NIH Proof of Concept Network Success Stories

Session Transcript:   
2021 Proof of Concept Network Annual Meeting: NIH Proof of Concept Network Success Stories

Okay, welcome back everyone. I home again you're able to stretch your legs. I unfortunately was tied to a chair. I still haven't moved around. (Laughter) but I was trying to clear a few emails while I was waiting for this panel to start again. We're really excited for this next panel. So we talked earlier about the network and how it's been around since 2013, all of the different projects which we supported, the innovators we have supported. And, it's exciting when we can soak in some of these innovators and the projects, it shows we're doing something right. That's what we're going to be doing next. It's an opportunity for you all to hear from these four exciting innovators and their journeys. So that's what we'll be doing. So what we'll do is, as I said, we have four innovators who were academics, are academics, and have taken their ideas and have started companies or have brought products to market. So we will have each of them give a little sort of a bit of introduction on their journey about their product, technology, their project and their company. And then a little bit like somewhat of a journey through not just their own path but how they've lead through some of the programs, after we hear from each of them, we will then just have a discussion on you know, some of the approaches that they have taken, some of the lessons learned and success and students.

And so I'll be moderating the session, I'll have a few questions, but we want this to be interactive. So please type your questions in the chat and Q&A box. This is your opportunity to hear more from them and learn about their experiences. So please, we would -- I would love for you to, for the questions to come from you rather than me asking all the he requests, so please, as we are going, typing in the questions and then we'll bring it up once we start the discussion, but first, we'll start with next slide, please, I think we're going to start with Barry from Anavasi Diagnostics, he's an associate professor at the University of Washington, we'll talk about your journey, Anavasi and the product you're developing.

>> Thank you very much, Ashim. Yes, I am a faculty, and pioneering at the University of Washington. My research group is focused on developing point of care diagnostics. So we do some hardware development with a lot of assay development. So, February or so, of 2020 when COVID hit, obviously we thought we would contribute. So we started to adapt some of the technology that we had developed for some other projects towards COVID-19. So, around July of 2020 we applied for the RADx program, you heard a little bit earlier from Matt McMahon. It's like project warp speed except for diagnostics of rapid acceleration for manufacturing of diagnostics. We were able to go through the vetting process there and did pretty well. But we're in a really super early stage. This was university prototypes of devices and assays, something really far out from that point. So, July 2020 came and went, a couple of months later we got a call from Rodney Ho the Director of The Washington entrepreneurial program, sorry about that. At the University of Washington, so the REACH Hub at the University of Washington. So again, the opportunity to provide some funding to a couple of projects and to help a couple of projects apply for funding for a RADx core program you heard a little bit about before this redirect program. So Dr. Ho worked with us, brought together a team including Teddy Johnson, and helped us to develop an application for the RADx program. Through that we developed commercial milestones really focusing on things that would take it from an academic project closer to commercializations, what are the key steps like $200,000 Bucks you could really advance to promote the commercialization. So we got the award. Dr. Ho assembled a team to work with us closely as we've heard. Milestone-driven research through four months of work. We also had great support from NIH through an entrepreneur residency program that joined the program and helped us to define those commercial milestones. So after about four months, we pushed on technology in a couple of key ways, to move it forward. During that time we also raised money to support some additional activities. And, then at the end of that time, four months we published our milestones, we started to talk with RADx about the funding for acceleration of manufacturing. Again, the program Steve Flaim, Dr. Ho helped us to really refine the story and develop a pitch to the RADx program. We went through this with the team. Eventually recently got a $15 million that you heard about to accelerate manufacturing of the product. So we're in clinical studies now looking to get measure chants used authorization for COVID-19 tests in the next couple of months.

>> Thank you, thank you, Barry. Yeah, I've had an opportunity to work with Barry and his team over almost the whole year, it's been exciting to see the progress, as Barry mentioned when it started just like, an idea almost like a prototype. Now it's a real full-fledged product that will get to the market soon.

>> I shouldn't have let you out, yes, of course, thank you. Thank you, Barry. So, we will again get to the discussion and you will all have a opportunity to ask questions. Next we'll hear from Lilianne from Stony Brook University. So, yeah, it will be great to hear Lilianne about your journey from being a academic, the idea that you had in your case you worked with a small business to move the idea forward. So great story. So yeah, we would love to hear that.

