Race is on for EU's $1.3 billion science projects (Update)

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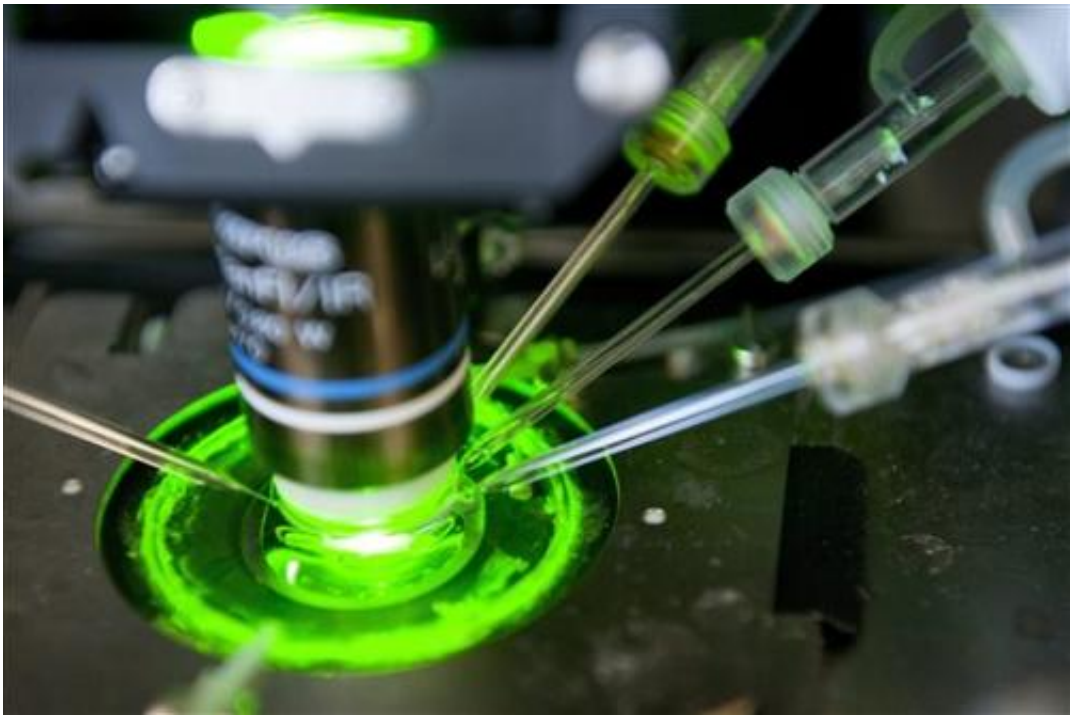

In this May 9, 2011 file picture people use a infrared-DIC microscopy to do multi-neuron patch-clamp recording in the Blue Brain team and the Human Brain Project (HBP) laboratory of the Ecole Polytechnique Federale de Lausanne (EPFL), in Lausanne, Switzerland. The Blue Brain team has come together with 12 other European and international partners to propose the Human Brain Project (HBP), a candidate for funding under the EU's FET Flagship program. The Blue Brain Project is an attempt to create a synthetic brain by reverse-engineering the mammalian brain down to the molecular level. (AP Photo/Keystone/Laurent Gillieron)

Call it Europe's Got Talent for geeks. Teams of scientists from across the continent are vying for a funding bonanza that could see two of them receive up to €1 billion ($1.33 billion) over 10 years to keep Europe at the cutting edge of technology.

The contest began with 26 proposals that were whittled down to six last year. Just four have made it to the final round.

They include a plan to develop digital guardian angels that would keep people safe from harm; a massive data-crunching machine to simulate social, economic and technological change on our planet; an effort to craft the most accurate computer model of the human brain to date; and a team working to find better ways to produce and employ graphene—an ultra-thin material that could revolutionize manufacturing of everything from airplanes to computer chips.

The two winners will be announced by the European Union's executive branch in Brussels on Jan. 28.

Initially, each project will receive €54 million from the European Union's research budget, an amount that will be matched by national governments and other sources. Further funding will depend on whether they reach certain milestones within the first 30 months, but over a decade it could total €1 billion each.

Securing such vast sums will be made harder by the austerity measures imposed by many financially drained European governments.

Still, the senior EU official overseeing the so-called Future and Emerging Technologies Flagships program is confident the money will be made available and insists the investment is necessary if Europe wants to match the success the CERN labs on the Swiss-French border that have become the world's premier center for particle research thanks to

their $10 billion atom smasher.

