An Interview with

C. SUZANNE IACONO

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Conducted by Jeffrey R. Yost

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C. Suzanne Iacono Interview

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Abstract

With support from the National Science Foundation (Grant No. 0811988, "Designing and Using FastLane: Distilling Lessons for Cyberinfrastructures") CBI researchers Jeffrey Yost and Thomas Misa conducted oral history interviews with 70 NSF staff members as well as numerous additional interviews during 29 university site visits. An overview of the project is available at <www.cbi.umn.edu/oh/fastlane/> and a complete set of 643 publicly available interviews is at <dx.doi.org/10.13020/D6RG6B>. Here on the CBI oral history database is a selection of notable NSF staff including Joseph F. Burt, Jean Feldman, C. Suzanne Iacono, Constance McLindon, Carolyn L. Miller, Paul Morris, Andrea T. Norris, Erika Rissi, Craig Robinson, Mary F. Santonastasso, Rich Schneider, Frank P. Scioli, Beverly Sherman, George Strawn, and Frederic J. Wendling. Topics common to many of the interviews include the design and development of the NSF's FastLane computer system, interactions with users, e-government initiatives, grants management practices, peer review, and NSF policies and practices. These interviews span a wide range of NSF staff, from program officers to senior managers.

C. Suzanne Iacono has worked as a CISE program office and as Senior Science Advisor, and provides insight on FastLane from a human-centered computing perspective.

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Yost: My name is Jeffrey Yost, from the Charles Babbage Institute at the University of Minnesota, and I'm here this morning with Dr. Suzi [C. Suzanne] Iacono at the National Science Foundation. It is March 11, 2010. Can you begin by telling me when you came to NSF, which directorate, and describe principal positions you've had over the years?

Iacono: Sure. I came to NSF in 1998. I came as a Program Director in CISE, the directorate you're sitting in, here.

So I was Program Director of a program called Digital Society and Technologies, which morphed into Human Centered Computing. So I was Program Director until 2003 and then I took over the Information Technology Research Program, which was a Foundation-wide program and so we had a big committee with representatives from all of the other directorates. I did that for two years. I still sat here in CISE; had an office here. And then I became Acting Deputy AD for CISE because our current Deputy had to take over another office, so then I went and sat in the front office of CISE; it's what they call the Office of the AD, is the front office. And I did that for six months, nine months, the better part of a year. And then, at some point, I submitted my application for Senior Executive Service and was accepted into that. Then I came over here and was Acting Division Director of this Division, IIS, for a year; and then I was Acting Division Director of another division in CISE, still, CNS, for the better part of another year; and then I was Senior Science Officer in the front office for about a year. Now I'm back in IIS as the Deputy Division Director; this is a temporary assignment for me; I will go back to the front office as Senior Science Advisor. (Laughs.) I can't even remember.

Yost: Can you describe your experiences with managing review of NSF paper proposals, pre-FastLane?

Iacono: I recollect paper proposals from the other side [as a PI], right before I came to NSF. Maybe you remember too, that we had to get things to FedEx by 5:30 or whatever time the FedEx office closed, so that the proposals would get to Washington, D.C. the following day. And so it was always this huge, mad rush. You had to make 11 copies, I think, or 12 copies of the proposal, and so I don't know if you recollect the printers back then, but they were very, very slow and if I had printed something off at work but then I had to actually print the 11 copies or whatever it was, at home, before I went to FedEx, then sometimes the lines would not be the same on different equipment, then you'd have this made rush to try to fix the lines, take out words, and then get everything printed and bundled up to the FedEx office. Otherwise, you were late, and you miss the deadline. So we even had a time when we had missed the deadline but we knew that someone was flying to Washington, D.C. so we drove to the airport to give them the copies of the proposal, so that they would get to Washington on time. I mean it was just terrible, right?

