I'll give is both or either really encouraging or really frustrating depending on, I guess, how your morning coffee was this morning because it's the same answer that I think has both reactions. The answer is it can really be anyone depending on the needs of the program, that each program has the-- I was about to say the capacity, the option, the requirement to set out a BAA, a broad agency announcement, specifying the things that it is looking for in order to make that program successful. While many of those requirements-- it's impossible to tell at the moment, even for our existing programs, what the full panoply of those requirements will be, let alone for programs that have not yet started. It's entirely possible that they could cover an extremely broad set of skills and needs.

Case in point, I was at a meeting a couple months ago, and I was talking to someone who is in the community behavioral science department at a state public health agency, and she said, "Oh, yes, we were a DARPA grantee or a contractor," and I said, "Oh, what was it for?" She said, "Well, DARPA had this program to try and prepare for long-distance space travel to other solar systems consisting of decades, and we were given a contract to figure out the behavioral health aspects of that so that people didn't go crazy or kill each other along the journey.

You would never predict they would be the recipients of a DARPA grant, and yet they were. I would say that many of the-- and I should correct myself to say a contract rather than grant. I would predict that many of the contracts will go to established labs, established companies, but I don't think you can rule out anyone being potentially eligible as additional programs come on stream.

Dr. Roxane Cohen Silver: Yes.

Dr. Tyler Best: Maybe a different interpretation of that question is, are we going to be establishing education type of grants or awards? The answer is to be determined. We don't have a mechanism similar to the K99, R21. DARPA, the Defense Advanced Research Projects Agency, had Young Faculty Awards, which were research projects developed by young faculty. I think when I was there, it was newly appointed faculty that had been there with less than five or eight years or something like that. That was something that happened at DARPA. We haven't started anything like that at ARPA-H, but it's not outside of the realm of possibility.

For graduate students, for postdocs, that may be something that comes down in the future, but right now we don't have anything specifically tailored just for them. As David said, it's really driven by the program manager and the outcomes and the capabilities that they want to establish.

Dr. Roxane Cohen Silver: Thank you so much. Let me just take one more question about the eligibility, and then I'm going to turn it back to Mitch and to ask another question. Are these funds available-- and I guess it would be for the actual contractors for both for-profit and non-profit institutions alike. David, you mentioned a little bit about companies, so I just-- is that the case?

Dr. David Bowen: Yes. For some requirements of program BAAs, it may be that a medical device company is the most suitable what's called performer in ARPA speak, the person who actually does the doing. It may be that it's an academic lab. In the case of the DARPA rocket ship example, it was a public health department. It could be anything, but it certainly does not rule out either academic institutions or private companies.

Dr. Roxane Cohen Silver: Thank you so much. Mitch, would you like to ask another question and then maybe we'll turn it back to Rob and then we'll look at some of the questions that are coming in right now?

Dr. Mitch Prinstein: Sure. Yes. Actually, one of the questions in the chat is talking about some of the prior commitment that your office has made to joint healing themselves. Can you talk a little bit about how that's an illustration of ARPA-H and how that hit the mark as being ambitious and achievable?

Dr. David Bowen: Yes, well, maybe I'll go forward. I'm going to start with a slight tangent but bring it back. I've heard the program manager talk about this program, and he talks about it from his experience as a military surgeon and seeing soldiers who were in vehicles that ran over IEDs in Iraq. He said the force of the explosion from below was so significant that it would actually drive their jaw muscles into their skulls with such force that it would ruin their joints there. These were primarily young men and women in their 20s and maybe early 30s, and they can get a joint replacement there that'll last them for about a decade, and then another replacement, or decade, two decades, another replacement, and then there's no more option left for them.

I think that's a really powerful illustration of taking from your personal experience and saying, "Well, why does this have to be? What if we figured out a way for joints to repair themselves?" which will come as a great relief to anyone who's played basketball on decades-old knees or tried to throw baseballs with decades-old shoulders. I heard one phrase from the DARPA folks that you're allowed to assume one miracle in your program that you can try and say, "Okay, well, this is really unlikely, but if we do this, then here are the following things," but you don't get to assume two.

