

FDTV: Lessons Learned (NSF Trip)

- 00:00 Hi, my name is Dr. Christine Grant, I'm the Associate Dean of Faculty Advancement in the College of Engineering at North Carolina State University. And the purpose of this presentation is to let you know what we learned on our College of Engineering Faculty trip to the National Science Foundation.
- 00:18 This trip occurred during the Spring of 2015 when a group of basically new faculty went to the National Science Foundation with myself to learn more about what the National Science Foundation was about. For the majority of them it was their first trip to the National Science Foundation. They were able to meet with program officers who did presentations for them in a conference room, then they held individual meetings in the afternoon that were set up ahead of time with potential funding officers. During these meetings, the Faculty members were actually able to pitch their projects. They brought up what we call bio-boards and the bio-board actually had a summary of what they did-they took some pictures and a few graphs and some words that they can actually leave with the program officers. The content here is actually what was gleaned from the faculty during the end of their day reflection time in the conference room. And so this was very organic, I was leading the discussion and we came up with some things that we thought were relevant and we want to share them with you.
- 01:28 When we start to think about our research portfolio, our research portfolio is a puzzle with opportunities to expand indefinitely. So once you have your research portfolio put together, if you keep working it, you can expand it to areas that go beyond where you are at the present time. However, in order to expand you need to be strategic in your approach; you need to be opportunistic in looking at the potential opportunities that are available for you to fund your research or your education portfolio; and you will need to be reflective. This is something that is a challenge for faculty because we are so busy with so many things but one of the things that the faculty came up with during this visit was that it was very important to be reflective in the development of projects.
- 02:18 So our research portfolio is also a puzzle and for young faculty and new faculty, it is just an opportunity waiting to happen. You will see in this picture it looks like these are kind of blank places where you can put all kinds of projects and all kinds of activities so new opportunities abound for new faculty. The question is what opportunity are you going to go after and how are you- (audio is cut off).
- 02:49 Our potential research portfolios initially are a bunch of opportunity pieces. So as a new faculty member, you are looking at all these opportunities for funding from the National Science Foundation and DOE and EPA and on-campus grant opportunities and you don't know exactly where to start. Now, of course, again, it's important that when you're developing the initial potential research portfolio, you have to be strategic, opportunistic, and reflective.

- 03:20 So where do I start? Who do I get to fund me? Do I go through the NSF EFRI program? The EPA which is local to us? Do I get an REU supplement? Do I do an NSF EAGER? Do I do a GOALI which is with industry? Do I do something DOE or DOD? What other agencies are out there? For you there may be some things that are specific to your discipline and you don't know where to start. At the end of the day what you really want, is you want to have a portfolio that is again strategic, opportunistic, and reflective and what you will end up with is your research career box that will cover a multitude of agencies-a multitude of funding opportunities. In order for that to happen you have to have a vision and you have to have a research mission. Some of that should have been developed prior to you coming to NC State and I believe it probably happened a little bit in your job talk. Maybe you've gone off and done a postdoc and a couple of years that have intervened between you developed your initial vision statement and your research mission statement and now, but it is critically important for you to have a vision for what you want in your research portfolio to look like, what is your research mission and what is your what your group- (audio was cut off).
- 04:38 So what you need in this process is a combination of hypothesis, validation and application. And again, there are a lot of ways to look at research and research opportunities. This approach was actually developed by the faculty that were at the National Science Foundation, in terms of what are the different components that go into an actual proposal. So you need a hypothesis, you need to be able to validate that, and you need to apply it. The combination or the ratio that you have of these three things depends upon the funding program within the agency and in this case, when we were at the National Science Foundation.
- 05:13 So you need to make sure you have the right balance to actually get funded and what we thought about was the fact that you may have an opportunity to do different things, you may have your portfolio made up of different funding pieces, but each one of those funding pieces has those three components that we mentioned earlier. And there is a pivot point on which you are going to be balanced. So for a particular program, that pivot point – that we will call the pivot point – may be different. So where is your pivot point and where does it need to be with regards to your funding, portfolio and also the contents of things?
- 05:52 So we already discussed the fact that you need a hypothesis box. You also need a validation box and finally you need an application box. Now the degree of application that is going to depend on the program. Actually, the degree of all these depend on the program.
- 06:08 So again we ask the question where is your pivot point? it depends on the actual funding opportunity.
- 06:15 So in the engineering directorate, there may be one combination of those three things. If you were looking at funding in Human Resources within the National

Science Foundation, it may be that there's a different combination of those three things and it's up to you to find that information.