On this side [at NSF], the issue always was sending proposals to reviewers, right? And so you would have to make physical copies of all of the proposals and then put them into these boxes. People are going to come to NSF later and be part of a panel but they've got to read all these proposals before, and they often would read 10, 11, 12 proposals so getting the right proposals in the right stacks and sent to the right reviewer was always a

logistics nightmare. It was something that the admin staff were responsible for doing and had to be done within a certain timeframe. Again, while you're getting them to the reviewers so that they had adequate time to review the proposals before they came to Washington and that was always a struggle, actually, managing that. It's just amazing to me today to think back on those days, at what a time-consuming kind of silly logistics operation it was, but kind of how it often devolved into lots of conflict with the admin staff because they were often supporting many Program Directors, they had many different kinds of jobs, so they might [be] late and then the Program Director is kind of yelling, no, you've got to get those proposals out to people otherwise they won't have time to read them. So it's very interesting. I'll stop there.

Yost: What was your initial response to the news that FastLane was being developed and that it would be a mandatory system for submitting proposals?

Iacono: Oh, it was fantastic, absolutely fantastic because the logistics of mailing things around was just a nightmare. So being able to have people submit proposals electronically, just made everything very, very different. There were lots of glitches in the beginning, lots of bugs, you know, proposals wouldn't come through exactly as they were supposed to, and we still have problems with font size. At one point we actually talked about legislating font size and saying you have to use these certain, you know, one of these three fonts. But for some reason we decided not to go that route, and so people are free to do what they want. But we still say it has to be readable, and often people try to squish tiny fonts into many, many more lines onto a page than is actually readable. And

that really ticks off the reviewer, so that's still a challenge. On the reviewing side, we don't have to send these big packages, so I would probably say it's less money, too. But I recall that the reviewers, now can read proposals online but they were angry because now they have to print off the proposals themselves, right? There was something in the beginning with reviewers still wanting us to send them paper proposals, even though they could themselves get them off the system. So, it's interesting; I mean, no one would think about that today. I don't think a person sitting at any university out there would demand that we provide them with paper copies, but back then it's like their printers, I guess, were centrally located, they worried about confidentiality of the proposals being printed, printers were slower, paper was deemed to be expensive, right? So it was a more-consuming activity and more costly, I think, than it is now, and also, of course, we've gotten completely used to this new model.

Yost: I understand that CISE was one of the areas that piloted FastLane, or at least a number of programs within CISE.

Iacono: Yes.

Yost: Can you talk about the interaction CISE had with FastLane designers and developers, and what type of feedback you were giving them?

Iacono: Boy, I don't remember. It's really hard; I can hardly recollect that era. I'm so used to the system, I mean, I remember the font thing that I mentioned. So lots of policy issues

because of these deadlines, and because of the many glitches, but there were lots of discussions about embedded URLs, right? One issue was they could give more information by putting URLs in these electronic documents that then would take us beyond the 15-page limit. A lot of the issues revolved around our policies, so you take those policies that grew up around paper documents and then you put them into the electronic world, and there's new possibilities that could let the PIs kind of escape the rules. So font size; more information than 15 pages can hold; issues around graphics, and what format they should be in, and whether or not the graphics came through correctly; what else did we talk to designers/developers about? I don't know, maybe it will come to me. I'm just not recollecting any more than that.

Yost: Did NSF offer training or support for the use of FastLane and, later, E-jacket?

Iacono: Yes. There's always been lots of training available around all of our systems. Tons of classes. There's an NSF Academy that monitors all of the classes that are available, and we have a catalog and people can go online and sign up for any courses that they want. I think everyone took courses, at that time.

Yost: You touched on this a bit, but do you recall if you got any comments from the research community, PIs, about FastLane and what was the general nature of the comments you were receiving?

Iacono: The people submitting, really, I think appreciated the new system. I mean, it made it so much easier. At the same time, there's a new division of labor, with the pushing of the button, and so I think there was lots of confusion about who pushed the button. It's actually the SRO, now. It used to be before that the researcher had to get the proposal to FedEx on time, right? But now, the researcher puts all of the information in there and the budget gets put in there, often with help from the SRO, and then one can edit over some period of time. But then it's up to the SRO to actually push the button to submit it to NSF. And so I think that some researchers didn't realize that if they didn't tell the SRO to push the button, then it would never come to us. So there were lots of proposals that we didn't get on time because of miscommunication or lack of communication back at the universities. So the SROs got brought in, in a different way with FastLane than before, so I think there was lots of training with the SROs, too. They had to learn new modalities; they had to train the people at their universities; and so lots of time people come to us with questions about FastLane, they come to their Program Director, and then we have to tell them to go back to your SRO because they set up a system in a certain way, you need to talk to them and they can train you in how to use it.