That's a pretty rough-and-ready metric for that blend between achievable and audacious, but it's not a bad one. I think that people-- we talk about high-risk, high-reward research, it does necessarily mean that not all the programs are going to work 100%, but we have to be tolerant of that because the ones that do are truly transformational. If we actually figure out how to preserve joints before they become arthritic, it's hard to even calculate the value of that in suffering avoided and economic gain and et cetera, et cetera.

It is not I think an exact science. Things that are judged to be completely outlandish and utterly unfeasible are not selected. Things that are "Oh, yes, of course, that's going to work," are probably too cautious, and the sweet spot is somewhere in between. Then I think the last thing I'll say is that the mechanism of selection is important, and it's different from a traditional research agency. In a traditional research agency, there's an RFP around a particular subject, and there's a group, there's a study section that meets and determines.

What tends to happen is that the-- if you look at the bell curve of the risk-reward ratio of the proposals, the mean or the median gets funded, that things that either end probably drop off, things that maybe one person in the group thinks, "Hey, this is amazing," but the rest of the group thinks, "Well, it's probably not going to work. That probably won't hit the pay line."

Sometimes that protects you from ideas that are outlandish and bad, but sometimes it stops you from funding ideas that are bold but revolutionary. The mechanism at ARPA is very much not that. It is very much under the discretion of the program manager, who has the capability to determine whether an idea's worth pursuing, working with the mission office and working with the director. You can't put a precise point on the scale and say, "We fund things that have a 73.28% chance of failing versus 78.9%." It's an art and a science.

Dr. Roxane Cohen Silver: Thank you very much.

Dr. Tyler Best: Certainly, along the way is establishing the program structure so that you can identify those successful failures, as I mentioned in the slides. We want to be able to identify and pinpoint those inflection points so that when things do fail, the knowledge gained from that failure is actionable, that we can move forward from understanding why things failed so that we can design the future experiments or future trials in such a way that success is more likely than it was before.

Dr. Roxane Cohen Silver: Thank you very much. Rob, would you like to ask another question before we move to?

Dr. Robert Gropp: Yes. Thank you very much. What I'm thinking is sometimes the limitation on revolution is having access to the right tools or techniques or common vocabularies, whatever, those sorts of things that enable the research that drive things forward. To what degree is ARPA going to be looking at supporting things or might support things that are in fact revolutionizing research design or tool development or the way we do science as a way to catalyze revolution and transformation? [crosstalk], I guess.

Dr. David Bowen: I guess two sort of partial answers or three kind of partial answers. One is, to take the example of our second program, the PSI program, or-- I don't know if we're pronouncing it, PSI-- it was PI until a week ago, and now it's PSI, so I don't know whether we pronounce it P-S-I or Sai. I suppose in this audience it would be Sai, so I'll go with that for now. That is a tool not to enable other science, although it will, but to enable a broad range of surgeries. It's a way to visualize pathogenic or disease tissue as opposed to non-disease tissue live and in real-time during surgery, so that's an enabling technology for surgeries.

There are also going to be, I think, enabling technologies, or capabilities that we develop, particularly through the network of offices, which are really hubs for capabilities that ARPA is going to develop out, that will provide, I think, broad-based capabilities for ARPA programs that are not simply tied to one program per se.

So those are two partial answers. I think the other thing you're getting at is, will ARPA intentionally fund the equivalent of, say, CRISPR or mRNA? The answer is-- demonstrably what the ARPAs have funded, that sort of technology, I think they were done as applied tech. How do we solve an issue of getting proteins to express in cells? How do we solve the issue of editing genes? In developing the applied solution, a general capability emerged.

