Interview with NSF Division of Mathematical Sciences Director Juan Meza

by Robert L. Bryant

Communicated by Harriet Pollatsek

In February 2018 Juan Meza became director for the Division of Mathematical Sciences (DMS) at the NSF. He came to NSF from University of California Merced where he served most recently as the dean of Natural Sciences. Prior to joining UC Merced, Meza served as department head and senior scientist for high performance computing research at Lawrence Berkeley National Laboratory. Meza received the 2013 Rice University outstanding engineering alumni award, was the 2008 recipient of the Blackwell–Tapia Prize and the SACNAS Distinguished Scientist Award, and is a Fellow of the AAAS. He has served on numerous boards, including the National Research Council Board on Mathematical Sciences and their Applications, and the NSF Mathematical and Physical Sciences Advisory Committee. This interview was conducted via email.

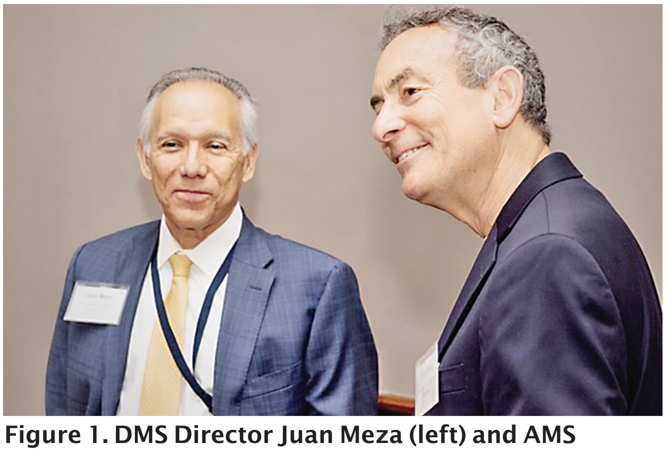

Figure 1. DMS Director Juan Meza (left) and AMS President Ken Ribet at the AMS-Congressional briefing talk given by Eric Demaine in May 2018.

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You've had extensive administrative experience, both in leading scientific teams and more broadly in the University of California system. Could you tell us something about this and what stimulated your interest in serving as director of NSF's Division of Mathematical Sciences (DMS)?

Yes, I first became a manager in 1997 while I was at Sandia National Labs, but I was leading small research projects before that as well. I remember thinking hard about whether I wanted to go into management because I was having so much fun doing research. So, I decided to ask a lot of people whom I respected about their experiences. What I learned from them was that, if you do it well, you are able to accomplish a lot more through other people than you could do on your own. I've tried to follow their advice although it's sometimes easier said than done. I then moved to Berkeley Lab, followed by a position as dean for the School of Natural Sciences at Merced. The most important lesson that I've learned is that each organization has a distinct culture that you need to respect and work with, and your leadership style needs to adapt if you want to be successful.

That leads me to your question as to what stimulated my interest in DMS, and it's partly what I learned early on—the possibility of doing something that would have a larger impact. Another strong motivator is that the mathematics community has been really good to me over the years and I felt that it was time to pay it forward. It sounds a little old-fashioned, but I grew up in the John F. Kennedy generation when you were told—"Ask not what your country can do for you; ask what you can do for your country." As a result, service to the community has always been a guiding principle for me.

What are some of the unique aspects and challenges of the role of Director of DMS?

I suspect that it's still a little early for me to give you a good response to this question, but at this point in time, what I've learned is that one of the most important roles is to act as the go-between between the mathematics and statistics communities and the rest of the world, including within NSF as well as outside. I have found over the years that this can be a challenge, but it's also one of the most interesting and fun aspects of the job because I get to learn about all the cutting-edge mathematics and then I have a chance to try to explain the beauty, the importance, and especially the value of the research to others who may not have the expertise or time to learn about it.

Most of us who have been supported by the DMS in one way or the other (a large fraction of the US mathematical community) have ideas about what the DMS could or should be addressing with its resources. Are there some particular issues that you have in mind to look into or work on during your tenure?

I have some general ideas, but I don't have anything specific just yet. In my first three months, I've been trying to speak to as many people and constituencies as I can find time for. My first impression is that DMS has been doing a great job in providing support to the community, and the research it funds has had a great impact in many different areas. As a result, I think it is important to ensure that I don't change anything that is already working well.

However, as I learn more about what we're currently funding and the needs of the community, I hope to be able to provide everybody with a clearer sense of where I think DMS might want to head. In fact, I hope this article encourages the math community to reach out to me and send me their best ideas.

Increasing participation of under-represented minorities in the STEM workforce has long been one of NSF's priorities. Would you say something about your own experience with involvement in this effort, perspective on effective strategies, and how the DMS director might help further this goal?

