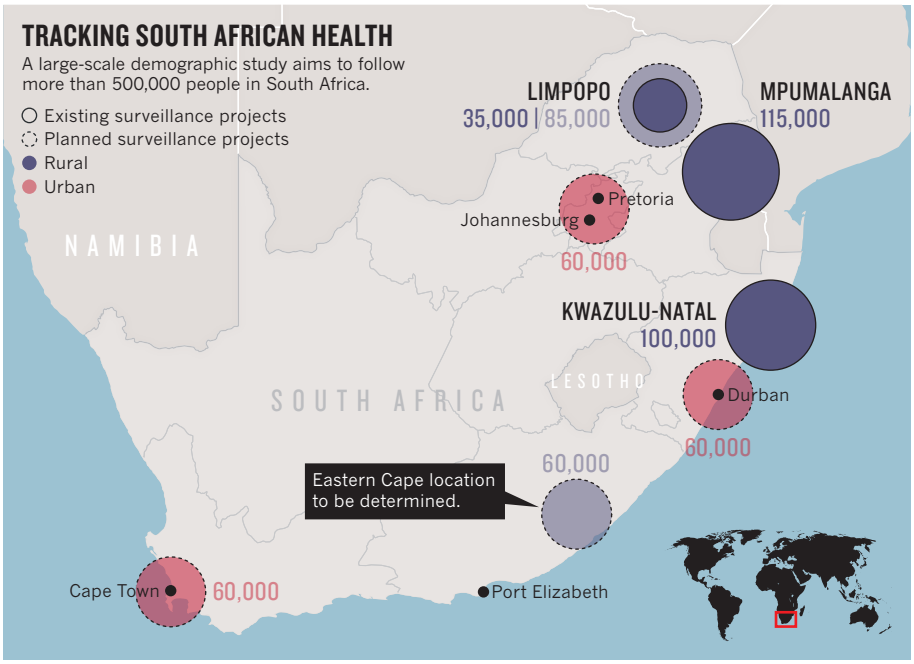
Limpopo in the northeast, and KwaZulu-Natal on the east coast. These have been able to track trends such as a growth in life expectancy as the country rolled out antiretroviral drugs to fight the HIV epidemic. But the long-term sustainability of such studies — which have been funded by non-governmental donors — is a perennial concern, says Kobus Herbst, deputy director of the African Health Research Institute, based in Durban, which runs the study in KwaZulu-Natal. So the government's investment is particularly welcome, he says.



FROM RURAL TO URBAN

All the existing surveillance projects are in rural areas, providing only a narrow view of national population trends, says Gray. "The rural sites have been critical for understanding things like how antiretroviral rollout plays out in districts," she says. But they don't catch emerging patterns of disease linked with modern city life, driven by factors such as pollution, work-related stress and dietary changes. Of the four new surveillance nodes in the planned network, three will be based in South Africa's biggest cities: Cape Town, Johannesburg and Durban (see 'Tracking South African health').

The existing surveys already cover around 250,000 people, but each collects different types of data, so their measurements cannot be compared or integrated together. During the first three years, the surveys will be linked up, and the Limpopo one will be expanded. By the end of the three-year period, a total of 300,000 people should be included in the project, says Herbst. The target of 500,000 people will be reached, hopefully, in five years' time, he says.

The government funding will cover the full health and socio-demographic surveys, and will fund linkages to national health records and the collection of dried blood spots from adult participants once a year for HIV testing, Herbst says. To do more — such as DNA sequencing — will require funding from external donors.

Linda Fried, an epidemiologist who is dean of Columbia University's Mailman School of Public Health in New York City, thinks that the surveys will not only allow South Africa to develop its science base but will also attract international investment.

The programme was launched on 4 October by South African science minister Naledi Pandor, at a conference to plan out South Africa's first road map for national research infrastructures. In addition to the demographic project, the road map launched this week includes plans for a nuclear-medicine research facility dedicated to drug development and clinical research, a solar-research facility to demonstrate photovoltaic technologies, and a new hub to coordinate efforts to protect the country's natural-history collections.

"We build big scientific infrastructure to attract international researchers to our country," Pandor said. ■

PLANETARY SCIENCE

NASA rethinks Mars exploration

Agency considers time-allocation model in an era of shifting international interests.

BY ALEXANDRA WITZE

NASA is investigating a new way of studying Mars. Starting in the 2020s, scientists who participate in the agency's Mars missions might no longer design and build their own highly specialized payloads to explore the red planet. Instead, planetary scientists could find themselves operating much as astronomers who use large telescopes do now: applying for time to use a spacecraft built with a generic suite of scientific instruments.

The proposed change is spurred by NASA's waning influence at Mars. The agency's long-running string of spacecraft is winding to a close, and international and commercial interests are on the rise. By the middle of the next decade, European, Chinese, Emirati and SpaceX missions are as likely to be at Mars as NASA is (see 'Red-hot planet').

Jim Watzin, head of NASA's Mars exploration programme in Washington DC, suggested the new approach to the red planet on 6 October at a virtual meeting of Mars scientists. "The era that we all know and love and embrace is really coming to an end," he said. "It's important to recognize that the future is not going to be the same as the past."

Throughout the 2000s, NASA sent a sustained barrage of spacecraft to Mars, unique in the sheer number of robots directed at one planetary target. But many have expired, and the ones still operating are growing old. NASA's three functional orbiters — Mars Odyssey, Mars Reconnaissance Orbiter, and MAVEN — launched in 2001, 2005 and 2013 respectively. The Opportunity rover is in its thirteenth year, and the Curiosity rover is in its fifth.