Certainly, the internet to take a truly canonical example of a DARPA program. The internet was designed to be a way to allow military computers and military and scientific computers to talk to each other, and it's become arguably the most important technology of the last 50 years.

Dr. Roxane Cohen Silver: Thank you very much. I'm going to ask another question that came in from one of our registrants, and this, again, is speaking to the individuals who are going to be applying for the funding, not the program managers, but the contractors that the program managers will select. Somebody asked if you could present an overview of what the application process looks like or how it differs from R01 applications, for instance.

Dr. David Bowen: Tyler, why don't you take-- because you've been involved in--

Dr. Tyler Best: Yes, sure. Right now, this is through our Open BAA, which is available on our website. Right now, that Open BAA is accepting abstracts that are three pages long. In those abstracts, we ask for certain things outlined in the broad agency announcement itself, and they're judged on scientific and technical merit on cost reasonableness, on the capabilities of those proposing that objective, as well as the fit, so to speak, to the ARPA-H mission. Is this going to accelerate better health outcomes for everyone?

If that abstract is deemed of interest and meets the criteria, then a full proposal may be requested, at which point that letter will go out to the submitters, and a full proposal would be requested and given a potential due date for that. That full proposal outline and details are also included in the BAA, at which time at a minimum three government federal people with scientific expertise in that area will review the proposal, and whether or not that gets funded in full or part is up to a program manager at ARPA-H to decide on whether or not to fund that in part or full or not at all. That's the Open BAA.

Right now, just last Friday, the full proposals for the Nitro program, this joint healing program, were due. Those are now going undergoing source selection and will be assigned to reviewers. Again, three federal employees that have the expertise in that field will be reviewing those, in addition to the program manager will establish and decide which proposed ideas and efforts will be funded.

One important key there is that the program manager can decide to fund part, none, or all of what's proposed. They don't have to accept it, yes or no, full bore. They can pick and choose certain tasks or certain elements or even negotiate with those that are proposing to adjust or refine what is being proposed to better fit the goals and objectives of the program or what the program manager is interested in and sees as potentially impactful in their portfolio. I hope that answers the question.

Dr. Roxane Cohen Silver: Yes, very much. It does for me. I wanted to see if Mitch or Rob wanted to ask any other questions, or do we want to maybe take the first question that's in the Q&A? I'll read that, Mitch, unless you want to read it.

Dr. Mitch Prinstein: No, go for it. Thanks.

Dr. Roxane Cohen Silver: It is clear how important program managers are in the ARPA ecosystem. Have you noticed any commonalities in experience or outlook that make these people a good fit for their jobs? Then importantly, what do you expect that they would do after they left ARPA?

Dr. David Bowen: Smart, driven, capable, really committed to succeeding. Fair amount of self-belief that you have to believe in yourself to propose something audacious. I've really been impressed not only by the people that we have currently hired, which I am impressed by, but also by the applicants. I've seen a number of program manager job talks from others who may be hired, maybe being hired. It's an impressive group. It is not uniform when it comes to other characteristics. There are people at different stages of their careers, but I think that the unifying theme is, I really want to get this done, I really want to throw myself into this for a period of time and try and make some progress.

What people do is some of them go off to senior roles in industry, some of them go off to work at other ARPAs, some of them go off to work in academia. I do think that it's particularly important for ARPA-H to establish a strong post-ARPA career path and show a track record of success for the initial crop of program managers because people will look at them and say, "Well, I know,

Susan, she applied to be a program manager and got in and she had this great experience then went on to become blah de blah."

We all know that professional networks are enormously helpful and informative in that way. Before long, you will all know someone who at least knows someone who's an ARPA program manager and you'll all know how that person did. That will be either a very positive or a not-so-positive inducer for the next generation to become program managers, so it's always important to have that transition, but I think particularly so with the first group because they're precedent setting.

Dr. Roxane Cohen Silver: Perfect, thank you. Mitch or Rob, would you like to ask another question?

