

Interview with William Rundell

William Rundell served as director of the Division of Mathematical Sciences (DMS) of the National Science Foundation (NSF) from the fall of 2002 until the summer of 2006, when he was succeeded by Peter March of the Ohio State University. Rundell has now returned to his home institution, Texas A&M University. What follows is the edited text of an interview with Rundell conducted in fall 2006 by *Notices* deputy editor Allyn Jackson.

Notices: *What was the budget climate like in the NSF when you went there in the fall of 2002?*

Rundell: The first year was an incredible roller coaster. Over the previous forty years, DMS had gone up roughly with NSF, but probably a percentage point or two behind per year. You see little blips of inspiration. For example, after the David Report [published in 1984] there was a little budget boost. After some of the experiments the DMS did in the early 1990s, there was a decline—they didn't sell well. But this was tinkering with percentages, not major structural changes. But with the Mathematical Sciences Priority Area being declared and with [then-NSF director] Rita Colwell's promotion of it starting in 2001, the DMS went from about US\$100 million up to US\$150 million at the start of 2002.

The [fiscal year] 2003 budget was waiting to be passed by Congress when I came in. There was a US\$30 million request from NSF for the priority area, and in the Senate version of the bill someone had written in that DMS would only get a US\$10 million dollar request rather than US\$30 million. There was a big fight over this and an ensuing battle to try and restore the US\$30 million dollars. For the first several months it wasn't clear whether we were getting the US\$10 million or the US\$30 million. But that got resolved positively, and we got the US\$30 million increase, so the DMS budget was US\$180 million.

In December 2002 the president signed the authorization bill to double the NSF'S budget in five years. This meant DMS surely would get at least the NSF average increase. We had already almost doubled the DMS budget, and in fact at the end of that next fiscal year it was going to be US\$200 million. If we got the doubling after that, it would be US\$400 million, and we would be in great shape.

There was a sense of euphoria around the NSF that we had seen some good times, and they were going to get better.

You can achieve a doubling of the budget in five years with an increase of 15 to 18 percent per year. Instead, we got 2 percent. That burst the bubble. In subsequent years the NSF had a flat or declining budget. Things changed very quickly around the foundation. All the plans—you just saw them getting shelved. People were in the mode of, What can I cut?

Notices: *How did DMS deal with these changes?*

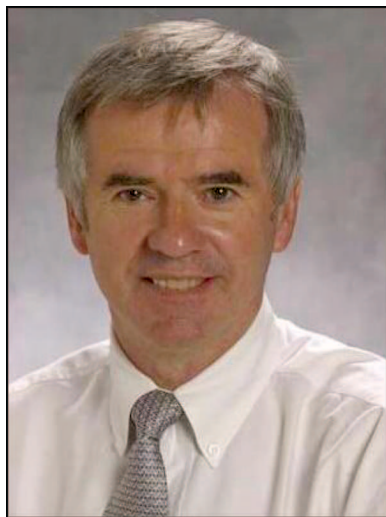
Rundell: Well, it certainly was problematic. It did cramp us making new programs. So for example, I inherited VIGRE [Vertical Integration of Research and Education]. VIGRE was being run at a pace that was commensurate in the long term with probably a US\$300 to US\$400 million budget. It was a very popular program in the foundation and Congress. The DMS was tackling the obvious problem of how to get U.S. citizens into science, in particular hard sciences. We were at least trying to do something about the problem, and there was a certain sympathy for that. So to cut off VIGRE would be stupid, and yet we had a program that required an increasing budget for its sustainability at then-current levels but that was overgrown for the actual budget. I also knew that VIGRE shouldn't be sustained. VIGRE was there to transform, and after that had been achieved, it had to be mainstreamed. So I brought in the Research Training Groups, which are similar to VIGRE but done within a smaller group. I thought this could be a useful addition to VIGRE and possibly an answer to, what will VIGRE transform into? At that time I had no idea what the budgets were going to be like in future years. But there was no intent

to cut the amount of money being spent on work force programs.