>> Yes, my name is Lilianne Mujica-Parodi, I'm a professor of biomedical engineering at Stoneybrook university. What we're very interested in is using fMRI for clinical purposes, necessary neurodiagnostics and of course for research. In order to move into useful clinically it needs to operate at a single subject level. The way neuroimaging is used today, you have 40 subjects of one type, 40 subjects of another. You scan those two groups, then you look at comparisons between the groups. But of course if you want to use neuroimaging clinically you need to be able to take a single subject and use the data to be able to make decisions clinically about what's going on. And so, you know, if you want to be able to move to a single subject level analysis, what's involved is increasing signal to noise. And of course, in that case, there are two approaches. You can increase the signal. Or you can decrease noise. And so, the areas that we focused on were first of all moving to University of Texas for high field neuroimaging to get the noise we needed to decrease noise. The problem was there was actually an actual way to measure the scanner noise during fMRI. So there are calibration devices that are used to look at scanner stability, but the brain is not stable. It's actually producing a signal and so, of course what you want to do is to determine whether the signal dynamics that are the signal that you care about are actually real. So what dynamic properties of the signal are actually real? And what are due to artifacts? And in order to answer that question, we had to develop essentially a ground truth for brain signals. So we produced essentially an artificial brain that could produce a signal that was brain like. And then by using that known signal, and comparing it to what came out of the scanner, we could then characterize what was the scanner noise then remove it. So, the initial prototype we developed with a graduate student, a very talented young scientist named Dan Dedora, Helmut Strey, and I were the two PIs. In 2016 we were able to get SEED funding from the REACH program through NIH using that money we developed a prototype which was then further, you know, developed through an STIR through the NSF Phase I. And then in 2017, we also received an SBIR both Phase I and Phase II. And that was what we used to get our prototype to something that was sort of commercially viable. So the culmination of this whole process was beta testing in 15-20 of the top neuroimaging sites around the world. One of our big interests was being strategic in where these beta testers went. Because one of the advantages of the phantom is not only removing noise so you can look at a single subject, but also removing noise so that you can combine scans for multiple sites. We wanted to choose sites that already were sharing data as part of large scale collaboratives like ACD through NIAID. Unfortunately, as we all know in 2020 COVID happened. And as a result, exactly when we were supported to start our beta testing in all of the neuroimaging sites, pretty much all neuroimaging sites around the world closed down because the subjects were available, everybody was on lock down. So, the plan was somewhat derailed now getting back on track. We do now have some beta testers. That's where we've at now. We've been partnering through ALA scientific instruments. We were paired with them through the REACH program which is very helpful in identifying small businesses that might be interested in collaborating with us. And, for all of these grant mechanisms we've been collaborating very closely with ALA in developing what is now a sort of commercially viable product.

>> Thank you, Lilianne, definitely a great story. It's good to see that tale. Oftentimes, sometimes there are some academic innovators who undertook the idea and sort of started a company and sometimes it makes sense to a partner that is already existing working in something similar, it's great to hear that singer guy with ALA and the partnership that you built. There is funding that you would be able to raise and have a product out there that they can use. Okay. So, again we'll get back to discussing more. Next we'll hear from Jonathan Thon, who in some ways is almost like a poster child for NIH in so many ways. I mean, he received a K99 award then sort of started his journey there. Then has gone onto start not just one but two companies now, maybe more that I might not even be aware of. (Laughter) and take some of these ideas and sort of move it forward. And so, yeah, definitely very excited to hear about your stories, Jonathan, so I'll pass it to you now.

>> Absolutely. Well, I think I began my journey when I was a postdoc. I have a -- like most of the viewers I was an academic by training came to Harvard initially as a postdoc. During my doctoral work, my lab was focusing on understanding how platelets the Band-Aid for blood stream are made outside the human body trying to replicate that process and make platelets artificially. So that work led to discoveries which was an advanced version of the initial prototype for this. But that initial idea is what led to the application for the program, some early funding and conceptualization around how this could be commercially relevant. And, the opportunity to advance this to commercial opportunities paralleled my career. So I was then promoted to professor at Harvard Medical School, it reached a point where it became its own thing. I resigned my faculty position at Harvard to join this company that I just founded, as the CEO and chief scientific officer. I ran Platelet for quite a number, almost decades, until just a couple of years ago where I stepped away from platelets to found another biotech company called STRM.Bio, which unfortunately I won't talk too much about. When I started the Platelet, it was 0 people, one person was founding it. When I stepped away from Platelet a couple of years ago we had grown to about 40 or so people, Platelet is still doing great, I think they're at like 60 or 70 people now.

>> Thank you, Jonathan. Yeah, we'll get to discussing more in a little bit. Next we'll hear hear a little different sort of take now from Sarah Kalil who is an experienced methodist who has led a number of companies, it's a interesting question sort of Sarah, took an idea from one of the professors at the University of Vermont worked with him to create a company called map, then has worked in New England area to get a lot of support. So it's really great to have you Sarah, and excited to hear your story.

>> Thanks, Ashim. Hi everyone I'm Sarah Kalil, I'm the CEO and co-founder of a company called CoreMap. And at CoreMap, we're mission-driven to deliver a therapy for the very large patient population with atrial fibrillation which there have very few treatment options we're the diagnostic that will unlock therapy. With that background, a little bit about the history of the company, because we are very different from all of the presenters today. And that is that I, am an operator, have co-founded the company with an academic researcher. While I've been doing this with him for five years the roots of the company go back for 25 years, he first developed a computational research model to study cardiac arrhythmia, it was from his computational model that he commercialized as a training company that he discovered the patent portfolio that would become our company. By the way of understanding what we've done and how novel it is, today, with a 33 million patient population, less than 1% of AF patients, less than 1% of those are taken to an EP lab. And that's because there is no clear diagnostic to identify order in this what appears as a chaotic system.