Dr. Mitch Prinstein: Oh, there's a question in the chat to ask if you could talk about, what's being done so far either at the program manager level or if there's already been a call for proposals in mental health, and in particular this comment is about autism and talking about the enormous need for a creative solution for distributing resources, educational and psychological intervention for those with autism.

Dr. Tyler Best: To date, I have not personally seen any ideas from program managers or through the Open BAA focused on autism spectrum disorders per se. Cognitive health in general, I've seen some ideas come through for that and we're reviewing all of those. We have contractor teams that have the expertise to thoroughly evaluate those type of proposals through the BAA, those abstracts, as well as program manager candidates that come in with those ideas. Autism specifically no, I have not seen it as of yet.

Personally, I have interest in that. I have a nephew, a brother, I did my PhD research on mouse model of Down syndrome, while not autism, certainly has some mental cognitive abilities deficits. There is certainly a need there that I personally would love to see there.

Dr. David Bowen: Well and let me add a couple things. One is, there's such a need as you rightly point out for solutions around autism for all the spectrum of challenges that face people with autism and families in these circumstances. I think it would be enormously helpful if there were advances that occurred through ARPA programs that could help. We are completely transparent about being evangelists for people to apply to be program managers and people to submit ideas to the Open BAA.

The Open BAA is called the Open BAA because it is truly open for any idea on any health topic. If you have an idea around autism, and this is true for autism or anything else that is health-related, but since the question was on autism, if you have an idea that would help, please submit it. If you have someone who would be capable of taking that idea and moving it forward, please encourage that person to submit their name for consideration themselves for consideration as a program manager. There's no smoke and mirrors on this one. There is an absolute open willingness to consider any good idea on any topic and any qualified person who's driven to make progress.

Having worked with the autism community for some years, I know that there is a deep and abiding wellspring of capability, of passion, of drive and technical knowledge that we would love to be able to tap into.

Dr. Roxane Cohen Silver: Thank you very much. There was another question that came in amongst the registrant that also asks a sort of similar topical question, so would there be funding

for rare diseases or a rare autoimmune disease, or does it have to be something as large and omnipresent as autism?

Dr. David Bowen: No, Open is truly open. If there's a proposal on any health area, and health areas need not be-- the other thing we should mention about program managers is that what you didn't see on the slide is all program managers have to have an MD or a PhD, and the reason it's not on the slide is that it's not true. We would welcome program manager applicants who are nurses, who are behavioral scientists. I personally would love to see some more electrical engineers working as program managers.

Let's figure out how to use information technology, communications technology, computer apps. Let's look at the breadth of technology and funding and capability and human ingenuity and throw it at problems that are significant in health. Those problems are without boundaries, so if there's someone who has a great idea on a rare disease, have at it. We'd love to hear it.

Dr. Roxane Cohen Silver: Thank you. Tyler or David, any final comments, as we're running out of time at this point?

Dr. Tyler Best: Thank you all so much for inviting us here. In looking for program managers and ideas, please be innovative, creative, provide technical justification, even if what you're thinking is so far out there that there's no technology that shows that it's possible. Cite data, recent research developments that show that something similar is possible because of this group at some institution, some company has shown something similar.

Dr. David Bowen: I'll just add my own thanks. Thank you to APA for hosting us, and I think congratulations. I think it's a really important function of a professional body to round up expertise and opportunities for their membership to get funding, to get professional advancement, to get even just connected with interesting things going on. I think that's enormously thoughtful of APA, and it sounds like this is one of a great series, so I'm so glad to have been able to contribute.

Dr. Roxane Cohen Silver: Thank you so much. As we close, I would like to again thank our speakers, our engaged audience, APA, APS, and FABBS for organizing this series. I would also like to thank Julianne Baron, Executive Director of FABBS, and our APA colleague Shandol Hoover and Pat Kobor, who ensured this webinar's success. Again, this webinar has been recorded and we will share the content and the slides with our registrants. Thank you again for joining us today. Bye-bye.