As I said, the reviewers doing the reviewing and being able to get access to the proposals, so do they get them faster than they did before? You know, the thing is, there's still processes that have to be managed so we try to get proposals to people a month before they need to come to NSF. So that should give them sufficient time to read all of them, write their reviews, and submit them. In practice, I don't think that we get all of our proposals to the reviewers a month ahead. I think we have so many panels, so many

programs, that many times we're late. We had, you know, all these snow days this year, right in the beginning of panel season, which was very hard on everyone. So, are we doing better? I mean, sometimes we get complaints if they don't have enough time. But then again, they probably actually don't read them until they're on the plane or a couple of days before they're actually coming here. We, in theory, would like the reviews to be available to us some number of days before the panel is actually held, so we could get some kind of idea of the set of proposals and what reviewers are thinking about them. So when we walk into the panel we have some kind of idea of what's going to happen. That could help the panel moderator to set up the panel in a certain way so that the proposals that nobody liked and are saying do not recommend, he might be able to blow through those very quickly because there's consensus. People can say this is why; and it wouldn't take so much time. But in practice, we get the reviews the night before the panel, the morning of the panel, during the panel, right? So, we have these systems that could, in theory, let us do some nifty things that we couldn't do before, but people still behave in the same ways, doing everything at the last minute. (Laughs.) Right? Because you're dealing with people who are very busy.

Yost: Has FastLane and/or E-jacket had an impact on how Program Officers communicate and work with their Program Officer peers?

Iacono: And how Program Officers talk amongst each other?

Yost: Exactly.

Iacono: In CISE, we have groups of Program Directors that work in programs, so it's that organizational structure that has changed, and peer communication, more than the electronics. It used to be that it was one Program, one Program Director, one Program Assistant. We had many, many small programs. Now, we have much larger programs, so we've pulled together numbers of small programs that are closely related scientifically, you know, called it something that's much more broad and then you might have five or six Program Directors. The main problem we have now is that the proposals come in, and then we have to decide how to parcel them out into panels. We don't have technology for that. We *could* have technology to help us do that but NSF has never invested in it.

We've done some experiments with these new technologies. Mike Pisani, who was Division Director here in IIS, is a machine learning researcher and he developed a tool whereby you could cluster similar proposals together. I actually used that when I was running ITR to help figure out which proposals belong together and if there were these orphan proposals, that is, a proposal where it's not clear where it goes and every time you present it to someone they'd say oh, that's not my area, maybe it's Joe's area; and you go to Joe and Joe says, no, that's not my area. So one could use this system to figure out which panel had the closest neighbors, scientifically, to this orphan, so it was very, very helpful. Back to the problem. You just get these 400 proposals coming in; or 300; to one of our programs here, right? And you've got six Program Officers so they're going to have, in panels, of about 20-30 proposals in a panel. So this is a tremendous amount of work dividing these proposals up, and that's what really takes the longest time. Even

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before they get to do that, we have admin staff that go through all of the proposals for compliance checking. So we have all these rules in our Grant Proposal Guide, and other rules in the solicitation, about font size, for example; you have to have no more than 15 pages; you have to have a post-doc mentoring form, if you have a post-doc; your bio can only be two pages; the project summary has to articulate intellectual merit and broader impacts. And if these things are not met, these requirements, then we get to return the proposal without review. You didn't meet the requirements; these are the rules; solicitation may say you can only submit one proposal to this solicitation and the PI may have sent us two; so we have to deal with all those issues. And then we have to divide up all the proposals into panels that fit, kind of, the expertise of the Program Directors that we have.