And so, first, he shrunk the electrodes that are used for mapping today’s electrodes are almost a thousand times bigger than those that we're putting in the heart in the vicinity of the diameter of a couple of human hairs. But it's not enough to go small. He's stacked them in a pair and I listened to Lilianne talk about noise, so much of our early years was understanding noise. But it's not electrical noise, it's Wave propagation noise if you will, because the area that you're trying to look at has multiple ways of propagation. The less prominent ways end up looking like noise if you're looking at a large spatial area. So we shrunk the electrode to the micro scale, then we created what's called a orthogonal close you any polar pair which is a -- Uni polar pair which is a stacked pair, if you subtract the two stacked stair you look just below the tissue on 100 or 150 microns.

Now you've got high special resolution, you've rejected the far-field Waves, and configured those in a high density array. So we have 64 of those pairs that are delivered intracardially to the endocardium; they arrive at 2.6-millimeter shaft delivery. So a lot going on in this. When they get in there, we still have to solve for the problem that every activation beat was different. And so, my co-founder's invention was, look for a property of the tissue. Because the cells aren't changing from one beat to the next. So we eventually identify the tissue property that we could derive from the conduction velocity that we were recording with our high spatial resolution electrodes. So that's the core principles of our company.

But here we were in Vermont, the two of us with no money, and a patent portfolio. And so, the first challenge becomes how do you fund the company, and you were no in Kendall scare, no the in a major area. Nicer of us had marquee names going to the venture capitalist and say oh, let's bet on them again. Despite my cofounder being a profound electrophysiologist and me spending a career in early med tick. So we were successful. We raised three rounds of convertible debt, our velocity was only raise the money that we needed to gather enough data to raise the next money. And that was to preserve equity in the company as we came out of the gate. And ultimately, as you go out to raise money, you find yourself met with in God we trust, everybody else bring data. So how do we get the data set that convinces people to invest in the company?

So through our convertible debt financing, we set about how do we make electrodes, they're a concept not sketch odden a napkin, we tried and failed fabrication processes before we could think about how we could make something so small. Then challenged, we found ourselves challenged with how do we reduce the impedance which is effectively the noise. We resolved that problem. So we were at the point where we really needed some serious capital. And about this time we were introduced to the DRIVEN Hub. The DRIVEN Hub was incredibly helpful to us in terms of getting our message right, helping us build our story, which becomes so important as you go out to get professional money to invest in your company. So, they were helpful in that, they made introductions to us. They critiqued our presentations. And so we set out to raise our series. And were were targeting $10 million. And I think in retrospect if you have a lot of early stage inventors here who go through the same path I, the most important thing we did is to learn when to say no money, we had two terms sheets sequentially offered to us through our series A for $10 plus million we walked away from. It was really a culmination of two things that made us decide those investments weren't right for us. And neither of which was the valuation of the company.

And, the first was governance, your governance becomes very important because when you believe that you're in the best position to make the strategic positions for the company, you don't want to give up your governance to, and ultimately give your decisions to somebody else. So that was number one, and two number is, look at the people you're going to take money with, and say when things aren't going well, because they won't at some point, are these people going to have my back or my hides? So we decided that we would rather put the company on phase versus take money where we didn't think those two criteria were met. We ultimately ended up with a group of invest who did invest $10.5 million in us, I would truthfully say I would have anyone of them to my home for a thanksgiving meal, now we're this the process of raising a series B based on the human and pre clinical data that we've acquired to dated. That's a little bit about our history.

>> Thank you Sarah, we have a good diversity of innovators, companies and stories, so it will be a fun, fun conversation. So, you sort of heard that theme, if you started from somebody in lab discovering something really exciting. Then sort of moving it forward from there. In some cases, yourself, finding a team, in some cases partnering with somebody who knows it really well. All of you did get some sort of help along the way from some of the REACH programs and NCAI and all those different programs. We can sort of start the conversation with then, I can let you see two want to go, if no one speaks I'll call on people. But when you first have an idea, either an idea or know someone who has an idea, what are some of the early steps that you should be taking? What are some of the challenges in your mind from your perspective that you face? How do you go about solving those and figuring that out? So, I will start with I don't know who wants to go. Jonathan? There you go. (Laughter).

>> Well, I'm happy to kick off, yeah, a lot of us, especially if you're coming from an academic background or a graduate student postdoc you don't have a lot of experience in how to do program management and strategic planning. I think maybe the first step is to get a bit of an education with that, or bring someone in with that experience. Like as an adviser or a company leaderful because what effectively you need to do is to whiteboard out what success looks like to you. What would the end goal of all of this is you're trying to solve for. And work backward from there, try to build out the individual steps or gaps that you need to fill in order to get to that place. And I just started going through that exercise, you'll start figuring out what elements are operational in program development, what are infrastructure needs, the personnel needs? What are finance needs? What are intellectual property needs? All of the little pieces that ultimately have to come together and -- it's a lot of work. You can't do it all at once. But you start taking some steps building on what on a prioritized rank order what needs attention first and bringing that up to good enough that you can shift tensions to something else and go a little bit further. Now as a project processes and you recruit people to help you along, and possibly raise some capital, non-valuated or valuated or both, you're able to not do all that work yourself, but provide that labor among the growing team, and you're all continuing this prioritized gap filling process. But it's so important that you do that because, you don't want to get it away from there. If you do it the other way around you can end up solving short-term problems and end up somewhere where you didn't intend to be, and not the purpose of this.

