



Núria López-Bigas has a one-to-one meeting with PhD student Hanna Kranas.

# HYBRID WORKING TAKES HOLD

Two years after COVID-19 first hit, life in the lab has changed, perhaps forever. **By Kendall Powell**

**O**n 17 March 2020, Serena Nik-Zainal's laboratory shut down after two members of her group came down with COVID-19.

Announcing the closure to her team at the University of Cambridge's Medical Research Council Cancer Unit, UK, she said: "Take everything with you, take your screens and your good office chairs – there is no chance this is going to end in three weeks.

"As a PI holding lots of careers in my hands, the hardest thing was managing their expectations," says Nik-Zainal, whose priorities suddenly switched to addressing worries about well-being, lost experiments, staying connected and how to move research forward from various remote locations.

In the two years since the World Health Organization characterized COVID-19 as a pandemic, many research groups have established a 'new normal' routine that blends working from home with time in the laboratory. It's clear that many pre-pandemic work patterns are gone for good.

Indeed, academic supervisors are following the same trends as employers in other sectors. Last year, the World Economic Forum (WEF) asked 12,500 employees from 29 countries about their views on the future of work, post-pandemic ([see go.nature.com/3sdh6fj](https://go.nature.com/3sdh6fj)). Two-thirds responded that they wanted more flexibility in the amount of time they spent in the office, and 65% reported that they were more productive when they had a flexible

schedule that allowed them to do some work from home. On average, respondents wanted to spend 2.5 days per week working from home once pandemic restrictions are lifted. The WEF survey and others show that the predictions that remote work would be disruptive, unproductive or lead to burnout were largely unfounded, and that workers' desire for flexibility greatly outweighs these concerns (see 'What hybrid workers want').

Nik-Zainal's team has embraced hybrid working. Those who need to do bench work have sorted themselves out according to rotation schedules and culture-room capacities. Those who do computer-based analysis have more flexibility, but generally work in the lab either twice a week or every weekday during the core hours of 10 a.m. to 3 p.m.. Team meetings are held between those hours, too.

Nik-Zainal sees value on both sides of the hybrid equation: "Being in the same space is important for sparking creativity and discussing certain issues in person, but we do not need to be nine-to-five in each other's company all the time," she says.

Principal investigators (PIs), including those who started research groups during the pandemic, are now incorporating the best parts of pandemic flexibility into the future of research. "It's hard to see any good when we are heading toward six million deaths," says Mark Gerstein, a computational biologist at Yale University in New Haven, Connecticut. "But the pandemic has taught us new ways of thinking about things."

For example, Gerstein has learnt that some group members work most efficiently at home, whereas others really need to come in to work. "I have been a little surprised that the tails of that spectrum have been so wide."

Gerstein says that increased flexibility should also help to ease some of the thorniest problems that early-career researchers can face, such as childcare support and the two-body problem – the challenge of two partners needing to find a job in the same geographical location. "I want to be very flexible," Gerstein says. "That's what talented people want in their workplace."

## People and project movers

Many lab leaders were quick to adopt online tools that could help them to organize and communicate with their teams. Cell biologists Eugenia Piddini and Rafael Carazo Salas at the University of Bristol, UK, for instance, started to use these techniques as soon they realized that home-working was inevitable, and Carazo Salas says that "many of those quick structures

we put in place, we still keep to this day". These include a Google Sheets booking system for lab spaces and devices that people can use to take data home and analyse them there.

Hybrid lab working has also changed the dynamics of groups. Gerstein's weekly Zoom meeting with his 40-strong team can last for several hours, but he's fine with a healthy dose of zoning out, turning cameras off and multitasking for those who don't need to engage in the main conversation. His group uses a Google Doc to draw up the agenda and the members share screens to annotate it in real time. He then saves the final document to the lab's Dropbox account.

"It is efficient and works even better than in-person meetings," says Gerstein, who plans to retain video meetings to accommodate childcare responsibilities, illness and scheduling conflicts. "Now, everyone is equal, even our collaborators in Europe or China. I don't think we'll ever go back to a large in-person lab meeting."

Likewise, Adam Steinbrenner's plant-immunology group holds a 30-person joint meeting with two other labs at University of Washington in Seattle. After someone presents their work, there is a 3-minute pause for people to post their thoughts or questions in a shared Google Doc before the meeting resumes with a question-and-answer session.

Almost all of the PIs *Nature* spoke to now schedule either weekly or monthly video calls with individual team members. Jean Fan, a computational biologist at Johns Hopkins University in Baltimore, Maryland, schedules these on Fridays. "I ask my students to teach me what they've learnt, where they might have gotten stuck and what their plan is for the next week," she says.

And theoretical physicist David Weir is thankful that they share their mentoring load with other group leaders in the computational-field-theory group at the University of Helsinki. They find their hour-long meetings with individual students easier to manage mentally when other supervisors are on hand to field questions and direct the conversation.