So we have a structure where the Program Directors have to talk to each other all the time in order to get their work done. It wasn't mandatory that we structure ourselves this way; no one made us do this here in CISE; and some other Directorates have done the same thing, but it's really the only way that we could scale up and so along with new technologies and increasing budget, we're getting more and more proposals every single year and so we're on a big growth curve. Even when the budget is stalemated we still get more proposals than we did last year, so every year we're growing. So how do you manage that much growth, double the number of proposals in ten years, for example, with the same staff? Technology helps, but there's all of these kind of open loops where there's no technology, so bringing proposals into panels, we have to do that by hand, basically. So this new organization, we think, helps us to manage so people can substitute

for each other when somebody's out, somebody else can do things, you know, we'd have some overlapping knowledge so you have a cluster of Program Directors. We pick each one because of their own expertise but they probably could handle the work of some of their nearest neighbors, scientifically, of the Program Directors.

Yost: Is that technology Research.gov; is that — I remember in my interview with [George] Strawn yesterday, I think it was Research.gov, in relation to work that Mike Pisani (pause)

Iacono: Mike Pisani's tool is a clustering tool. His tool was very experimental and it never was hardened, or developed, so it's not anywhere, Mike Pisani's tool. And Research.gov, isn't that the U.S. government portal for all proposals coming to all the agencies? Is that right?

Yost: That's Grants.gov.

Iacono: So what's Research.gov?

Yost: As I understood from what he [Strawn] was saying, it was an ongoing effort to try and take work that Mike Pisani and a graduate student had pioneered and take it to the next level so that it could be used within the NSF and potentially, within other agencies.

Iacono: Oh really? So I'll have to look at Research.gov. But that would be great if someone is doing that because it was the best tool that I've seen of all of the tools, and we looked at a lot of them over the years for being able to sort proposals into panels, which would save us just so much time. Then the Program Director could just look to see, you know, it would be an aid to them. Then they could say oh no, this one's not really right for X, Y, Z reason and put it over here. But you would just be fixing things at the margins rather than having to do the whole thing. So if it has a future I'm very happy to learn about that.

Yost: And Mike's no longer at NSF.

Iacono: No, he's VP for Research at Rutgers.

Yost: Did FastLane and E-jacket have an impact on internal reporting and oversight of Program Officers?

Iacono: The way that I monitor where the Program Directors are at, time wise, is not through FastLane or E-jacket. That's done through our information system, EIS, and EIS has been around forever. They just updated it recently, so it has a nice new web interface, much easier to navigate around. I can't remember; it's always been here. You can look in there and there's a dwell time module. All proposals that came to NSF would end up in the mail room, would have to go be data captured by the system, so there was a time stamp, a real electronic [time stamp], there's always been that for every proposal coming

into the Foundation. In the system, you can see when it arrived and then what program it was supposed to go to, and then this module that says what's the target date for various actions that have to take place along the work flow of that proposal. So that's where one kind of monitors; where I would monitor, as a supervisor, what the Program Directors are doing; whether they're on time or not.

Yost: This is also something you touched on a bit, but how did FastLane and E-jacket change the way Program Officers interacted with support staff?

Iacono: Let me start with most recently, there are some disturbing new things that are happening, whereby work that used to be done by admin staff now has to be done by Program Directors. For example, REU Supplements. Every single PI wants to get an REU supplement. You know what that is, right?

Yost: Yes.

Iacono: And there are standard amounts that we give, something like $8k. Sometimes there's exceptions; somebody wants two students and it makes sense, it's a larger project, and we can; so $16k, and there can even be different amounts but mostly it's a very routine thing. The PIs all know how to do this; there's a standard template for how you submit the Supplement; and the Program Directors typically want to fund every single one that comes in, because we believe in undergraduate experiences with research. We know that that's what gets kids to go to graduate school and to want to become

researchers themselves. So I had centralized that activity when we were using PARS, which is another old system, so that all of the REU Supplements came into the Division and within a window of time, and the admin staff could kind of say this is a spreadsheet of all the REU Supplements, here's the amount, and they could go to the Program Director and say, tell me which ones of these that you want to fund. And then they would say, oh my God, what's this one for $235k, right? Very different from the $8k. They might examine that and see that it's wrong or they made a mistake or it's really something else. But at any rate, the admin staff could go back and we had a standard review analysis, and we would just do them all kind of in this big batch thing. Now we can't do that. So the admin staff could do a lot of things in PARS that were batch activities; reassigning whole groups of proposals to another Program Director. So this Program Director leaves, we take all of that person's portfolio and we give it to the new Program Director who's going to take over that portfolio; batch these REU Supplements. But now everything has to be done by the Program Director; all of these actions. I believe that there are policies about Prevention of Abuse, or the Program Director has to look at every single thing, but because of this, the Program Directors are now individually doing each REU Supplement so I'm seeing them dribble through, right? Now this is the time when we try to get the money out to the PIs so that they can hire students for the summer. And so, they're spending their time on actions that are tiny, for us. These are not multi-million-dollar projects, new projects, where we have to really spend a lot of time and review and effort, site visits and everything, these are PIs that we've already funding and we believe in — we wouldn't have funded them if we didn't — asking us for tiny little amounts of money so that they can get an undergraduate, right? So we've never heard of

