at Arizona, where I had incredible students. And I was editor-in-chief of Astrophysical Journal for a lot of that time, which gave me a different viewpoint again.

The decision to move to Cambridge was difficult. Professionally, it meant me giving up telescope time in favour of the rough and tumble of ESO applications, and moving everything. I must have had 100 people give me advice – mostly unsolicited. Half of them said “Why are you not on the next plane?” and the other half said “You’re mad to even think about it”. It was the same with my family. For me it came down to the fact that I had been in Arizona for 17 years, where I had been perfectly happy, and it was 17 years until retirement. Did I want another 17 years of the same thing, or to try something different?

There were other reasons, of course: the Institute of Astronomy is a unique science environment and it suits my style, observation interacting with theory. And there’s the chance to work at a university like Cambridge and to have a job that originated in 1703 and has been held by Eddington, Hoyle, Aihy, Couch Adams, Rees... I haven’t regretted moving. I think it would be the same for me if I had been at Cambridge for 17 years first, and then gone on to Arizona.

Big teams
One of the big things to have changed over my career so far is the balance between individual and team research – and I’ve taken that transition further than most. I’ve led four big teams, including one now on Herschel, and some of the best and most cited papers have had between 5 and 35 authors. I think it is inevitable: we have bigger problems to tackle, telescopes are bigger, and the volume of data we get is much bigger. From a personal point of view, I think there are dangers. Some days you become more of a science administrator than a scientist. If you get too far into management mode I think you do have to jump back into the trenches and do some science otherwise you lose the respect of your team members. Team research does demand a different skill set, however, and that is inevitably reflected in the way we are training our students. They need team skills and communication skills, because you can’t apply what you know about one-to-one interaction to these big groups. But that’s a good thing, because these skills are valued in industry and a lot of our PhDs go elsewhere than astronomy.

What’s not so good is the smaller fraction of data collected by individuals directly, at the telescope. When I started you had to be there at the telescope, in the freezing cold. Twenty years ago we got to stay in warm control rooms, but you still had to be on the mountain top. Now you’re sending Phase 2 files to anonymous help desks and the data appears on a website after six months or so. You do try to make sure PhD students get a chance to visit telescopes, but you have to be realistic. If you’re spending a billion euros on something like the E-ELT, you have to operate it in the most efficient mode. But that’s why we need a cadre of smaller telescopes, for experience. If we get to the point where the only experience of telescopes that students get is via a keyboard, we’ve lost something valuable.

Culture lag
The other big change is the internet. In some ways the professional culture has not yet caught up with the technology. There are going to be more changes and in terms of behaviours and training, we are behind the curve. If you invented astronomy from scratch, with the technology we have now, you wouldn’t invent the ways of working we have now. And things are going to change even more. If you look at the number of launches of space observatories and the number of missions working, we are in a golden age of observing. NASA currently has more than 12 astrophysics missions; that will go down to between one and three by the time the James Webb Space Telescope is in operation – unless we keep the HST running for ever. The feeding frenzy we’ve had over new data is going to have to change to working on those vast archives, and maybe that will mean more considered research, perhaps papers with a bit more meat in them.

The economic climate is going to be a big challenge. There’s funding pressure on science and we have to make more of the value astronomy has for exciting young minds and bringing them into the STEM subjects (science, technology, engineering and mathematics). In the US and in the UK too, there’s been a lot of concern that the country is falling behind in science and maths, losing competitiveness and endangering prosperity. We are so fortunate; we live off the public and it’s pretty generous, but we do so by the flip of a coin. We have to justify that support by sharing our discoveries. We’re building a talent base and a skills base for the country, but we need to keep what we do in the public eye. We need to have a bit more pride in our discoveries, to shout about them a bit more.

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