- 06:33 So how do you find out where the pivot point is? Well the pivot point, in the combination of those things in your particular proposal requires proper positioning, prioritizing and it has to be aligned with the core principles associated with your research. And then of course your program director insights that's- (audio cut off).
- 06:53 So now, what I would like to do, is that I would like to give you the list of information that the faculty learned while they were at the National Science Foundation. And this came from their discussions with program officers and their reflections about they needed to do when they came back to NC State.
- 07:10 The first thing, is to think about crafting proposal topics for variety of programs. You don't need to just go to the program that is aligned with your particular topic that you went in the door with. So for example if you're interested in catalysis and you want to go within the chemical engineering directorate it or the engineering directorate, maybe there is something in the chemistry directorate, that might also be useful to you-that you should look into.
- 07:36 Do continuous improvement and evaluation of your grants and your proposals.
- 07:42 Find the balance between being very risky and conservative in your approach. Some programs really like you being risk-a risk taker. Some of them actually would like you to be more conservative in your approach and that you can also find out from your program officer.
- 07:58 Ask if your project is incremental. Is it really going to make a big difference or is it just incremental over something that you have done in the past?
- 08:07 It's also important that the National Science Foundation to define the science for NSF. They really want to know what the science is.
- 08:16 What you have actually may be fundable-it may be a great idea, but it may not be fundable as it's written now and that's again, something you need can glean from your program officer.
- 08:28 Understand the review and triage processes and how they are implemented for your program. The National Science Foundation actually has a relatively new process that they're following for reviewing proposals. And it actually has its roots in something that is similar to what they do in NIH in which are not all proposals are reviewed. While at the National Science Foundation what they're doing, some programs are actually not discussing all proposals at a given panel. So for example, they may triage some in the side-we're only going to talk about the one at the top, oh you pick a number, 50% of the proposals. Not every program is doing

that but you need to understand the review process and how it is being implemented to feel your program.

- 9:12 The other thing is that you should consider a workshop to help your NFS plan. So this could take the form of two things. One, NSF holds workshops that you can go to, to find out about what their interests are in a certain area and what direction's they're going to take, that's one thing. The second thing is that you can look at a workshop that you could actually hold here at NC State, where you are the planner. We had one of our colleges Cranos Williams, who did one a few years ago on systems biology, in which he brought all of the-I called them "biggie wiggys" in the field around the country to NC State and had a strategically planned workshop that was sponsored by NSF. NSF program officers were there, in which they determined where the important areas of research were for the future. And so that actually put in front and center in that process and in that discussion. So those are two things you should consider, in terms of workshops.
- 10:11 The next, is to partner with HRD lead for Broadening Participation. Broadening participation is something that is very important to the agency, but we don't always do that well, especially in engineering. And there are people around the college and around the university that are working in that arena but they may be people who have funding from the HRD that is human resource division or director, within NSF-that you can partner with them the they already may be on campus and you can work with them for broadening participation ideas or partnerships.
- 10:41 Be an STC/ERC faculty research partner with other schools leading center level efforts. So the STC is a Science Technology Center and the ERC is there an Engineering Research Center. These multi-million-dollar research centers are great opportunities for faculty, particularly young faculty, to get involved with multidisciplinary collaborative research. The interesting thing is that you don't have to be the lead on the big proposal, in face as a young faculty member, you probably should not be the lead on the center proposal earlier on your career. Because it's a lot of work and it usually takes a few years actually to get the funding in place. And we have two ERC's here at NC State right now-this is 2015. So we're probably not going to get another ERC in the future. However, there may be other universities that are working on ERC proposals. Now that information is not public knowledge, but you can find that out through your networks by talking to different people. The other thing is that, if you are a faculty research partner on another school-with another school or another University, you still get the funding and you can still do you work, that's not the only way to go, but that is another way to- (audio cuts off).
- 11:56 The next thing is that we discussed how it's important to get on other proposals that are led by off other faculty as appropriate. For a young faculty member, of course, you really want to have your own funding because you really need to have your independent single investigator research portfolio as a part of your overall portfolio. However, there are opportunities to get on equipment grants so the