For similar reasons, Federica Di Nicolantonio no longer tries to squeeze her monthly one-to-one meetings into one day, instead conducting them over the course of a week. "My brain can't manage meetings from 9 a.m. to 7 p.m., and this way I am fresher for each person," says Di Nicolantonio, a cancer researcher at the Candiolo Cancer Institute in Turin, Italy.

Inducting and training new lab members can be especially challenging when done remotely. Rather than sitting alongside the trainees to troubleshoot coding errors, as they would have done in previous years, the mentors in Weir's group had to share their screens over video calls. That was certainly more awkward and inefficient, Weir says, because without in-person expressions and body language, it was difficult

to assess trainees' comprehension.

Di Nicolantonio experienced similar inefficiencies when troubleshooting stalled research: "Recently, I ran into five people [in the lab] and managed to fix things with each of them in 2 minutes. That would have taken me half a day [virtually]."

In March 2020, Steinbrenner had a fledgling group that needed training in several experimental protocols. He took inspiration from Kenji López-Alt, a US chef and food writer who wears a GoPro camera on his head during YouTube demonstrations to explain the scientific basis of cooking. "I totally used his idea and did simple video editing," he says. "Now, we have internal video files that show the million little steps of doing a Western blot."

### **"As a PI holding lots of careers in my hands, the hardest thing was managing expectations."**

The beauty of such visual protocols, he says, is that they capture lab-specific details (such as which refrigerator shelf holds the correct buffer), and can be consulted when trainer and trainee are not in the lab at the same time. So far, he's generated five visual protocols for common molecular-biology procedures, and plans to get students to make videos for horticulture techniques.

Likewise, researchers at the Allen Institute for Cell Science in Seattle use webcams set up next to tissue-culture hoods to live-stream

training sessions, and still help trainees to safely learn cell-culture techniques up close, yet remotely. The ability to see how the pipette should be held and to ask questions in real time makes training someone in another room, or another country, nearly seamless, says executive director Ru Gunawardane.

### **Back to the lab**

Some aspects of graduate education do require in-person training, argues Karla Neugebauer, director of graduate studies for Yale School of Medicine's Molecular Biophysics and Biochemistry PhD programme.

She's been gently but firmly advocating a return to in-person meetings when it is safe to do so, after noticing that early-career researchers needed more in-person opportunities. "The new students don't know their classmates, or the class above them or the department faculty members," Neugebauer says. Concerned that the programme's students weren't seeking enough advice from their peers, she holds get-togethers outside at her home so that the second-year and third-year cohorts can meet face-to-face, literally in opposing lines, for 5-minute introductions. "They are thirsty for it," she says.

She has, however, taken extra steps to ensure that the in-person events exceed COVID-19 safety regulations. "As a PI or director, you don't want to be the head of a superspreader event," she says. "So I put in a huge amount of effort." That includes communicating plans to the director of Yale's environmental health and safety office, and rethinking meeting spaces, capacities and logistics.

For a poster-session event, held in a large lobby area at Yale last December, numbers were limited to about 100 faculty members and graduate students. People were socially distanced when viewing posters, and the fonts were enlarged. "It was fabulous. People were having such a good time because students haven't had that kind of casual engagement to talk about their science," she says.

For Neugebauer's dozen-member group, Zoom simply cannot replace her favourite mode of brainstorming: a small in-person group session, nowadays with masks. "There's a moment when I'm ready to write on the whiteboard, with lots of coloured pens," she says. It might be to outline a new manuscript or to go over someone's next experiment. "It's me seeing if I understand what my lab member means. It's also physical and joking around." Gerstein, however, prefers to do a small outdoor group meeting. "We just leave my office and walk and talk with no computer. It's fun to get outside, and that is something worth preserving," he says.

Weir says group meetings walking around Helsinki's parks and forests are good for free-flowing catch-ups. They are also good for one-to-one meetings that involve sensitive



**Adam Steinbrenner wears a GoPro camera to record the steps involved in a Western blot.**

ADAM STEINBRENNER



conversations not suited to a video call, for example, to address human-resources issues or a misunderstanding.

## The future of work

As the pandemic drags on, PIs are struggling to inject the organic cohesion that arises from a team working together in person. Piddini notes that some people do their experimental shifts so as to get in and out quickly, and as a result their interactions have become “transactional” and very business-like. For many PIs, the future will be dominated by finding ways to balance the desire for flexible working with the need to spur innovative thinking.

Slowdowns in experimental work can allow projects that were simmering on the back burner to flourish, leading to some unexpected discoveries. For example, a member of Nik-Zainal's team decided to use the time he would usually have spent in the lab to dive into genomic and other data sets, and managed to verify a key genetic mutation in lab-cultured stem cells. “He wouldn't have found it if he didn't have that time,” she says. After experiments confirmed the mutation's impact, the finding significantly improved a paper that the group was planning to submit.