>> Thanks Jonathan, yeah, I think sort of that point about having milestone-driven focus in mind. That project management is really critical. And I used to be in academia myself. Often in academia, you tend to get lost in I'm trying to solve this problem, and trying to figure it out. Then, sometimes you don't know when to sort of stop. So, I think that knowing that okay, these are the milestones we need to meet, this is how we get there. I think this is very important. Barry?

>> Yeah, I totally agree about that stage. I wanted to make a comment about before that stage, we see a lot of potential at university, there are a lot of ideas, a lot of people that are excited to do it, especially translational feeds that do commercialization. So, we get a lot of times early on the question of, you know, is 24 something worth pursuing, if -- is this something worth pursuing? Is there a need? What does competition look like? What are the intellectual issues? There is a lot of up front issues to figure out is this is a winning idea. That's where like entrepreneur residents, this is the model that we've seen often is connecting with somebody who has obviously the expertise that we don't have to vet ideas. The motivation to do it. They're looking for ideas. So I think that has been a big part of it. A lot of ideas get killed because of some fundamental flaw, at that early stage. I've seen the opposite happen when you pursue a idea for a long time. Would really vetting it, you would think we're onto something, we're spending time on it, but we're not actually vetting it properly at the early stages. That model of connecting with a expert early onto death is really helpful

>> I would add to that that, your balancing two things that are at odds, one is you want to act like the company you're going to become, and the other is as Jonathan said, what's good enough, because you could at a early stage invest in enormous amount in your patent portfolio, but if you're not acquiring data that's going to allow you to fund the invention, then you're going to have a problem, so, it's almost as if deciding what not to do is more important than deciding what to do, because you could do it all. But it's a cost. So what I'm choosing to do this, to what end am I doing this? How do I fit in with the milestones that identify success?

>> I really appreciate Sarah's point about being very careful about your partner. There's also an issue of timing. Because who you partner in at one stage in development of your product might be very different than the strategy for partnering later on. So when we first decided to commercialize, the assumption is that we would go to a company like Siemens because Siemens is a leader in fMRI, they would be exactly the right company to try to develop this and then get it out to market. And when we worked with REACH one of the arguments they make that I think was, that was very smart at that time was that it would be more strategic at that stage to work actually with a much smaller company with a small business because, there was a lot of R&D that still needed to be done in moving between the prototype and the beta testing stages that a larger company would not necessarily invest in in partnership with us. So they would kind of take it over and do it on their own, but we would be really left out of the picture at that point. At the end of the day it was a very smart idea to work with a small business, I don't know what the future will bring or what will remain, for the strategy at that time it was.

>> All of these are great points, some of it was making the right decision, some of it is knowing when to make the decision, who to partner with, who not to partner with. I would definitely, it's not easy answers, but somewhat different paths and have succeeded in some ways. So, there is a question and I think it's sort of, it would be great for you all to chime in in the chat, as an inventor who has a couple of patents could you elaborate how should I start? Oftentimes that's one of the struggles, not a lot of entrepreneurs and innovators have. They file patents, they have something but it's difficult to figure out where do I start? Do I clear the company? Do I go out and try to raise funds?

Also I think it would be interesting as you are speaking to it, if you could also talk a little bit to the geographical location in some of the challenges that come of it right. So if you are in Boston area, maybe it's a little easier to try to like reach out and meet some venture capitalists and others and try to do it that way. But if you are sort of in Vermont, Long Island, in the country where a number may be different. How do you start first? Then, how do you partner? How do you figure out what to do based on where you are? Sara? Would you like to go first?

>> Sure. So for me, because I was there, the patents were issued, but we had no money, we didn't know how to build it. What we did first which turned out to be very beneficial was that we engaged well respected key opinion leaders to say, if we can do what we propose we can, what's the value to the market? To the patient? And so, we convinced several key opinion leaders the merit of our ideas and it's potential to significantly affect patient outcomes. With that clinician feedback, we use that to get our initial funding in the company. And so, I think having somebody outside the company speak for the value of the invention is incredibly helpful. We also made a decision, and this was related a little bit to our space, there had been a sizable acquisition by a strategic for a company that was doing something similar that hadn't panned out. And, so I made the decision that no, none of our key opinion leaders or clinical advisers were going to have equity in the company. And that's been very helpful to us in our field, so that we could clearly say that there was no conflict between the people who were speaking for us and the merit of our insens.