The DMS's move to put in a high-profile program to attract domestic talent into the discipline was a really, really important move. You can argue endlessly whether VIGRE was a good program or whether it was implemented well. But I think it's absolutely clear that the attempt to do something was viewed very positively.

Notices: *You did not cut the work force budget during this time. What did you cut in DMS?*

Rundell: Basically what we did was, we kept everything flat. I was an optimist, and I think we are probably going to see now better times ahead. It takes time to put programs in, and when the



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money does come, sometimes you have got to have an idea for grabbing it. To sit back and do nothing until good times come along isn't necessarily a good strategy. So a certain optimism has to be there.

But when I came in in 2002 the number of expansion programs already in place through the priority area was huge. We didn't need more programs as much as making sure the existing ones were working well. We were

doing business with every single research directorate in the foundation, partly through the priority area, but partly just through regular business. We were working with NIH [National Institutes of Health]. The DMS interaction with NIH is by far the largest interaction that has ever taken place between the two agencies.

Notices: *You mean even between the NSF biology directorate and NIH?*

Rundell: Yes. When biology puts something together, it's a few million dollars, and it lasts for a fixed period. We have been running this for five years now, and we are going to continue it. The level of money has been around US\$20 million, of which NIH has been putting in US\$2 to our US\$1. This is a huge program by almost any standards. During a visit to Congress, NIH director Elias Zerhouni gave three examples of NIH's innovation, and one of them was the interaction with DMS. So that is high value, and it's something that is a success.

Notices: *Most mathematicians believe PI grants are the most important part of the DMS. How did PI grants fare in this budget climate?*

Rundell: I'd rather not call them PI grants, although it is a good term. I would call them single-investigator grants. They include summer salary support, travel, sometimes graduate student support and visitor money. These are sometimes complicated grants. If you take any block of time from NSF's beginnings to now and you ask, what were the best years for DMS single-investigator grants or for senior researcher increases?, the answer is the period of 2001 through 2005.

Notices: *You mean in terms of numbers of PIs supported?*

Rundell: No—the amount of money in it. The number of single-investigator grants went up somewhat, maybe 10 percent. But the amount of money available in the grants went up considerably. Before that time, we were really cutting back on the amount of summer support. It was basically a month, maximum. We are now giving junior people two months, and senior people sometimes a month, but often a month and a half and even sometimes two months. We are much more likely to give generous travel, and we are giving money for bringing in visitors. The value of the grants went up enormously. The foundation had been worried not just about the lack of support for mathematics in general but about the low value of each grant. So in the priority area there were goals of increasing the money available globally to mathematics, about the work force, about interactions with other disciplines, and about funding grants at a better level. The next level of priority would be to increase the number of awards. But that was never one of the main priorities.

And remember inflation here is a huge factor. You view inflation costs as being 2 percent, right? But in fact the inflation costs that DMS was seeing were nearly 6 percent.

Notices: *Why?*

Rundell: The average raise in universities is 2 or 3 percent, but the stars are getting 6 or 7 percent raises. They are getting a 10 percent promotion raise, and if they move, they are getting a big hike in salary. These are the people we are funding. The single biggest thing we pay is single-investigator grant salaries—and you add on fringe benefits and indirect costs, which are prorated to the increase in salary. So the whole budget goes up basically as that block. We need in other words to double the budget every eleven or twelve years just to stay even.

One of the drivers of the priority area was to improve graduate student support. The numbers are difficult to come by, but I would say that essentially we doubled the amount of money spent on this. All of my predecessors and I worried enormously about what damage inactivity here was doing to U.S. mathematics. We knew that if we didn't do something for graduate student support, then we would not be able to attract the best students from

abroad, and we would not send a good message to domestic students. And we will suffer in the long term.