"Supporting research and development is not a nice-to-have, it is essential because no investment means no chance for a better future," Neelie Kroes told The Associated Press in an email. "And especially during a crisis we all need something positive to look ahead to. Just cutting public expenditure and austerity don't bring new growth and jobs."

Kroes, whose title is European Commissioner for Digital Agenda, believes it will pay off. "By pooling resources across the EU and focusing on the two best projects we get a good shot at a manifold return on the investment," she said. Switzerland, Norway, Israel and Turkey, which are not part of the 27-nation EU, are also partnering in the program.

One explicit aim of the program is to encourage scientists to address not just contemporary problems but also those that could arise in future.

Climate change, ageing societies and a shortage of natural resources all loom large in predictions for Europe's future. So far, solutions to these problems have been limited, partly because of their sheer scope.

In this May 9, 2011 file picture scientist Ying Shi looks into a microscope at the Blue Brain team and the Human Brain Project (HBP) of the Ecole Polytechnique Federale de Lausanne (EPFL), in Lausanne, Switzerland. The Blue Brain team works together with other European and international partners to propose the Human Brain Project (HBP), a candidate for funding under the EU's FET Flagship program. The Blue Brain Project is an attempt to create a synthetic brain by reverse-engineering the mammalian brain down to the molecular level. (AP Photo/Keystone/Laurent Gillieron,File)

"The world of today has become so complex that it's beyond our control," said Dirk Helbing, a professor at the Swiss Federal Institute of Technology ETH in Zurich. Helbing is the coordinator of the FuturICT team that aims to monitor the state of the planet in real time using growing mountains of data now at our fingertips. Anybody will be able to tap into the system to explore possible future scenarios in much the same way as the meteorologists can now forecast the weather with a certain degree of accuracy.

"Think of it as the telescope of the 21st century to help get better insight into problems," Helbing said.

A rival project led by scientists at ETH's sister school EPFL in Lausanne, focuses less on the planetary and more on the personal.

Adrian Ionescu, a professor of nanoneletronics at EPFL, says the booming in mobile devices has concentrated mainly on communication and gaming. His team's Guardian Angels project aims to develop wearable, self-powered gadgets than can warn their users of danger, encourage them to exercise, and collect environmental and health information that could be of use to doctors.

Ionescu claims such devices could save large sums in health care costs by preventing diseases and helping manage them.

The components to make them are already available, he said. The key is integrating them all into one system—a process he likened to the effort made by the United States in the 1960s to put a man on the moon.

One of the most promising materials for electronic devices of the future is graphene—the sole focus of a third finalist. It has been touted as a solution to problems as wide-ranging as mopping up nuclear spills, making airplanes more fuel efficient and speeding up computer chips. Russian-born scientists Andre Geim and Konstantin Novoselov received the 2010 Nobel Prize in physics for their experiments with this two-dimensional "wonder material" that's up to 300 times stronger than steel—but much lighter.

The problem is how to manufacture it efficiently.

"There is still quite a bit of research to be done," said Jari Kinaret, professor of applied physics at Chalmers University of Technology in

Gothenburg, Sweden.

Kinaret said the long-term funding offered by the EU program would be key to developing what he called a "disruptive technology."

"If you want to create a new technology it does not happen in one or two years," he said. Although Europe, the United States and Asia each produce a third of the scientific papers published on graphene, the number of patents coming out of Europe lags behind.

"We risk that the fruits of research that started in Europe will be harvested elsewhere," he told the AP.

The prospect of Europe losing ground to nimbler rivals plays a prominent role in the arguments put forward by all four projects still in the race.

"If we don't get the funding...we may see some of the European talent move to parts of the world where there is better funding situation, like Singapore," said Kinaret.

Henry Markram said CERN's success was the best example of how polling European resources can put the continent at the forefront of science. CERN announced last year that they have finally found solid evidence of the elusive Higgs boson particle that scientists have been hunting for 50 years.

Markram, a professor of neuroscience at EPFL, says his team wants to do the same for the human brain.

"The pharmaceutical industry won't do this, computing companies won't do this, there's too much fundamental science," he said. "This is one project which absolutely needs public funding."

His Human Brain Project plans to use supercomputers to model the brain and then simulate drugs and treatments for diseases that Markram says cost €800 billion each year in Europe alone.