As you know, that has been a priority of mine for a long time and I hope to be able to contribute to this area. I'll also expand your question to include gender diversity as that is equally important in our fields. My own experiences have been shaped by several mentors who have helped me throughout my career as well as some lucky breaks I've had at key points in my career. From those experiences, I learned two important lessons. The first is that mentors play a critical role, especially those that come from similar backgrounds to yourself. The second is the need to recognize that this is a shared responsibility and that we can't place all of our expectations on women and underrepresented minorities to solve this problem. We all have a role to play in addressing this national challenge.

When I was dean at UC Merced, the accomplishment that I was the proudest of was in our faculty hiring. Overall, we hired 38 new faculty members of whom 18 were women and 7 were underrepresented minorities. In the Applied Mathematics department alone, we had a 50-50 ratio of men and women.

You've had considerable experience with interdisciplinary research, working in academia, national laboratories, and industry. Can you say something about what you would like to work on at NSF to help promote collaboration between the "traditional" DMS researcher and those supported by other NSF directorates?

Interdisciplinary research is a key area and one that has seen large growth in recent years. My own experiences have taught me that the intersection between different fields can provide some of the richest sources of interesting mathematical problems. As I mentioned earlier, academia, national labs, and industry all have their own individual cultures, which causes them to address problems in different ways. And that's not including the differences between individual scientific disciplines.

One lesson I've taken away from my own work is that you need to listen carefully to the other side and be willing to ask what may appear as really naïve questions. At DMS, I hope to be able to help bridge those different cultures so that we can start conversations about how to tackle some of what I see as the most challenging problems because they require expertise from different disciplines. However, let me also state that it is critically important to maintain a strong base program in the individual areas because this feeds into the interdisciplinary programs. The core programs are a necessary component for interdisciplinary programs to be successful.

Some areas where DMS PIs [Principal Investigators] could participate with researchers in other directorates are the NSF's Ten Big Ideas. These are new priority areas from Director Cordova, and the whole foundation has been working hard to define the most pressing research problems in each of these areas. We are already funding projects in several of these areas, but I hope that the math community sees the opportunity for even more engagement. From what I've seen, there are interesting new mathematical approaches one might use in many of the Big Ideas. (See sidebar on the Big Ideas.)

The NSF would like to promote partnerships with industry and other supporters of basic scientific research. What do you see as the challenges and opportunities of this kind of "fundraising" for scientific research?

Great question, as it gives me the opportunity to highlight a new program that DMS will start this year. It's a wonderful collaboration between NSF and the Simons Foundation to support new centers for the study of complex biological systems. This not only emphasizes the last point about the importance of interdisciplinary research but also points to the wonderful opportunities that arise when you team up with other supporters of basic research like the Simons Foundation.

The goal of the centers will be to bring together teams of biologists and mathematicians to address some of the

In 2016, NSF unveiled a set of "Big Ideas"—10 bold, long-term research and process ideas that identify areas for future investment at the frontiers of science and engineering. With its broad portfolio of investments, NSF is uniquely suited to advance this set of cutting-edge research agendas and processes that will require collaborations with industry, private foundations, other agencies, science academies and societies, universities and the education sector. The Big Ideas represent unique opportunities to position our nation at the cutting edge—indeed to define that cutting edge—of global science and engineering leadership and to invest in basic research and processes that advance the United States' prosperity, security, health, and well-being.

1. Harnessing the Data Revolution
2. The Future of Work
3. Navigating the New Arctic
4. Multi-Messenger Astrophysics
5. The Quantum Leap
6. Understanding the Rules of Life
7. Mid-Scale Research Infrastructure
8. NSF 2026
9. Growing Convergence Research at NSF
10. NSF INCLUDES

In September the Joint Policy Board for Mathematics, consisting of AMS, ASA, MAA, and SIAM, issued the following statement on Mathematics and Statistics Community Engagement with NSF Big Ideas:

> It is critically important that mathematical scientists engage in the conversations that the NSF Big Ideas have launched, whether by participating in upcoming workshops on Big Ideas topics, responding to special funding solicitations, or by communicating key research needs to NSF. We encourage all mathematical and statistical scientists to become familiar with the Big Ideas, and to contribute in a substantial way to the NSF's research agenda.

https://www.cbmsweb.org/2017/09/jpbm-statement-nsf-big-ideas

most challenging problems in biology today. For example, how does a genotype lead to all the various phenotypes that we see in real life? This is still a poorly understood area—we hope that applying mathematical models and techniques and working closely with biologists will help us better understand these processes. It's also a wonderful opportunity to train the next generation of biologists and mathematicians in ways that I think will fundamentally change the way we understand biology.

Image Credits

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NSF 10 Big Ideas from https://www.nsf.gov/news/special_reports/big_ideas.

ABOUT THE INTERVIEWER

Robert L. Bryant

Robert L. Bryant is a differential geometer whose research applies the theory of exterior differential systems to a variety of problems in geometry and partial differential equations. He has served as director of the Mathematical Sciences Research Institute (2007–2013) and as the president of the American Mathematical Society (2015–2016).

EDITOR'S NOTE. DMS presentations are now posted online at https://www.nsf.gov/mps/dms/presentations.jsp.