that vulnerability by working together to add multiple blocks, although the group voluntarily disbanded once it came close to achieving its goal.

One way in which blockchain technology could help scientists is by reliably collecting and preserving data concerning research activities. This would make it easier to reproduce results in cases where published accounts insufficiently explain methodologies, according to Joris van Rossum, director of special projects at Digital Science, a research-technology firm in London. Blockchains could also be used to track each transaction in the peer-review process, says van Rossum, which could build trust in the process by recognizing reviewers' efforts and potentially rewarding them with digital currency. And open blockchains would generate information such as how frequently researchers collect measurements, enabling people to look beyond metrics such as publications and citations, he says (J. van Rossum *Blockchain for Research;* Digital Science, 2017).

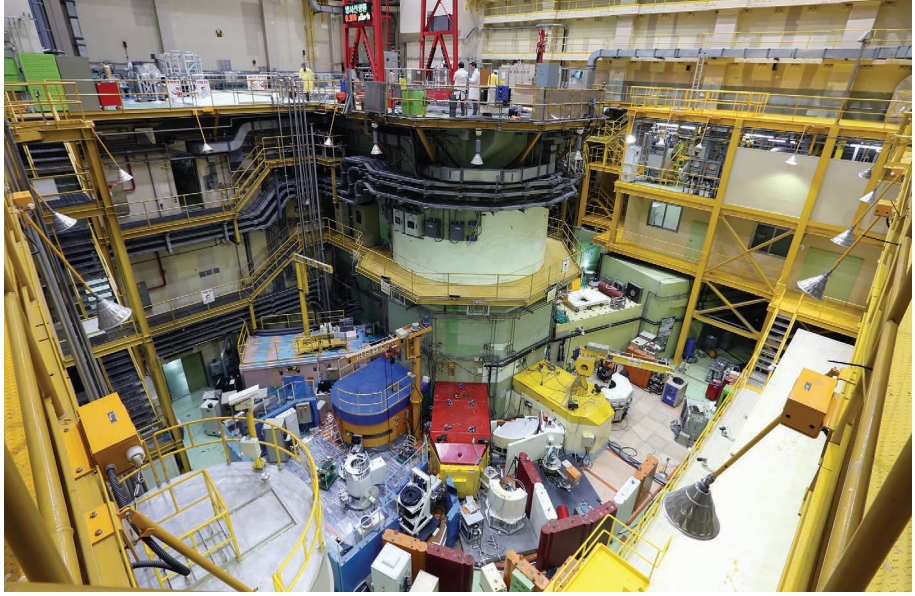
CURRENCY-FREE SCIENCE

Scienceroot and Pluto are part of the same 'universe' of open-blockchain technology as cryptocurrencies, says Gideon Greenspan, founder of London-based Coin Sciences, which developed MultiChain. Greenspan says that such currency-style blockchains are unsuitable as scientific archives, because recording each transaction incurs a financial cost, and these can easily add up.

Private "permissioned" blockchains without the currency element — which MultiChain lets people set up — are a better choice, Greenspan says. This approach sacrifices the security offered by Bitcoin's mining process in favour of a simpler system that gives members permission to add blocks to the chain in turn.

Claudia Pagliari, who researches digital health-tracking technologies at the University of Edinburgh, UK, says that she recognizes the potential of blockchain, but that researchers have yet to properly explore its ethical issues. What happens if a patient withdraws consent for a trial that is immutably recorded on a blockchain? And unscrupulous researchers could still add fake data to a blockchain, even if the process is so open that everyone can see who has added them, says Pagliari. Once added, no one can change that information, although it's possible that they could label it as retracted.

In Pagliari's experience, researchers exploring blockchain are becoming wise to its problems. She notes that fellow speakers at a 'hackathon' held in November in London were careful to warn about hype. That suggests "a realism that no solution is perfect and the value of blockchain in this context remains unproven", Pagliari says. ■



COURTESY OF KAERI

Engineers inspect the HANARO research reactor in Daejeon.

PHYSICS

South Korean reactor to restart experiments

Facility shutdown had slowed neutron research in the region.

BY DAVID CYRANOSKI

After a three-and-a-half-year hiatus, South Korea's nuclear research reactor has restarted operations, and experiments there will resume this month. Scientists and students are eager to make up for lost time after the facility was closed for repairs in 2014.

"Students have been thirsty for neutrons," says Sung-Min Choi, a materials scientist and neutron-scattering expert at the Korea Advanced Institute of Science and Technology in Daejeon.

After the High-Flux Advanced Neutron Application Reactor (HANARO) in Daejeon was shut down in July 2014, the South Korean nuclear regulator ordered the facility to address whether it could resist seismic activity before it could restart. Following the earthquake in March 2011 off the coast of Japan, which triggered a tsunami that swamped the Fukushima Daiichi nuclear power station, many governments, including that of South Korea, insisted that reactors be able to withstand major earthquakes or other disasters.

HANARO completed alterations, including reinforcing its walls, in April 2017. But the agreement that had been reached with local government required that a citizens' watchdog group be permitted to verify the safety of the site, which took until September.

The burden of HANARO's closure has been particularly heavy on early-career scientists. "We lost a generation of neutron scatterers," says Sungil Park, a physicist at the Korea Atomic Energy Research Institute in Daejeon.

Japanese researchers have also struggled with the closure of nuclear reactors in that country. The Japan Atomic Energy Agency announced in June 2016 that it would restart its JRR-3 facility by March 2018, but the process is behind schedule and there is no longer an estimate of when it will be able to restart, according to a spokesperson for the agency.

Japanese scientists are making do. Mitsuhiro Shibayama, a condensed-matter physicist at the University of Tokyo, shifted his research projects to X-ray and light scattering so that his students could progress. "Many graduate students left without any experience on neutron-beam experiments and many professors have had to change their research topics," he says.

In South Korea, researchers are starting to rebuild their community as HANARO undergoes final tweaks before experiments can start. "It will be a hectic but happy week for all of us working at HANARO," says Park. ■

CORRECTIONS

The Editorial 'Nurture negatives' (*Nature* **551,** 414; 2017) erroneously stated that *Psychological Science* had released a replication report. In fact, the report was in *Perspectives on Psychological Science.*

A quote in 'The axolotl paradox' (*Nature* **551,** 286–289; 2017) implies that animals obtained from a breeding facility in Kentucky have a high rate of malformations. This is not the case. The animals referred to may trace their lineage to the facility, but have been bred and potentially inbred elsewhere.