

As head of the department, Humphrey has to sign off on all faculty members' consultancy jobs. He cautions that researchers must maintain clear boundaries by, for example, not mingling consultancy work with university travel unless it is explicitly approved. He also notes that in some countries, including the United States, taxes are usually not taken out of payment up front, so consultants must plan accordingly and set taxes aside — or risk penalties. All scientists who act as consultants, whether full or part time, must grapple with the sometimes-elusive concept of doing unbiased science for a paying client who has a vested interest in the outcome. "You should question yourself on every job," says Şekercioğlu. "When you're

"When people are doing consulting, it's not something we talk openly about. Many academics believe in the purity of academic pursuit."

working for industry and big government, it's hard to resist that pressure sometimes." Working for free helps Şekercioğlu to stick to his principles, he says. "I can stand my ground. But consulting is often not black and white. It's grey."

"Maintaining scientific neutrality can sometimes require significant professional discipline," says Olson. "I always strive to do good science, but science is not a cut-and-dried field of work. Results can be interpreted in different ways." One of Olson's clients, a consortium of chemical companies, paid him to evaluate some scientific papers and investigate whether the methodology in them was sound; he found egregious flaws. Olson says that being paid didn't influence the quality of his work, but it was always in the back of his mind. "I know who's paying me and I know what they want to see," he says. Consultants should make sure clients understand that they intend to report the scientific results, whatever they may be, says Olson. "And if the client is legitimate, they'll not only accept robust science, but they'll be enthusiastic about it," he adds. "I wouldn't work for someone otherwise."

Even with all the caveats, scientists who act as consultants often find it fulfilling. The anonymous oceanographer says that one of his consultancy projects paid him to do a literature review that was highly valuable for his own research. "For me, it's kind of a dream thing," he says. Dabbling in diverse areas is part of the reward. "They're quick little projects," says Olson, "where I get to learn about some new area of science." ■

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TURNING POINT

Giovanna Tinetti

Giovanna Tinetti, a planetary scientist at University College London, learned in February that her team's proposal to lead the £400-million (US\$642-million) Exoplanet Characterisation Observatory (EChO) mission to search for life on other planets will be backed by the European Space Agency (ESA).

You started off as a theoretical particle physicist. How did you make the leap to searching for life on exoplanets?

I was pursuing my PhD in theoretical physics at the University of Turin in Italy, yet I was increasingly interested in working on something for which experiments were the driving force. So I started to look at other possibilities. In 1998, NASA started a virtual Astrobiology Institute to prepare ambitious experiments looking for life and habitable planets in the Universe. As I learned more, I decided that it was a great move for me. I was intrigued by ideas about Gaia and the notion that abiotic planets and living organisms grow together. I began my adventure with exoplanets as a postdoc at NASA's Jet Propulsion Laboratory in Pasadena, California.

Characterize your early career choices.

I made a series of decisions not to follow the 'safe' route. First, I turned down a well-paying job, instead choosing to finish my PhD. And just deciding to begin this search for exoplanets meant making a big bet with my career. Back then, only a few extrasolar planets had been discovered, and nobody knew whether they would prove viable for life. Several people told me that this could be a path that leads nowhere. I just felt that I had one life, and if I didn't try, I would regret it. Luckily, the field has been successful, so I made the right choices.

How have your past experiences shaped how you approached this space mission?

During my postdoc, a number of extrasolar planets were discovered, and attention shifted to a dedicated experiment to probe exoplanet atmospheres. It ultimately became a joint project, combining NASA's Terrestrial Planet Finder (TPF) and ESA's Darwin. But technological challenges and budget hurdles kept pushing the launch date further and further back. At the same time, we discovered that we could look for atmospheres that signalled potentially habitable worlds by monitoring planets as they move in front of their stars. This 'transit spectroscopy' technique proved successful, and we started to think that, rather than pursuing a big experiment, we should use the technique with existing telescopes, such as



Hubble or Spitzer. So the TPF/Darwin mission was shelved. But the process of preparing for a big experiment was informative.

Did that help you achieve success with EChO? Absolutely. Using the transit technique and existing technology, we can now make the most of a dedicated exoplanet mission. The most important technology — including a 1.2-metre telescope and spectrograph — already exists. That was important when submitting a proposal for a launch in 2020.

Are you confident EChO will launch in 2020?

I plan to work hard to ensure its success. It looks like a long lead time but it's really not. We have to go through ESA's assessment phase, to judge whether the project is doable — so we have to be ready to answer any question relating to the science.

Are you taking steps to safeguard your career in case EChO is derailed?

The preparation for EChO relates to my everyday research. My team continues to work hard on observing planets from the ground and from the Hubble and Spitzer telescopes. When you are involved in a space mission, you can't bet on its success until you see the satellite in orbit. That said, we are doing our best to create a mission that benefits extrasolar-planet research.

What is the most important thing you've done for your career?

I can say that it was a good idea to spend one year of my life pursuing this space mission because, in the end, we were selected. You have to believe in something — unfortunately, that doesn't necessarily mean it will happen. ■

INTERVIEW BY VIRGINIA GEWIN