any abuses back at the universities, when we visit they all trot out their undergraduates, so I've never seen anything that IG [Inspector General] has found where people were using the money improperly so I don't understand why we have to force the Program Directors to do this extra work. And the same thing is true with transferring proposals. The way that E-jacket is set up right now, it's only the Program Director who can transfer a proposal to another Program Director. Again, admin staff, if we decided okay, you're going to get this bunch, once proposals have been assigned to a Program Director then it's their responsibility, but what if they're not here? What if they're on vacation and we need to transfer something to somebody because some action needs to be taken or who knows what? So these are the kinds of things that we're dealing with right now because the work load of the Program Directors is horrendous because of so many proposals. So being able to, you know, kind of outsource some of these more routine, tedious tasks to the admin staff is very helpful to them.

The thing with E-jacket is that it's now become a playground for policy, and a place where we, NSF, can be more closely monitored that we're following the rules, you know, to the ultimate. It must be stated someplace that Program Directors must be responsible for REU Supplements, or all supplements and so we're embedding more and more of these kinds of policies in them that are making it very difficult for us. So the policy office has become kind of a more critical element in our lives. I don't know if you've talked to people in the policy office. Jean Feldman; she's been here for years. And also you should talk to Karen Geary. She's in the CISE front office, and so she is our IT representative to all of the working groups that bring these kinds of suggestions back to the IT people. So

we've got these two things that I just mentioned now; I'll tell you another one, too. She's going to report that back to the groups that she belongs to, where they talk about what are the highest priority fixes or new functionalities that we need in these systems; that's Karen Geary. I think Jean Feldman must sit in with her staff on all of these meetings because lots of things aren't possible because of policy. So the other thing is that I cannot mass DD Concur any proposals, each one has to be done individually. There was a moment in time when I first came back over here to IIS and somehow, the system wasn't set up so that I could DD Concur. So DD Concur — you know what that is? It's the final step that we take in the science divisions; the Division Director has to concur with the process that has taken place and with the decision that the Program Director has made, whether it's an award or decline. Every single proposal that comes to this Division has to have a DD Concur. The DD has to, basically, read through the whole dossier; make sure that it's complete; make sure that it all makes sense; make sure that they followed the rules; make sure that it would be clear to the PI why that decision was made; on and on and on. The DD has to look pretty closely at these things. So I somehow couldn't do it; I wasn't given that capability in the system so there was a whole bunch of them that were stacking up, or had stacked up, when I first got here. So I thought, well, I'll just read them at home this weekend and then they're supposed to fix this Monday, when I come in, I'll just whatever it was, decline all of these things once I have read everything, and there was like 20 of them.

So I came in and I tried, like, where is the button; now I've got the capability, why can't I do a mass DD Concur. Well, no; policy says no, you have to go through every single one.

I'm like, well, I've already read every single one this weekend, right? I couldn't do anything about it because I wasn't given the authority in EJ yet, because I was new here and I had to go through some process. So then I had to go through each of the ones that I had already read and already done due diligence, you know, gotten back to the Program Director to say I need X, Y, or Z here or this is missing this — or whatever — and I still had to go through all these pages of clicking and clicking and clicking, right? That you've looked at this, and yes, you agree with that, and yes, you're going to continue on. And that's policy, right? They're not willing to change that. So the Division Director can't just say okay, I'm going to take all these home, or on the plane, or on the train, and I'm going to read them all, and then come back and do my mass decision, without having to click through every single little thing.