>> Jonathan, since you have gone through the experience of starting something, you know, from sort of --

>> Yeah. I mean, first and foremost, you need to have patenting. Depending on where you are geographically, I was at a major tier 1 university in Boston, even then, the tech transfer had a budget for what it wants to pay for and the requirements, initially, I think she said, if you're working in the studying of the institution for the most part owns the IP. And, it's really their call as to whether they want to follow obviously or not. You do that by convincing them that what you discovered is the greatest thing ever, you'll have this huge impact on the world. Go ahead and file it. You don't hold onto patents for very long. As the IP progresses, the cost associated with making that IP grows exponentially. They have a budget. So, if they are filing, they want to do something with that IP, that means, typically to an organization, a commercial organization that develops the program. I think at that point, the invention needs to start, what are you really interested in, are you interested in taking this project commercially or not? And you want to be the person advancing these commercial efforts or would you rather somebody else do it? Because, if you choose not to advance this commercially, then the conversation really ends there, it doesn't really happen with the IP. If you are having this advance commercially, you wouldn't try to advance it commercially as I did, then you create the institution or company I guess the initial to acquire rights to the intellectual property. Sitting at the other end of the table you have to have negotiations with the tech transfer office, you have to converse them that it's the worst idea in the world, you'll lose money on it. That's the best they can do is a little bit of -- (Low Audio) probably nothing because they don't have any money yet. On the flipside of that, if you're not the one, you would like someone, then you are probably not going to have a conversation, you can direct them that the organization, the companies that publicly would a vested interest in the kind of work that you're doing and trying to encourage them to reach out to the appropriate partners in those other companies, incentivize the companies to talk to you and potentially enlightenment that technology. Those become very different paths.

>> In our case, one of the key issues to consider was how to market what we were doing. It was pretty clear that I mean, I could stand up there and Wave and say oh this is fantastic. But if this is a much less compelling argument than having the field collectively decide that this is the new gold standard that every standard in the world needs to have. And so, it was pretty clear to me that the right strategy with the beta testers means one of the elements involved was of course getting valuable feedback about the user experience and so forth. But the most important element of that was getting the leaders in the field to try our product, start depending on it, start publishing using it, and they essentially would be taking over the marketing. I realize that would be much, much more compelling that anyone that one person, especially someone who had a vested interest in the product would ever say.

>> Just want to add a comment following up on those. Jonathan said that the intellectual property, I think it's important to recognize that the clock is ticking at that point because those costs are escalating. It's important to be able at that early stage to do that vetting, find out is this -- can you make a case against the court for this quickly or, otherwise it dies because of attrition not being able to make that case and keep the idea alive. Moving to the past is important. Getting somebody else involved, taking it on yourself to that vetting is -- one ask be an option. For postdocs in particular, the question was from a postdoc, there are some programs now that are letting postdocs -- putting postdocs in entrepreneur roles to take time to take six months or even a year to focus on the prioritization aspects of their projects.

>> If you don't mind me just jumping in there, one of the most valuable aspects for us was at that earlier stage. We filed the IP, it would take years before it was actually -- grants, I mean, any claims were actually granted. But we filed the IP and now what? So as postdocs, working with a program manager an amount of money financed that would allow us to spend money on things that weren't research-related but exploration of commercial opportunity to see if this technology actually had legs. And how one would go ahead and develop it so that you then could build together an execution plan that one can do next.

>> Thanks Jonathan, and as Barry pointed out, sort of for postdocs to make that switch, there are a number of programs that are out there and try to help innovators not just postdoc graduate students and others, we're trying to make that jump into entrepreneurship. There are programs that support them like in exploratory, XLerator and other programs. National Institutes on Aging had a funding opportunity out recently, called ready where the focus wasn't postdocs in providing them with entrepreneurship training, a little bit of support to make that jump. I put the link for you, that particular funding opportunity has expired but hopefully they will renew it, hopefully other institutes will have something similar as well. Also there are a lot more other programs within your ecosystem that are providing this support like at your university or at the state level. So that is something to keep an eye on for that. In a little bit I'll put the link for a pretty interesting and new student-led organization that is out, Nucleate, they're doing a lot of really interesting things. They're trying to support students and postdocs and academics with a lot of entrepreneurship training. But they also have these incubator programs that are coming out as well. There's a lot happening in the ecosystem to support entrepreneurs and innovators who are trying to get in that -- innovators who are trying to get to that space. There was one question about institutes focus on making entrepreneurship a core curriculum to all students. I think again some of the universities and other places are doing that. But then even in places that are not, there are resources and programs out there that you can leverage. The other question, I think it sort of ties in with what Sarah you were talking about earlier, that piece about term sheets and other things, someone is asking about equity, distribution, the early stage, you cofound a company, you're leaving. Someone is asking again, if you are all comfortable with sharing how much is fair for inventors who opens the company to ask, do you get equity or cash payments? Some of those things, I think like Barry, might have some interesting insight as well. So RADx, Barry then Jonathan?

>> I'll give the answer.

>> So so.

>> From my perspective it's a situational response, because you have to value what capital brings to the table. Because an idea in itself would be the capital to develop it has a value of nothing. And so, it is awarding a piece of the equity commensurate with what is being brought to the table, it goes on and on. If you figure you're an investor you start, you have 100%, capital comes in there's a dilution to you, the next capital comes in there's a die lugs, then you hire a team, there's an equity option pool. So, it's a balance between preserving equity for a founder, and understanding that without the parties to whom you're going to give equity your equity will be worth nothing. So there's no formula. It's really situational. And you want to think, what is it going to take to either become a revenue positive company, or, to an acquisition? And what is the dilution that's going to be required albeit what's the capital that's going to be required at the various stages of the company? And what will be allocated to employee option pools? So, it's really a modeling experience. But in the end it's a negotiation every step of the way.

>> Thank you, Jonathan, -- someone has to leave in a minute. I'll give you two minutes.