research instrumentation-major research instrumentation program at the National Science Foundation is a way where you can get on a project. So for example, let's say somebody is going to buy a scanning electron microscope and they need to demonstrate that there are 15 faculty members on campus that are interested in using the scanning electron microscope. You would then put together your information, it might be your CV, it might be your summary of what you have done in the area and why you would like to be able to be a part of that program and what you would do so you're part of a big team that is getting this piece of equipment and your name is still on the proposal and you're able to use the equipment. So that's another way to get on proposals and get funding and you still have something that's going to help you with your research program.

- 13:08 The next thing is to send information to program directors to volunteer for panels, you need to strategize your timing relative to when you plan to submit. So you can actually be on the panel before you have funding at the National Science Foundation-and I think that is kind of misconception that you have to have funding before you can be on the panel. You can be on the panel and not have any NSF funding. However, if you're thinking about submitting in that particular program you need to be strategic in your timing and some programs actually will not allow you to be on the panel if you're planning to submit in the near future but just check with the program director on that. And that's a great opportunity to learn more about the foundation.
- 13:49 You also need to perform strategic proposal planning. This is something that I know faculty came away from this visit with that information. In fact, one of them I talked to earlier today and they were talking about how they're really trying to be strategic at work with people to not just throw a whole bunch of proposals up and see which I see what sticks. Now I have to do a little bit of that but if you can just be strategic in your proposal planning and work with somebody and develop kind of this master proposal of what you want to do and then you can take that and morph it and tweak it and change it. And you can't submit the same proposal to a whole lot of different directorates around the National Science Foundation-in fact you can get in big trouble for that-or even different agencies, but there could be different aspects or different emphasis and once you get the big main proposal done then you can kind of peel off pieces of it and tweak it or apply it different places or you can get many proposals funded-again as appropriate you need to talk to the people who are doing the funding and the people in your field.
- 14:52 Don't apply for everything because nobody likes to see a whole lot of proposals from the same person especially the same proposal. And if you apply and it's just bad and you put down "I've applied for 25 proposals" and none of them have been funded-well yeah you get some credit for applying but obviously after proposal number 5, somebody should have been sitting down with you and telling you "you know maybe you need to tweak this" or "you need to be reflective and think about it before you submit again."

- 15:23 Understand the role of the PDs-program directors really have in the award process. And you can get that information from your program director. Some people are basically the panel at the National Science Foundation is advisory in nature, but at the end of the day, the program directors make the final decision and they allocate the funding. So it's very important for you to get to know the program director, because it can't hurt if they know you especially if they understand what you're trying to do. I have never had a proposal funded at The National Science Foundation at the level that was submitted. There's always some level of negotiations and usually negotiation down, but if you know your program director well, then they will understand what is really relevant to their program at what needs to be left in. So again understand the role that they really have in the awards process.
- 16:18 When you start to talk about the difference between modeling and experimental work, one of the things one of the faculty said was, "modeling may require validation and that may require collaboration". So if you're a person that does theoretical work with a lot of modeling and in the particular program you are applying to, you really need to have some validation and the validation may require experimentation and you don't do that, so you may need to collaborate. So modeling may require validation and that may require collaboration. I would say experimental validation.
- 16:52 The other thing that the faculty came up with was, "how does your project fit into the NSF community of Science and the NSF portfolio?" For example, the other night I was watching PBS and there was a special on the brain. Well the brain initiative is a huge initiative that is going on across agencies, not just at the National Science Foundation. If you understand that and you understand how your particular project can fit into the NSF portfolio and the programs that are coming out then that's really important. So always go and look and see what's being funded, what new initiative, what "Dear Colleague" letters, which are the letters that are sent out to tell colleagues that an initiative is actually coming out. That there will be a funding request. So keep your ear to the ground with regards to that.
- 17:40 Be prepared to do a good short summary that may lead to a long meeting with a program director. So what does that exactly mean? Well, all of our faculty that went up there on this trip had what we call these bio-boards. And like I said, the bio-board had a picture of them, it had a picture of their research and some very short-it's kind of like a mini poster and they were all prepared to do a very good succinct, short summary of what they do and why they were doing it. And you never know, sometimes the program director only has 5 minutes and then you leave the bio-board with them and it's great you make an impact with them when you leave. Other times they may be really interested in something that you said, and it may lead to a very long meeting which is always, in my opinion, a good sign.
- 18:25 Understand the emphasis of your program director's program and don't make them have to look for what the emphasis of their program is in your work. So for example,