If we had US\$400 million, we would use part of it to enrich the grants, we would support more graduate students, we would support more post-docs, and we would manage to slightly increase the number of people supported. It would be nice for mathematicians to have the same level of support as chemists, biologists, computer scientists, and physicists—but not on US\$200 million, not on US\$300 million, and, to tell you the truth, not on US\$400 million. The idea of spreading it like butter doesn't look like we are supporting the best stuff. We would be perceived as not making the decisions, but just giving it out almost like a charity.

Notices: *Few mathematicians get grants. Does this inspire apathy among people who feel they will never have a chance to get a grant? Does this apathy mean a lack of pressure to increase the budget for math?*

Rundell: Sure. It's a vicious circle. About half of DMS support goes to about twenty universities, three-quarters goes to forty universities, and so on down the line. That means that the stakeholders are relatively few in number. If we spread the money out, would it make a difference? Yes, but then the amount of money would be so insignificant it would not be on the radar map. But I think it is probably true that the mathematicians who get the money aren't pulling their weight for justifying us to get more. And on the other hand, those people who are disenfranchised have no incentive to do that.

We don't make the case. If you find a staffer on Capitol Hill who has a science background, I would guess there is a 50 percent chance the person is a physicist. I don't know what the chance is that the person is in mathematics, but it's less than 10 percent. The fact that a lot of information flow is coming through the physics community and is filtered by that perspective is on the long haul going to make a difference for that discipline. It's not just that we don't work Capitol Hill well enough. We don't work the whole process. Math departments in universities are notorious for not promoting themselves as well as they should. It goes beyond just federal funding. It's that the discipline doesn't promote its case well enough, whether at universities or for the funding situation.

So the problem isn't that the US\$200 million budget is small. The problem is that we haven't been proactive in promoting the discipline, and that's why it's small. And it is criminally small. But I think the fault here is not the outsiders. We are in a situation where you have to promote yourself, and we just haven't done that effectively. We

haven't done it effectively in a sustained way, the way others have.

Notices: *Some say that while the people who go to DMS are good and dedicated, they are not at the top of the field. How would you respond?*

Rundell: I am going to react strongly to the insinuation that the program officers aren't coming from a good research background. One of the things I worked at enormously hard was recruiting. We were not hiring people who we were not supporting. These are people who have a long history of support. We have got people who have been graduate chairs and chairs of departments, some of them very good departments. I don't think we need to get Fields Medalists to come in to be program officers. But we absolutely have been hiring people who not only are potentially fundable but have been funded by NSF. So the people making the decisions are on average quite a bit better than the people submitting proposals. They don't have to be at the very top of that list, but they are certainly better than the average submitting mathematician. And several of them have absolutely stellar records of research. You've got to print this in 24-point bold, that the people making decisions are people who have been successful.

It's very hard to recruit. In academia—and hiring at NSF is like hiring in academia—if hiring is not the hardest thing you are doing, you are not doing it well enough. It's going to be hard, because you are looking for better and better people all the time. One of the things I spent a lot of energy on at the NSF was to get every permanent program officer a window office, get everyone a nice office, and give them a lot more time to do their own work, and fairly generous travel money. The program officer environment is actually quite good, and the people we have been getting are really very good.

I had dealt with NSF a lot before going there. I had been on panels, I had a long history of NSF support for my own work, and I was a VIGRE PI. So I felt I knew NSF to some extent, and I felt very good about it. That's why I went. Did I feel better or worse about NSF after I left? The answer is, I felt even better. As an institution, it's absolutely without question the best funding agency on the planet. It's totally professional, and the dedication of the people really is high. And the quality of the people is much higher than the outsiders think.

You submit a proposal to NSF, and the level of justice you get is superb. DMS gets 2,700 proposals a year. I am not saying that every single one of those is handled superbly. That would be impossible. But the level of professionalism and the number of those proposals that are handled in an absolutely first-class way is astoundingly high. And I think the important factor is that there are good people. That's why it works.