>> We'll have a chat going in a second. But a professor here once put this dichotomy of a company between wanting to be rich or wanting to be changed. Clearly it's not as simple as that, there's a lot of gray in between. The more ownership or control you want to retain in your ventures, the less you're going to be raising or the less valuation you'll be taking or on the flipside the more fuel you put on the fire so to speak, the more money you raise to enable the technology and your ability to move faster, the more control you're going to see to investors for putting that capital in. Unfortunately, last no equation or table that anyone can share that tells you what is right and what is not. It's so specific to the opportunity, the founding team, where you sit on that spectrum, and how exciting the opportunity is and resonates with the investors, you may take all the money in the world the investors may not be there. You may want to take control of all of it, but circumstances are such that there's no way you can take the opportunity to the next step without giving up a certain amount of control. I think the conversation is a little more practical than theoretical, and really based on who's the capital on the table what opportunity is in front of you.

>> The best thing you can do for yourself in that situation is to surround yourself with experts.

>> Wanted to point out, there is also, a situation that emerges in pursuing IP as part of a academic setting as opposed to funding your own company and developing it within the context of the company, that has to do with the dual role as an adviser in terms of education and also in developing the technology. So in terms of IP, it becomes a little bit tricky when you're supervising students who are then working on the technology, on the project to make the distinction between is this someone who's acting in a what capacity of a employee or a co inventor then there for someone who owns a piece of the I p, that's tricky for students because they even evolve, they start as employees and then become much more independent. So this is something that there's no sort of boiler plate formula for handling, but it also is something that we have been thinking a lot about, particularly as students sort of come in and take on this project at later stages development trying to figure out how the share credit equitable is something that's nontrivial.

>> Just around the question, there was a question of staying at the university or actually leaving the university. The way that we looked at this transition is that there was sort of founders equity that was for past contributions up to a point in time. There's a key point where it is money coming in and future contributions, those should be tied to future performance, things that you would contribute in the future. That was a way to clarify. Here there's no formula for what that number should look like.

>> Thanks, Barry. Let's see. A few more questions. Someone asked, I think again, I don't want to put you on the spot, it's totally fair if you don't want to answer. If there are any conflicts sort of from the tech transfer office or the academic unit when you're trying to do some of this, it's how do you navigate it. How do you make it appealing to them to sort of help you move this forward?

>> I can comment just for my personal experience. I think that I'm lucky, even though the University of Washington is a state university, and private and state universities have different transfers in the office, generally wants to support inventors as opposed to taking the IP and going to do something else with it that goes against the inventor's wishes which is really nice. As lily pointed out we do have a conflict of interest that need to be resolved. Working with students or going on inside and outside the university. But they will -- the approach is to try to manage those conflicts as opposed to outlawing them, you know.

>> I personally found them to be very fair partners. I think our interests are absolutely aligned. Because that benefits both of us to succeed. So I didn't see any particular conflicts.

>> I would support that, that the tech transfer office was among our friendliest forces in the institution. We did have to navigate some items where we conducted research at the institution, and, the conflict of interest protocols sometimes slowed us down from conducting research, so we actually went out and found ourselves independent facilities in the beginning because it was hard pressed to navigate. But once we figured that out, it became much easier. It seemed apparently obvious to us, it was everybody's in everybody's best interest for us to be successful. But it wasn't always easy outside of the tech transfers.

>> There's an interesting question, I think worth discussing. So someone asked, it's from the perspective of the inventor, is it denied that -- is it a major driver for the inventor to believe the solution has a potential to solve patient needs and specifically will help patients and owl that. Especially in orphan disease and rare disease where no such therapy exists. So how do they balance that from like commercial viability of the solution and the potential of gaining NIH or other support being the only driving factor right? So it's an interesting question. Because for our office, I think everyone is working in research, all of us. Our goal is eventually to have a therapy or diagnostics to help patients. And then there is sort of that question about how do you now still make it commercially viable entity? How do you sort of grapple with that? How do you sort of make sure that what you are developing has commercial potential down the line and that there is a company, it's a product that sort of will get paid and things like that. I'm like, so before I pass it onto you all it provides support for the Proof of Concept Network, the very early stage where you have an idea, you're trying to start a company, you're starting to think about the requirement down the line. Will you get paid or not? How do you make sure you get paid before you're starting? How do you fundraise and all of that? Which is why it's important to have those things up front and think about it. But I also want to quickly point out even though, even if it's not ready, it doesn't mean it's no market there. I think there's a huge market for orphan disease now, you are seeing that more and more with a lot of the therapies are coming on for rare diseases and markets. So having even my commentary, with you all, I'm so like, you're sort of taking your idea forward, you have the same sort of question in mind. There is a clinical need, but how do you balance that with the reality of a commercial need? Making sure that it will have that down the line you'll get paid. It may sound evil, sinister to be talking about making money when you're talking about making a product to help people. It's necessary in particular for medical products, somebody has to put in the effort to funding the ongoing effort to get regulatory approval to do manufacturing, to do distribution, otherwise, have a science project from a lab can't get used in the patient. I think commercialization is necessary, whether you're talking about getting rich or making it economically viable. That's a balance that varies among individuals. But it has to be clinically viable, especially in medical products.