NASA has only one more spacecraft scheduled in its Mars programme, a rover due to launch in 2020 that is tasked with gathering samples for an as-yet-unscheduled return to Earth. (The InSight geophysics probe, slated for a 2018 launch, was not developed under ▶

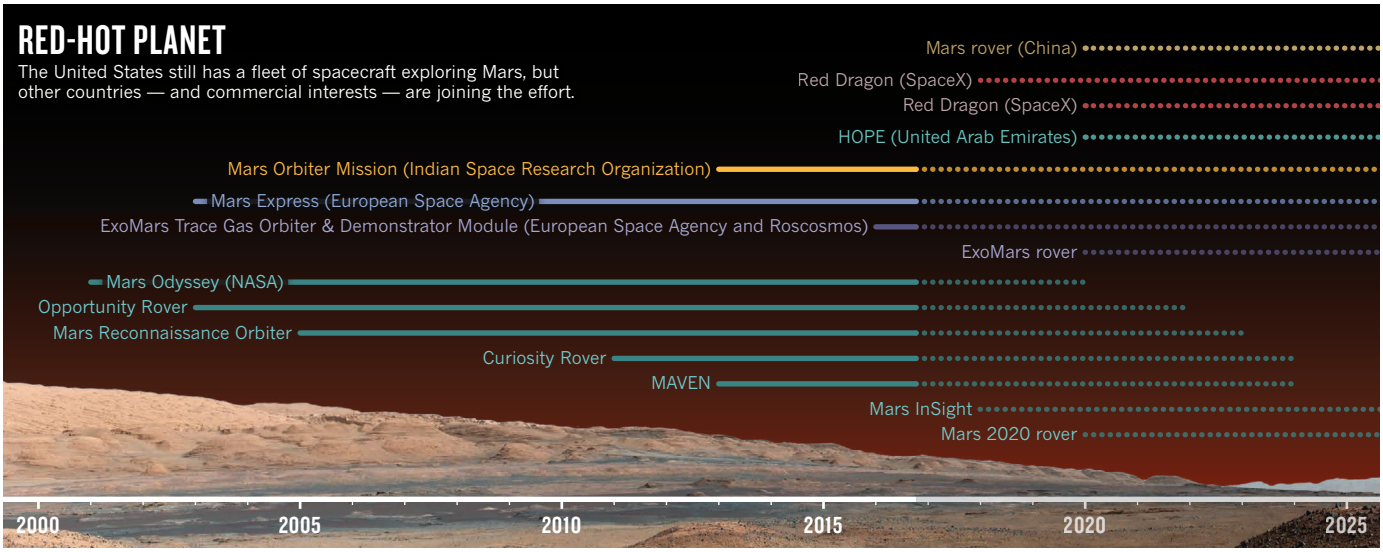


IMAGE: NASA/JPL-CALTECH/MSSS

the auspices of NASA's Mars programme.)

NASA wants to start planning for an orbiting mission to launch after 2020. In June, the agency asked five companies about what sorts of Mars orbiters they might be able to build, and how quickly and cheaply that could be done. Five international partners have also said they would like to be involved, Watzin said.

Many non-NASA missions to Mars are already on the books. In 2020, the European Space Agency and China each plan to launch Mars rovers, while the United Arab Emirates will send an orbiter. SpaceX of Hawthorne, California, hopes to send its first Red Dragon landers to Mars in 2018.

This broadening context prompted Watzin to propose the new way of operating Mars missions. "I'm not trying to fix something that's broken," he said. "I'm trying to open the door to a larger level of collaboration and participation than we have today."

In the facility-based approach, scientists would propose investigations using one or more instruments on a future spacecraft. NASA would award observing time to specific proposals, much as telescope-allocation committees parcel out time on their mountaintops. This would be different from the current approach, in which individual teams of scientists propose, build and operate instruments.

Watzin's proposal is a trial balloon, not an official change to NASA policy. "It's a little early yet to figure out how the community is going to respond," says Jeffrey Johnson, a planetary scientist at the Johns Hopkins University Applied Physics Laboratory in Laurel, Maryland, and head of the group that organized the meeting.

But some researchers are already pushing back. Alfred McEwen, a planetary scientist at the University of Arizona in Tucson, noted that the Mars Reconnaissance Orbiter's HiRISE camera has taken thousands of images of Mars based on public requests. "We've managed to do all the things [Watzin] described already without a new paradigm," says McEwen, the camera's principal investigator. "We have distributed operations, we have multiple customers, we have a foreign contributed instrument. So my immediate reaction to this idea was not very positive." ■

DRUG DEVELOPMENT

Safety concerns blight promising cancer therapy

As the first T-cell treatments for tumours near US approval, researchers race to engineer less-toxic versions.

BY HEIDI LEDFORD

A groundbreaking treatment that arms immune cells called T cells to battle cancer is barrelling towards regulators, fuelled by unprecedented clinical success and investor exuberance.

But progress of the therapy, called CAR-T, has been marred by its toxicity; several deaths have been reported in clinical trials. Even as the first company readies its application to the US Food and Drug Administration (FDA) — expected by the end of the year — researchers are hard at work to make the supercharged T cells safer.

Doing so is crucial to expanding the use of the therapy to more people, says Anthony Walker, a managing partner at Alacrita, a consulting firm in London. "Right now it is heroic medicine," he says — a gruelling treatment deployed only in people for whom all else has failed. "Patients are taken sometimes to within an inch of their lives."

Most CAR-T procedures begin by harvesting a patient's white blood cells and sifting out the T cells. Those T cells are engineered to recognize cancer cells, and then infused into the patient, ready to do battle. The approach has shown remarkable success against leukaemias and lymphomas: in one