

News in focus

“It will make the world a less safe place,” says Peter Horby, an infectious-disease researcher at the University of Oxford, UK.

Funding freeze

After the Trump administration announced a three-month freeze on foreign aid last month, effects have rippled throughout the global-health community. Programmes supported by the US Agency for International Development (USAID) – in which many employees have been furloughed, according to news reports – fund research, prevention and care for diseases such as HIV and malaria, and work on other global-health priorities.

“People haven’t had a chance to get alternative funding because of the abrupt nature of this,” says Salim Abdool Karim, director of the Centre for the AIDS Programme of Research in South Africa, in Durban. The centre was due this week to enrol the first participant in a USAID-funded trial of HIV vaccines, which is now on hold. It is using its reserve funds to continue a trial testing whether a vaginal insertion can prevent HIV transmission.

“It is chaos,” says an HIV researcher in Africa, who runs a clinic that treats thousands of people supported by a US programme called the President’s Emergency Plan for AIDS Relief (PEPFAR) – they asked not to be named because of fears of reprisal. More than 20 million people, mostly in Africa, including more than one million children and pregnant people, receive antiretroviral drugs through the US\$6.5-billion programme.

The clinic has had to suspend staff, which were funded by PEPFAR, and its patients are still receiving drugs only because of volunteer efforts. Last week, the clinic received a waiver from the US government that seems to allow it to resume HIV treatment, but uncertainty abounds.

HIV treatments threatened

In South Africa, where the government provides the bulk of HIV care using some PEPFAR funding, the impact of the aid freeze will be minimal, says Abdool Karim. But in many other African countries, “if PEPFAR services stop, the effect will be catastrophic. The governments can’t just step in to meet the shortfall.”

Stopping antiretroviral treatment causes virus levels to rebound, making it possible for a person to transmit HIV – including through pregnancy to unborn children – and facilitating the evolution of drug resistance. “I’m hoping that someone somewhere sees sense and does not continue this abrupt ending of AIDS-treatment programmes,” says Abdool Karim.

The President’s Malaria Initiative, a \$1-billion US government programme that funds malaria prevention and research, has also seen funding dry up. Taylor Williamson, an employee at a company that helps to implement the malaria

programme and other projects, says that the aid freeze will have catastrophic effects.

Williamson’s firm has more than one million insecticide-treated bed nets in a warehouse in Ethiopia that, along with antimalarial drugs and diagnostics, it now can’t deploy, at a time when malaria transmission spikes in many countries. “Without those services – especially now that it’s the rainy season in a lot of the world – people will die,” he says. “We’re putting kids’ lives at risk by stopping this.”

WHO withdrawal

In Geneva this week, the WHO’s executive board grappled with how to handle the looming US withdrawal from the organization (this week, Argentina announced that it will also seek to leave the agency). Last year, the United States contributed nearly £1 billion (US\$1.24 billion) to the organization, whose budget for 2024–25 was \$6.8 billion. In response, the agency has implemented cost-cutting measures.

Much of that money is earmarked for specific projects, such as polio eradication, and other governments and organizations will now need to fill gaps, says David Heymann, an epidemiologist at the London School of Hygiene

and Tropical Medicine and a former assistant director-general at the WHO. “Somebody’s going to have to step in and fill that void if polio eradication is to continue.”

A US pull-out from the WHO, as well as a communication freeze, announced by Trump, between officials at the US Centre for Disease Control and Prevention (CDC) in Atlanta, Georgia, and the agency, will also affect the exchange of crucial information and technical expertise, say scientists. The CDC has operated more than a dozen WHO collaborating centres, and many employees had been seconded to the organization. The WHO also provides a daily threat assessment to member states, and it’s unclear whether the United States will continue to receive it, says Heymann.

Horby worries about how a diminished US role in global health will affect preparedness for pandemic threats such as H5N1 influenza and outbreak responses – including to one ongoing Ebola virus outbreak in Uganda, another possible one in the Democratic Republic of Congo and a Marburg virus outbreak in Tanzania. “It’s a big concern that there will be a huge loss of money and expertise on these global-health threats,” says Horby.

HOW CHINA CREATED AI MODEL DEEPSEEK AND SHOCKED THE WORLD

Government policies, generous funding and a pipeline of AI graduates all played a part.