>> So from my perspective, there is a huge unmet need within clinical neuroscience, in neurology, this is not a rare disease, this is all brain-based disorders. From that perspective, it seems as though a lot of the research that people are doing really can't be brought to fruition without this very basic problem being solved. And if we're developing a solution it can't be a solution just for our lab. It should be a solution for everyone's lab, so everybody has access to the technology. The only mechanism for making that available is to do so commercially. Again, I see those two paths as being in alignment, and complementing one another, supporting one another rather than being in conflict.

>> I agree with both comments, the thing I would add is reiteration of an earlier point. The getting that we made it isn't going to be us on the podium speaking about the commercial viability of our inventions, we would choose people who were well respected in the field to make those statements for us, to publish those results. We still hold to that now that is not coming from us, there will be a day in the future that's our role but that's not now.

>> Yeah, I think that sort of speaks to the need to have those key allies and partners key opinion leaders at the early stage to speak for your technology. Sort of tied to that, someone asked what resources can you reference to connect with innovators that are ready would like to partner for commercialization. It's a question about identifying the team and how do you get that support? How do you sort of figure out who to partner with, who do you take? And someone asked, is there funding available for such commercial endeavors from NIH's perspective? The programs like the ones like the Proof of Concept Network is our effort towards that. Like, what we are trying to pick. And academic and providing them with all of the support like, money but also this sort of wrap-around expert, expertise and access and all of that. So, what advice would you have for someone who has an idea now he's trying to sort of either build that team or get that expertise to take it forward.

>> I would be happy to start there. I will say, I far underestimate how hard it would be to recruit in a domain so complex as we operate. And perhaps influenced by the pandemic, current job market, recruiting was incredibly difficult. We hired recruiters, we were never very successful with that. It really became us identifying who are the experts in our field. Maybe we can talk them into being an adviser to us at this point and tap on their input, leads us to other people? But it was really targeted fashion of seeking out who are the experts in our field, and how do we turn them into allies and supporters?

>> Thinking of doing this a little bit earlier, as an academic, I, like some of the others, feel like I don't have the ability to be a CEO or lead a company. I need to partner with people who can do that. But there's really no institute, there's so much expertise that is needed for the finance fundraising side, regulatory side that you have, to have the network of people. And you can either get that by going around just talking to people to try to identify them, or having somebody who's been through this before has their own personal network. I've worked -- the current CEO has amazing connections. You can call out to anything you need done, you can call and find somebody from minimal money help do it. It's an amazing resource. But that's really what the programs, the REACH programs and the other ones provide is that network of people to get that expertise. So, where those exist, that's a great way to have sort of a ready-made network of resources.

>> I agree. I mean, not so much in the context of brain dancer, we have another venture we're working on, that's exactly what we did. We found someone who had a lot of experience dealing with the FDA and I've gone through this whole process partnered because it wasn't a cost-effective time-efficient strategy to essentially reinvent the wheel. It made a whole lot more sense to work with someone who had already traversed the path, made those mistakes and benefited from that person's prior experience.

>> Yeah, definitely. I think that piece is so important. Finding the right set of people who can work with you. And it's sort of an art. And I think like also that finding that network who can help you is actually critical. There are programs we have developed at NIH. But as Barry pointed out, as all of you have pointed out there's a number of programs and resources in your ecosystem, in your local, either through your university programs, there are a number of those programs out there. So even if you are not a member FCOI, one of the NIH programs, I think there are either at your university or leveraging your state government and other places you can definitely take advantage of those resources.

>> Ashim, I think it was mentioned here, I can't underestimate the value of picking up the phone, reaching out, finding somebody who somebody respects in that field. One time any co-founder of mine were at a driven conference, he said I wish I could find the guy who led software development for XYZ. With Google you can find him get him on the phone, he might not be available, but he may know someone. Talking to people, talking to more people, talking to more people. Sort of that whole idea of talking to people made me think of the I-Corps program, I wanted to make a plug for that program. It's an amazing program, NSF has these notes and Hubs around the country, so your university is more than likely part of one of the I-Corps nodes, NIH has programs that are more focused on the NIH ORDs and grantees. But it's a great program, a great way for a early stage sort of innovators who are trying to get into entrepreneurship to do. Because it will really make you think. Because when you have an idea, it will make you think is there a validity from this idea or a business for this idea? It will make you go and talk to people, you will soon realize, maybe I should not be thinking this way, maybe I should be thinking this way because this is what the customers are telling me. The other thing this will help you do, when you're going to talk to people, you may find mentors and sort of people who can advise you just through that means as well. Take advantage of that, if it's offered a the your university or in your ecosystem, take add advantage of that program. There's another question sort of on the flipside. Any suggestions for individuals outside of academia approaching scholars in the field for partnerships and business development from the brand point of inside the university? What's the best place to do it. Will you have events, conferences? Sarah, you mentioned directly contacting people. What's some advice for that approach in terms of building those connections and making those networks

>> Well, I think REACH, that was its role, specifically it was to connect those two parties and introduce them, we were introduced to several potential partners, it was kind of a matchmaking service. I think those mechanisms already exist.