Last August, Carazo Salas founded Cell-Voyant, a biotechnology company in Bristol that will use artificial intelligence and microscopy to optimize the manufacturing of human nerve, heart and other tissues for use in medicine and research. “I've wanted to do this for the last five years, and in one of the troughs of the pandemic waves, there was a window to meet with a lead investor,” he says. He then went on a four-continent virtual fundraising tour – something he could not have done in person with a toddler at home.

Virtual conferencing has opened up schedules in other productive ways, with academics able to teach undergraduates in Barcelona, Spain, in the morning and deliver a keynote address in New York City that afternoon with no jet lag.

“I'm not going back to that old life of flying around the world every two weeks,” says Nik-Zainal. “I literally watched my son grow about a foot and it's been so lovely to be near my children.” She has slept better, had more time for regular exercise, and spent more time with team members working on manuscripts and poring over data. “In some ways, I get into the science more.”

When two major conferences were cancelled outright, Núria López-Bigas planned two half-day mini-conferences on Zoom with two other cancer-genomics group leaders, one in the United States and the other in the Netherlands. “We had common interests and thought it would be useful to cross ideas,” says López-Bigas, a group leader at the Institute for Research in Biomedicine in Barcelona. “It was a very good way for the people in my lab to get

## What hybrid workers want

### Flexibility tops employee wish lists.

Last year, several global and US surveys asked employees across all sectors about work patterns once the pandemic is over or restrictions are lifted. Respondents' desire for flexibility, in terms of both when and where they worked, trumped most concerns about the lack of face time with colleagues, maintaining productivity and even pay, in some cases. At the same time, the data show that happier workers would allow employers to reap cost savings and other benefits.

According to a 2021 World Economic Forum (WEF) survey of workers in 29 nations, those in China, France and Belgium want to work an average of 1.9 days a week from home, whereas those in India would prefer 3.4 days at home (see [go.nature.com/3sdh6fj](https://go.nature.com/3sdh6fj)).

The WEF also found that before the pandemic, 24% of employees globally worked mostly from home. By July 2021, the proportion working from home had risen to 39%, and a further 22% were working from another non-office location.

a chance to present their work.”

There were other unexpected benefits of virtual conferencing, too. At the 2020 and 2021 virtual meetings of the European Society of Human Genetics, Nik-Zainal noticed higher numbers of participants and better quality in the pre-recorded presentations. Virtual conferences allow parents of young children, disabled researchers, scientists who would otherwise need to travel and those with lower incomes to participate on an equal footing. As Neugebauer notes: “The person who comes up with an app that allows us to do hybrid meetings better is going to be a winner.”

Gerstein has also been rethinking his computational group's workspace. “Do we want that same traditional look where people come in every day and sit at desks?” he asks. “I'm sceptical – no one wants to be in open-plan cubes.”

Instead, he sees his lab of the future as being one in which, ideally, researchers have their own office and can close the door when they need to think, code or write. There also needs to be a room big enough for three or four people, to host meetings or conference calls. Hybrid working could mean a lot of unoccupied space on certain days. He's considering a ‘hotelling’ option, with lab members booking larger office spaces in advance as needed, alongside everyone having a smaller dedicated workstation in the group's shared space.

In a 2021 survey of 2,050 US workers, carried out by consultancy firm Global Workplace Analytics in Carlsbad, California, 90% of respondents said they were as productive – or more so – working remotely as in the office, and 84% of respondents said working remotely after the pandemic would make them happier (see [go.nature.com/3mf3dbb](https://go.nature.com/3mf3dbb)). Nearly 40% would be willing to take a 5% pay cut to work remotely at least part of the time.

The consultancy, which specializes in flexible workplace strategies, has also studied the benefits to employers and employees of higher levels of remote working. In a 2021 study on telecommuting trends, it estimated that a typical US employer could save, on average, US\$11,000 per year per employee working remotely half-time, in part because of increased productivity, lower office costs, and decreased staff turnover (see [go.nature.com/34w7hqf](https://go.nature.com/34w7hqf)). Employees working at home half the time could save between \$600 and \$6,000 per year and the equivalent of 11 full work days in commuting costs and time.

Most PIs agree that hybrid working is here to stay in some guise. The flexibility for everyone to be included online, no matter their circumstances, far outweighs the problems of having to deal with technical glitches and the awkwardness of reminding someone, “You're muted.”

But there are challenging kinks left to work out, too. “I've not been as good at motivating people over Zoom,” says Piddini. She calls in-person chats over coffee with trainees “an essential part of the scientific endeavour, because we cast off from there with a lot of momentum”. Two years into a pandemic, energy is low and people have mental fatigue. When COVID-19 restrictions allow for doing science in person, she says, “You have to do that.”

Gunawardane agrees that “finding some ways to come back together physically is really important in team science”. But, she says, “I do not think we'll go back to the pre-pandemic ways completely.” The younger generation of scientists expects some flexibility, and this period has proved that scientists can be very productive without rigid, nine-to-five laboratory schedules. “If we truly believe that we want to be inclusive and we value different ways of doing things, then flexibility has to be part of how we move forward.”

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