By Gemma Conroy & Smriti Mallapaty

Chinese technology start-up DeepSeek has taken the tech world by storm with the release of two large language models (LLMs) that rival the performance of the dominant tools developed by US tech giants – but built with a fraction of the cost and computing power.

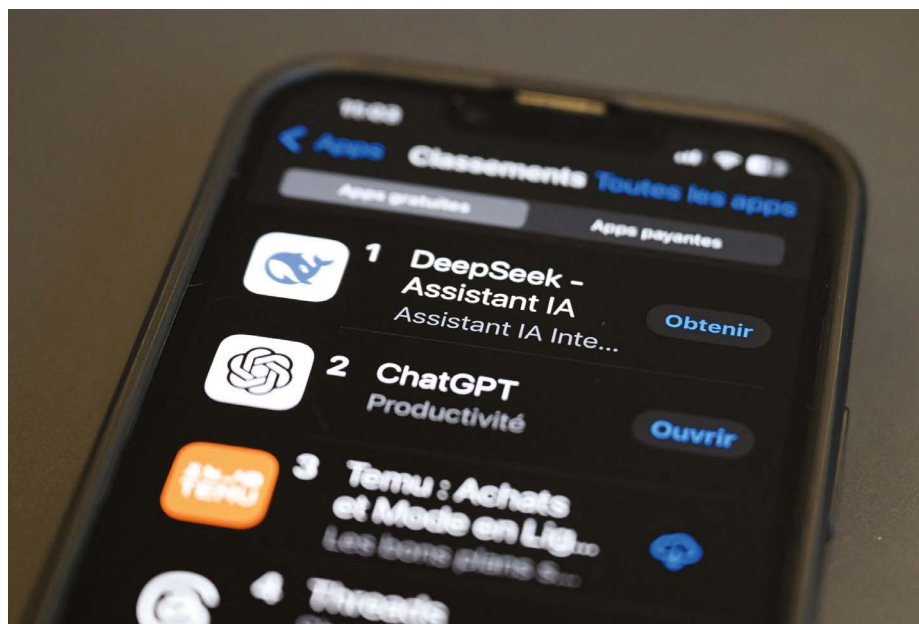
On 20 January, the Hangzhou-based company released DeepSeek-R1, a partly open-source ‘reasoning’ model that can solve some scientific problems at a similar standard to o1, OpenAI’s most advanced LLM, which the company, based in San Francisco, California, unveiled late last year. And earlier this week, DeepSeek launched another model, called Janus-Pro-7B. It can generate images from text prompts, much like OpenAI’s DALL-E 3 and Stable Diffusion, made by Stability AI in London.

If DeepSeek-R1’s performance surprised many people outside China, researchers inside

the country say the start-up’s success is to be expected and fits with the government’s ambition to be a global leader in artificial intelligence (AI).

It was inevitable that a company such as DeepSeek would emerge in China, given the huge venture-capital investment in firms developing LLMs and the many people who hold doctorates in science, technology, engineering or mathematics fields, including AI, says Yunji Chen, a computer scientist working on AI chips at the Institute of Computing Technology of the Chinese Academy of Sciences in Beijing. “If there was no DeepSeek, there would be some other Chinese LLM that could do great things.”

In fact, there are. On 29 January, tech behemoth Alibaba released its most advanced LLM so far, Qwen2.5-Max. The company says that its new model outperforms DeepSeek’s V3, another LLM that was released by the firm in December. And last month, Moonshot AI and ByteDance released new reasoning



DeepSeek-R1 can perform some tasks at a level that rivals competitor models.

models, Kimi 1.5 and 1.5-pro, which the companies claim can outperform o1 on some benchmark tests.

Government priority

In 2017, the Chinese government announced its intention for the country to become the world leader in AI by 2030. It tasked the industry with completing major AI breakthroughs “such that technologies and applications achieve a world-leading level” by 2025.

Developing a pipeline of ‘AI talent’ became a priority. By 2022, the Chinese ministry of education had approved 440 universities to offer undergraduate degrees specializing in AI, according to a report from the Center for Security and Emerging Technology (CSET) at Georgetown University in Washington DC. In that year, China supplied almost half of the world’s leading AI researchers, whereas the United States accounted for just 18%, according to the think tank MacroPolo in Chicago, Illinois.