>> As I was looking at things, I mentioned a program, I should mention a few other programs, there's a program called C3i I that's a little more focused on devices and diagnostics, that's another great program. There are a number of these training programs that you should all take advantage of, the other thing I wanted to quickly mention is none of the NCI and REACH and the NIGMS in fact have a number of these entrepreneurial training and resources that are available publicly, so you'll be able to go and find it, David has a really good YouTube channel they have all these short videos on different aspects, you can learn about those things. There are a number of other Hubs with similar resources as well. Definitely take advantage of that. So we have a few more minutes. I wanted to just kind of as I'm looking through questions, one question I wanted to ask you all is, a little sort of put you on the spot here. What is one advice that having gone through this experience yourself, from different aspects like, one thing that you are looking back, what advice that you yourself from back then, something you could have done differently or a lesson you have learned that made you better at what you're doing now? I'll give you a second to think about it. If someone has something they want the chime in right away. Any sort of lesson or something that you've learned.

>> That is to define the culture that you're going to associate yourself with? Whether it's external advisers, employees, team members, clinical sites, but define who you want to be and it should be embodied in the people that you associate with. And it came down to, investor decisions which I spoke of earlier, define what your fiber is and stick to it.

>> In my case what happened is when we partnered with the small business, we assumed kind of a partnership that involved the division of labor where the academics my colleague and I were taking care of all the scientific aspects, then the company was taking care of the manufacturing and design aspects. That was a mistake, it seemed to make sense at the time. But what we really should have been doing was pushing the company to become confident in what we were doing as well. And the reason for this, we already knew something about the design and manufacturing because we dropped the prototype. But they didn't know very much about the science. This turned out to be a very big liability when it came to starting to sell the product. At the end of the day, we as academics couldn't be the sales force going out and contacting potential buyers going through all of the science for how it works. And so, looking back I should have forced that integration at a much earlier point. It will happen out of necessity. But it should have happened earlier. I would say unrelated to what I mentioned earlier. Make sure that you have an idea. And make sure that it stays good over time. It's easy to get sort of tunnel vision especially as a technical person, too. You have the technology that you're working on, you're trying to find a place to fit it. Sometimes it is a force fit. If it's not a viable idea you want to know that as early as possible. You can come up with another idea that would be viable. That's at the beginning. Doing that very early is good. You want to keep doing that as you move along. Because things change. You get more information coming in. You learn other competitors that pop up. The landscape changes. It can be easy to feel like I'm done with that, I already checked out and vetted the problem or the need. You should be doing that continuously. Pivot, a lot of times companies the products that end up becoming successful is not the product they initially envisioned. That's heavy on flexibility is important to stay viable.

>> Great. I any we answered most of the questions. I don't see anything else. So before we end I wanted to provide you all a opportunity to provide one piece of advice that either in academic we sort of try to build a company, take the idea forward, or anyone who is on the other side where we are trying to work with a academic with a interesting idea, they'll sort of start a business around that. So is Sarah, Barry one piece of advice that you want to give that you found extremely helpful. Either someone else gives advice to you, things that you have learned. Yeah, right as we end the session.

>> I'll jump in, I would say that academics should not make the mistake of thinking that they're not very well suited to starting and running a company or turning their work into a commercial venture. The reason the reason I say that is because I mean I have a bore who works, is haven't vice President of the start up, I sigh the same process of academics as well as in the start-up world, in the sense that we are going out getting investors every time we write a grant proposal. We're having a funding agency to invest in it. When we get a grant we have deliverables. Those deliverables go back to the taxpayer. We have to get things done, we have milestones as part of our regular research programs, I saw the transition as being a very natural one. So, I really don't see the academic and the commercial worlds as being really so far apart.

>> Following up on that. Maybe a little different perspective not feeling the confidence. I would say, to be able to do that. After getting into it, it's something you learn. So so I would encourage people to get into it, into whatever level of commitment to pursue something even if it's the case like I mentioned earlier of an idea that you think is good, it turns out to be the right one, you learn something through that process, the next time you'll learn more, you'll understand the things to recognize, the questions to ask early on, it really is something that you can learn through experience. That's what these programs are designed. In part to execute these things, but also to learn about the way so you can do more yourself.

>> To me it would be the management of acquiring data. How do you acquire the data that demonstrates that you solved the problem that you thought you did? And how do you manage the capital required to produce the data and considering those where you want to take in enough capital, use the proceeds to acquire this confirming data set, and then additional capital to produce additional data all the way up to demonstrating patient outcomes for your invention. Considering that as a strategy for the company.

>> Thank you. That was very insightful and helpful. I really enjoyed this conversation. It was easy for me, all I had to do was throw those questions this way. So it was, you know, it's been a great day to day, again, thank you all for sharing your stories. I'm hopeful, I'm pretty sure a number of the unknown visitors in the audience will find encouragement. From your stories, and it will -- be able to make that leap, either themselves or in partnership with others to take that idea forward. And you know, there are programs like, the REACH program and NCI and NIGMS, Hubs but also, done some other programs either at the NIH or like, in your local ecosystem either through your university or other platelets take advantage of those, definite if there are anyways to support, you can reach out. I'm sure the panelists will be happy to talk to you all as well.