Yost: As I understand, in E-jacket, there's not a way to print, for one thing, and basically replicate what was in the paper jacket; you'd have to go through each component.

Iacono: That's right, yes. Exactly. Like I said, before, what a DD would do to concur when it was all paper, you would have these stacks of paper jackets, as the PD's had finished them they would sign, and depending on what time of year it was, then the DD would just flip through these pages. You'd open this thing up and you'd flip through the pages and make sure you have; yup, there's the abstract, you know, make sure the budget stuff is all right, they've got the right codes for the budget; you know, they've got all the other stuff that this jacket might need; IRB, blah, blah, blah; and you're kind of flipping through, and you've already discussed the award with the Program Director because we

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typically have; you know funding decisions happen before all of the paper work kind of trails after. So you've already agreed with the PD that it should be funded, so you're just kind of making sure the thing is complete and then you just sign off, right? So it's like a, I don't know, could be a couple of minute thing. And so now, it's not. (Laughs.)

Yost: Did FastLane have an impact on interdisciplinary and cross-directorate proposals, in your opinion?

Iacono: There's this capability in there where the PI can list other programs that they would like to have look at it, and I think that that is rarely used. I don't think that the electronics has really done anything to either hurt or help. It's just a problem of time and focus, so unless the PI has come to NSF and comes to see a Program Director in CISE and says, "I'm not sure where to submit this or what should be primary but I'm also talking to this Program down in SBE." Innovation and Organizational Change is a program that might be co-reviewing with Human Centered Computing, for example, if it's about computing in organizations. So then it kind of becomes known to the Program Directors that yes, I just talked to the Program Director down in SBE and she says that probably, because it really much more technical that I should probably submit it to you but I would love to have them co-review it, if that would be okay with you. So if there is that kind of proactive action taken by a PI then it probably would happen that the Program Director would then pick up the phone or e-mail the other Program Director and see if it's possible. But the main barricade is that we all do our own programs on our own deadlines, so down in SBE they do things in a completely different timeline. Proposals

are coming in at different times and decisions are being made not when we're making decisions so it's very hard for people to hold the proposal or wait a lot of months because we have this dwell time rule. Seventy percent of our work has to be DD Concurred by six months [from submission] so you can't really just sit on proposals and wait for other programs to do their thing. So there's lots of barricades in the core programs. Within CISE, a cross-directorate like this, it's pretty hard. Having said that, there are lots of obvious pairings that I see have been very effective over the years. So that's the Program Directors working very closely together and really trying very hard to make sure that if a proposal goes to Linguistics in SBE, but it's really about Natural Language Processing and it really should be here in our Robust Intelligence Program, that those Program Directors work very closely together. I see these nice pairings; it becomes difficult with rotators, because they're here for a short amount of time they don't develop those relationships across the other directorates as strongly, and that's how co-review and co-funding happens, so really, it's a people issue, the Program Directors and the PIs, just seeing that someone mentions another program. I think that so often the PI doesn't know which program is really the most relevant, so the example I gave you of the PI actually coming here and talking to people and asking, is the most serious way to do it. But if they're just guessing that other programs might be relevant, the Program Director might look at it and say they're completely off base, that program doesn't fund this kind of stuff. I haven't seen any system that has helped us there.

Yost: Did FastLane have an impact on how NSF staff interacted with the research community, with PIs?

Iacono: You see we still have to communicate via e-mail. We had e-mail during this whole change, and so there are many stages where we're doing e-mail with people. PIs are sending e-mail to ask questions about new programs, you know, this is my research topic, does it fit? We still have to contact reviewers, who are also PIs, via e-mail to ask them if they will be reviewers. There's no system by which we get reviewers. One could imagine a system where people sign up and give dates and their areas of expertise or something, and then they get assigned to panels that match the dates that they're available and that match their expertise. But there's no technology out there that claims to even get near that. So I guess we're not so immersed in an electronic world, really, that communication with PIs has been diminished. We still have PI meetings, we meet face to face, we still have site meetings, people still come to panels. Now that's something that we are working on here in this division, having hybrid panels and having virtual panels. We've had a couple of panels in Second Life; they were just experiments, so we weren't claiming that we were going to continue to do that forever, but they worked out pretty well. What you would see on the screen is the avatar for each of the people and then there would be telephones, so people would talk. We have our electronic panel meeting system, where everyone can see all of the reviews and they type in the panel summary that then gets shared. Typically, it's in a room with people seeing each other's faces, but we have these hybrid panels now where some people are at home and some people are in the room. So I could imagine us moving in that direction much more aggressively because of costs, airline costs going up, and people being so busy. A lot of people say no, I can't come to Washington, my wife is a physician and she's on call those days; but if I could