DeepSeek probably benefited from the government’s investment in AI education and talent development, which includes numerous scholarships, research grants and partnerships between academia and industry, says Marina Zhang, a science-policy researcher at the University of Technology Sydney in Australia who focuses on innovation in China. For instance, she adds, state-backed initiatives such as the National Engineering Laboratory for Deep Learning Technology and Application, which is led by tech company Baidu in Beijing, have trained thousands of AI specialists.

Exact figures on DeepSeek’s workforce are hard to find, but company founder Liang Wenfeng told Chinese media that the company has recruited graduates and doctoral students from top-ranking Chinese universities. Some

members of the company’s leadership team are younger than 35 years old and have grown up witnessing China’s rise as a tech superpower, says Zhang. “They are deeply motivated by a drive for self-reliance in innovation.”

Wenfeng, at 39, is himself a young entrepreneur and graduated in computer science from Zhejiang University, a leading institution in Hangzhou. He co-founded the hedge fund High-Flyer almost a decade ago and established DeepSeek in 2023.

Jacob Feldgoise, who studies AI talent in China at the CSET, says national policies that promote a model development ecosystem for AI will have helped companies such as DeepSeek, in terms of attracting both funding and talent.

“The problem we face has never been money, but the ban on high-end chips.”

But despite the rise in AI courses at universities, Feldgoise says it is not clear how many students are graduating with dedicated AI degrees and whether they are being taught the skills that companies need. Chinese AI companies have complained in recent years that “graduates from these programmes were not up to the quality they were hoping for”, he says, leading some firms to partner with universities.

‘Efficiency under constraints’

Perhaps the most impressive element of DeepSeek’s success, say scientists, is that it developed DeepSeek-R1 and Janus-Pro-7B amid the US government’s export controls, which have blocked China’s access to advanced AI

computing chips since 2022.

Zhang says DeepSeek’s leadership embodies a distinctly Chinese approach to innovation, emphasizing efficiency under constraints. However, the company hasn’t disclosed specific details about how much hardware it uses, she adds.

DeepSeek has said that it used around 2,000 H800 chips built by US chip-maker Nvidia to train DeepSeek-V3, a model it released in December that outperforms OpenAI’s LLM GPT-4o, launched last May, on benchmark tests (A. Liu *et al.* Preprint at arXiv <https://doi.org/n5qh;2024>). By contrast, Llama 3.1 405B, a sophisticated LLM released in July from Meta in Menlo Park, California, relies on more than 16,000 of the more advanced H100 Nvidia chips. In a 2022 post on social-media platform WeChat, High-Flyer said that it had 10,000 of Nvidia’s older A100 chips, which DeepSeek probably has access to. DeepSeek’s use of less powerful chips probably made its models cheaper to build. “The problem we face has never been money, but the ban on high-end chips,” Wenfeng told Chinese media in July.

DeepSeek draws on a variety of approaches to boost the efficiency of its models. For instance, it deploys a ‘mixture-of-experts’ architecture, a machine-learning method that trains models faster than conventional techniques, and with fewer parameters. This enables the company to train models with fewer chips, says Chang Xu, a computer scientist at the University of Sydney. It also uses an innovative version of another technique, called multi-head latent attention, which allows the model to store more data with less memory.

Last month, media reports suggested that OpenAI was reviewing claims that DeepSeek trained its model using outputs from OpenAI models. (OpenAI is being sued for intellectual-property infringements by news organizations.) DeepSeek has yet to respond to the claims. Even if true, it would “in no way diminish” DeepSeek’s achievement in creating R1, says Lewis Tunstall, a researcher at the open-science platform Hugging Face, based in Bern. Their advance is in using a learning approach to instill ‘reasoning’ abilities into an LLM, which experiments have already reproduced, he says. Hugging Face is leading a project to try to recreate R1 from scratch. “I expect we will learn rather quickly whether synthetic data from OpenAI is truly needed or not,” he says.

DeepSeek’s achievements could offer a blueprint for countries that have AI ambitions but lack the financial resources and hardware to train massive LLMs using the standard Silicon Valley approach, says Yanbo Wang, a science-policy researcher who focuses on innovation at Hong Kong University. “This could invite the creation of a large army of new models,” he says.