if it is a hypothesis driven-well all of the research is hypothesis driven, but you have to understand kind of the emphasis that that particular person has. And remember program directors change. They're rotators. They're from universities and not-most of them are. Not all program directors have the same emphasis, so just because your colleague who got funding in a particular program five years ago, got it based on one particular aspect of the research, doesn't mean that the new program director wants to put the emphasis on that now. The other thing is, they may already have a portfolio full of stuff in that area and so now they're actually moving into a different arena based on maybe initiatives at the National Science Foundation is taking on in terms of- (audio cuts off).

- 19:25 The other thing which I just mentioned-understand what the program director is looking for, what's in their portfolio. Go online and look in FastLane find out what has been funded by that particular program director. I believe you can look it up in the detail search engine in FastLane. You can actually look up funding by program director, so you can put their name in. Certainly you can put in the name of their area and find out what has been funded in the last 3 or 4 years. Look at what the priorities are, look at the reports that NSF is putting out for the engineering directorate-if that's where you're going to get your funding. What are their strategic plans looking like, what are there committee of visitors-the committee of visitors is like an external advisory committee, and what did the committee of visitors say when they came to visit that particular group? That might give you some ideas of what might be coming out the pipe.
- 20:18 The next thing is explore outside the funding box opportunities. It may be your connection-may be a connection to your work it may not. So again, you may think "well I don't do anything associated with the brain, that's not my area", however if you're a theoretical person or you're working with big data, maybe there's an aspect of the brain initiative that is related to big data and it might be connected to your work, but-that-you're not thinking about that-initially.
- 20:46 Be flexible in your research conversations. Let them-this program officers talk first, and have a very creative strategic conversation. Do not try to just push your research agenda down the throats of the program directors, because they want to hear about what you're doing, and they want to learn more about you and how you operate and what your core values are in terms of your research. But this is an opportunity for you, more so than them, to learn about what their priorities are.
- 21:18 When you're writing the proposal identify a problem, why does it need to be solved and articulate that well in the proposals.
- 21:24 When it comes to knowledge about the funding approaches you actually may know you more about than your colleagues about what is fundable because you've got a relationship with some folks at NSF. So like I said earlier, what was funded a few years ago may not be being funded now, so you have to take all of this information and the hardest part especially as a new faculty member, is to figure out what

information is really relevant and what information is something that you can discard or kind of put on the shelf and not give the top part priority.

21:54 You also need to be strategic, opportunistic, and reflective in your approach to funding. This is something that has been a theme throughout this presentation and this is something that the faculty took home in a huge way.

22:11 So what you want is the opportunity to find the funding piece that fits into your portfolio very easily and you want to have a nice funding portfolio that has all kinds of pieces and then you go to an agency and BLOOP you're able to put that right into your portfolio, into that big puzzle, that research portfolio puzzle and it fits just right.

22:39 You want it to be able to be seamless and you want it easily be able to put it in. Now of course just like any puzzle, puzzles can be taken apart, puzzles can be disrupted, pieces can be taken out and your funding portfolio might look spotty at times. The key is that you want to be able to have that dialogue, continue looking at what's going on out there, to see how you can complete what is your individual research portfolio, which makes you the faculty member that we hire to be successful here and NC State. And of course what you want is dollars.

23:18 So I hope that this presentation gave you a nice overview of what we learned on our COE faculty trip to the National Science Foundation. Some of this information you probably read somewhere, but I want you to know that this group of faculty that you're looking at on this slide, this information came from them, this is what they learned, this is not what I told them, this is what they learned. So at end of the day, this is from them to you and I am just the vehicle. Again, this is Dr. Christine Grant from the College of Engineering at North Carolina State University, the Faculty Advancement Unit and I hope that this has been helpful and happy hunting for funding!