stay here in Ann Arbor, the kids are in school, I could participate in the panel. And so it really does fit some people's situation much better. I mean, we still have to contact the PIs all the time in the course of making awards, we always renegotiate the budget. It's rare that we give people the budgets that they ask for because we're always underfunded. We have to get human subjects certification. We ask them often to write the first abstract that we then edit before we put it online. So it's a real socio-technical system with lots of the social stuff still in there.

Yost: You provided a number of examples but I'm wondering if there's anything you want to add to how FastLane and E-jacket could be used more effectively to advance the research enterprise, moving forward?

Iacono: There's this tension between tight policy and more efficient, effective research enterprise with those things that, you know, you could implement that policy. There are other functionalities; being able to sort proposals into panels; having some kind of a more effective reviewer database, right? I talked about this sort of imagined world in the future, where NSF is a machine. Proposals come in over here, they get read, natural language processing so that one can understand the science, they get sorted, reviewers are coming in over here with dates they're available and areas, and they all get matched in some thing. There's no more face to face panels; it's discussions, they could be asynchronous discussions around sets of proposals, and then recommendations given. So the thing that we've always jealously guarded, of course, is the NSF scientific expertise and its importance in making the decisions. Other agencies, NIH, follow much more closely

what the panel says. The panel says fund this, the panel says don't fund that, and the Program Directors have to follow what the panel said. We believe that we hire people with the expertise who know that area of research and understand what a balanced portfolio should look like — you know, we're not getting enough proposals in this area, we need to grow it; we're getting too many in this and it's becoming very mature, we shouldn't be funding much more of that — so even though the more mature thing got highly recommended and the thing that we need got a lower score, we're supposed to take risks in order to remain at the frontier. I think everyone takes that job very, very seriously so I can't imagine that the NSF could become a complete machine.

But even back to picking reviewers, you know, the quality of reviewers is essential to a good review process, right? So you can have the most high status folks sitting on the panel, they could write terrible reviews; you could have young folks who are really hungry and see this as something they need to do a good job on, that are writing long, really excellent reviews that give the PI feedback. It's hard to imagine a system that would be able to deal with that kind of complexity of what it is that we do. But I sure wish we could put proposals into panels and be able to handle the orphans, the things that we just don't know where they belong.

Yost: And finally, looking back at the decade-plus history of FastLane, are there key lessons that can be learned from it in the design and development of cyber infrastructures and if so, what are those?

Iacono: I like very much the ability to start out with a beta version of things and be able to, as an agency, move it along. I mean, E-jacket is so much better now than what it was. And so the fact that we all use it and then we all help de-bug and think about new functionalities, and that all of that is taken very seriously, I think is great because you can't wait until something is perfect. And how would you wait until it's perfect if you didn't have all of that user input, right? I think it's hard, though, because you don't have much money for IT, compared to industry. We're really limited. And so it's the prioritization process; there's just some things that are higher priority and so you never get that proposal sorting tool because there's just so many other priorities way about it. It's a pretty good system with a lot of input and a lot of care. But I would say there's insufficient resources for us to move as quickly as we probably should. I could imagine us really being overwhelmed at some point in the future, were our budget to really double. We really suffered last year. Now, when I say suffer, it was a good suffering, in a way, because we got the R-money [ARRA money, more commonly "stimulus funds" ?], anyway; but then we have the same staff but 50 percent more proposals so it was a lot of work. The agency has to seriously think about how do you scale up. If we're going to double the budget, how do we do that so that we're not fighting with each other. You know, you didn't do your thing and I needed you to do your thing before I could do my thing and now everything is late, aargh!

Yost: Okay. Well, thank you very much for your time.

Iacono: Sure thing. Good luck with your project.

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Yost: Thanks.