City who was one of the programme chairs.

"In general, I would say the ethics process has done well," says Katherine Heller, a computer scientist at Google in Mountain View, California, who was the conference's co-chair of diversity and inclusion.

Gabriel says that most problematic issues should have been caught, because any of the three anonymous peer reviewers could flag a paper, as could the subject-area chair. "A signal from any one of them would be enough to engage the review process," he says. Still, he admits that the process was not infallible. For example, if all the reviewers happened to be men — not unusual in a male-dominated field — they might not be able to adequately assess whether an algorithm could affect women negatively. "I can't rule out the possibility that there would be blind spots of this kind," Gabriel says.

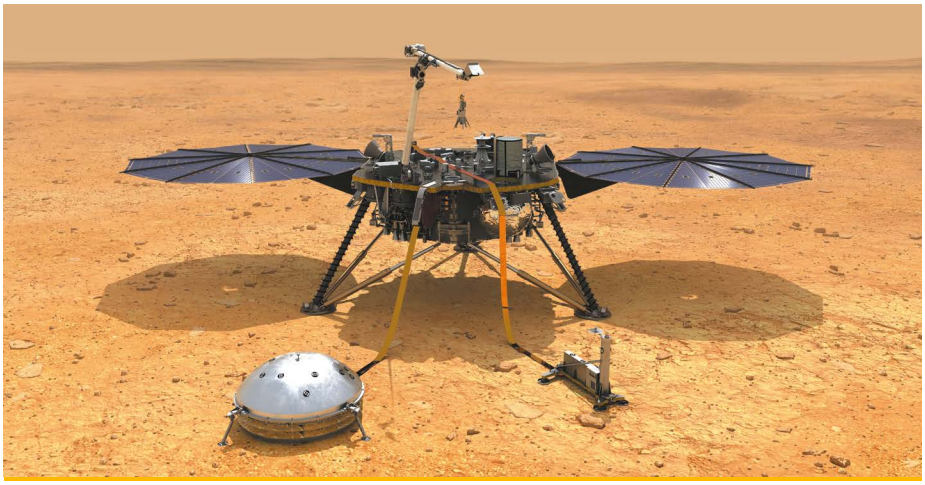
In addition, reviewers were not given specific guidance on what constitutes harm to society. For example, says Ranzato, some reviewers flagged papers that made use of databases containing personal information or photographs that were collected without explicit consent. The use of such databases has come under heavy criticism, but the conference organizers did not single out this issue to reviewers or provide a list of problematic databases. Still, Ranzato adds that the review policy is a step in the right direction. "Nothing is perfect, but it's better than before."

Policing AI

The last day of the conference featured a special session focused on the broader impact of AI on society. Hecht, Gabriel and other panellists discussed ways to address the industry's problems. Hanna Wallach, a researcher at Microsoft in New York City, called for researchers to assess and mitigate any potential harm to society from the early stages of research, without assuming that their colleagues who develop and market end products will do that ethical work. Ethical thinking should be built into the machine-learning field rather than simply being outsourced to ethics specialists, she said, otherwise, "other disciplines could become the police".

Wallach and others, such as Donald Martin, a technical programme manager at Google in San Francisco, California, are redesigning the product-development process at their companies so that it incorporates awareness of social context. AI ethics, Martin says, "is not a crisis in the public understanding of science, but a crisis in science's understanding of the public".

The revamped review process and the ethics-focused discussions are the latest in a series of efforts by NeurIPS organizers to improve practices in machine learning and AI. In 2018, the conference dropped an acronym that many people found offensive, and began a crackdown on sexist behaviour by participants. And last year's meeting featured robust discussions of AI ethics and inclusivity.



NASA/JPL-CALTECH

The Mars InSight lander is measuring 'marsquakes' with its domed seismometer (left).

FIRST PEEK INSIDE MARS REVEALS A CRUST WITH CAKE-LIKE LAYERS

NASA's InSight mission yields the first data on the internal structure of a planet other than Earth.

By Alexandra Witze

NASA's InSight mission has finally peered inside Mars — and discovered that the planet's crust might be made of three layers. This is the first time scientists have directly probed the inside of a planet other than Earth, and will help researchers to unravel how Mars formed and evolved over time.

Before this mission, researchers had measured the interior structures of only Earth and the Moon. "This information was missing, until now, from Mars," said Brigitte Knapmeyer-Endrun, a seismologist at the University of Cologne in Germany, in a recorded talk played at the virtual American Geophysical Union meeting on 15 December. She declined an interview with *Nature*, saying that the work is under consideration for publication in a peer-reviewed journal.

It is a major finding for InSight, which landed on Mars in November 2018. One of its goals is to work out the planet's internal structure[1]. The InSight lander squats near the Martian equator, on a smooth plain known as Elysium Planitia, and uses an exquisitely sensitive seismometer to listen to geological energy thrumming through the planet[2]. So far, the mission has detected more than 480 'marsquakes', says Bruce Banerdt, the mission's principal investigator and a scientist at the Jet Propulsion Laboratory in Pasadena, California.

Just as they do with earthquakes on Earth, seismologists are using marsquakes to map the red planet's interior structure. Seismic energy travels through the ground in two types of wave; by measuring the differences in how those waves move, researchers can calculate where the planet's core, mantle and crust begin and end, and the general make-up of each one. Those geological layers reveal how the planet cooled and formed billions of years ago at the fiery birth of the Solar System. Now, "we have enough data to start answering some of these big questions", says Banerdt.

Earth's continental crust is generally divided into sublayers of different types of rock. Researchers had suspected, but didn't know for sure, that the Martian crust was also layered, says Justin Filiberto, a planetary geologist at the Lunar and Planetary Institute in Houston, Texas. Now, InSight's data show that it is made up of either two or three layers.

A three-layered crust would fit best with geochemical models[3] and studies of Martian meteorites, says Julia Semprich, a planetary scientist at the Open University in Milton Keynes, UK.

Next up, InSight scientists plan to report measurements taken even deeper in Mars, says Banerdt — ultimately revealing information about the planet's core and mantle.

1. Knapmeyer-Endrun, B. & Kawamura, T. *Nature Commun.* **11**, 1451 (2020).
2. Banerdt, W. B. *et al. Nature Geosci.* **13**, 183–189 (2020).
3. Semprich, J. & Filiberto, J. *Meteorit. Planet. Sci.* **55**, 1600–1614 (2020).