

Heavy-lift drone technology is tested during a UK military exercise in Cyprus.

UKRAINE WAR: A NEW ERA FOR EUROPEAN DEFENCE RESEARCH?

After Russia's invasion, politicians promised to boost military research funding – but policy specialists aren't convinced a rapid change lies ahead. **By Ann Finkbeiner and Richard Van Noorden**

Some time in the next decade, solar-powered European airships might hover 20 kilometres above battlefields, relaying crucial details about the movement of troops below. These extremely high-altitude drones, or pseudo-satellites, haven't yet taken flight. They're one of scores of research and development (R&D) projects supported by the European Defence Fund (EDF), a European Union fund that this July announced the winners of its first set of grants, worth €1.2 billion (US\$1.24 billion).

The EDF marks the EU's first major foray into funding military research collaboratively across the bloc. It had been planned for many years, but its first grants are remarkably timely. Russia's invasion of Ukraine in February has stirred European interest in ploughing more money into defence research, after decades of being eclipsed by the United States in the field of warfare innovation.

In the three months after the invasion, European nations announced increases of nearly €200 billion to their defence budgets. At the same time, EU politicians announced a flurry of strategies to boost the bloc's combined military power. Although both of these developments focused on procuring weapons and other materials of war, they also included promises to spend more on the R&D that will stock the next generation's defence inventories, from drones to artificial intelligence (AI).

"Innovation is key to bolster our defence capabilities," the European Commission declared in May when announcing an initiative to boost research in the sector. (The EC is the policy-making arm of the EU.)

Russia's invasion has been "a wake-up call", says Frans Kleyheeg, business director of the Netherlands Organisation for Applied Scientific Research (TNO), an independent applied-science organization in The Hague that conducts defence research.

There is uncertainty, however, about whether European nations and the EU will deliver on their rhetoric. Almost all the R&D funding announced this year, including the EDF, had been in preparation well before Russia's invasion. The aggression has added fresh urgency to pre-existing plans to increase collaboration and funding for defence research across Europe, but change is likely to be slow and gradual, specialists say.

"One thing I'm waiting for is how much investment in innovation goes up in response to Ukraine," says Daniel Fiott, who heads the Defence and Statecraft Programme at the Brussels School of Governance, an interdisciplinary research centre.

The EU's turn to defence

In the past, the EU didn't invest in defence, let alone defence R&D. What is now the EU grew out of inter-country agreements after

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the Second World War to collectively manage the coal and steel industries, and more generally to promote peace and its member states' welfare – but not to defend them. “The EU was a peace project – trade, prosperity, peace,” says Frédéric Mauro, who specializes in European defence research at The French Institute for International and Strategic Affairs in Paris. Defence, and defence research, were the responsibility of the EU's individual member nations. The EU's flagship R&D funding mechanism – its latest iteration is the €95-billion Horizon Europe programme, running from 2021 to 2027 – explicitly excludes defence-related research.

Three countries account for the bulk of Europe's defence R&D. France currently spends the most (€5.6 billion), followed by Germany, according to the European Defence Agency (EDA, an EU agency in Brussels that coordinates European defence planning and collects statistics from member states). The United Kingdom, which is no longer in the EU, is the region's other major funder. But for decades, those countries had reduced their spending as they increasingly relied for their protection on the umbrella of NATO (the North Atlantic Treaty Organization, the military alliance between European and North American states), partnership with the United States and the unlikelihood of war in Europe.

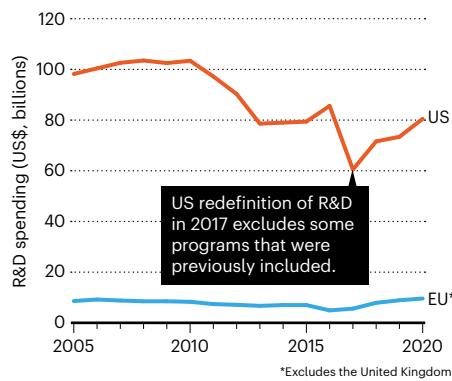
Beginning around 2014, that protection started to look less reliable. Russia began a pattern of aggression by annexing Crimea. And the US–EU partnership seemed more fragile: in 2017, then-president Donald Trump complained of European countries not “paying their fair share” to NATO. Jean-Claude Juncker, head of the Commission at the time, pushed for the EU to boost its defence role, including setting up a defence research fund. The Europeans were like “lettuce-eaters realizing they're in the midst of carnivores”, Mauro says.

After two small pilot programmes, the EDF started in full in 2021 with a seven-year budget of €7.9 billion: €2.8 billion for research, the remainder for development (focused more squarely on getting technologies to the battlefield). Its grants support only internationally collaborative work, in a deliberate plan to avoid the redundancy of 27 national military priorities. Most of the EDF money goes not to universities, but to other institutions, such as semi-governmental research and technology organizations (RTOs) that accept contracts from governments for applied research, large defence industries and smaller companies. Only around 8% of the almost 700 organizations involved in the EDF's first 61 grants are universities, according to *Nature's* analysis.

The EDF isn't the EU's only effort to bolster military research. Through 2021 and early 2022, for instance, the EC announced a series of strategies to enhance inter-country defence collaboration. But the totality of

MILITARY RESEARCH FUNDING

The United States spends much more than the European Union on defence-related research.



European efforts pales beside US defence-related spending. By one accounting, the United States spent US\$80 billion on defence-related R&D in 2019, compared with around \$9 billion across the EU (see ‘Military research funding’). The comparison is not entirely like for like: definitions of what counts as defence-related R&D differ between nations, and might change over time. But it's clear that the United States is the world's major military research funder; Europe is a long way behind.

Ukraine reactions

Russia's aggression might have changed the calculations in Europe. Two weeks after the invasion, heads of EU member states met in the former royal palace of Versailles in France and issued the Versailles Declaration. It said that, besides agreeing to “substantially” increase defence spending, EU members would “foster synergies” between civilian and defence research and “invest in critical and emerging technologies and innovation for security and defence” – emphasizing policies that were actually already in motion. “That mindset has taken off in Europe,” says Fiott, “that innovation pays off and lowers dependence on countries we may not trust.”

So far, however, there's been little extra research funding to follow this rhetoric. In May, for instance, EU officials announced the European Defence Innovation Scheme (EUDIS) – said to be a €2-billion package of support measures (over five years) to help firms get technology to the military, but at least three-quarters of it simply repackaged already-budgeted EDF money.

The bottom line is that EU can do little in response to the invasion of Ukraine to increase its agreed defence R&D funding, because EU budgets are already set for 2021–27, and “no one wants to reopen EU budget negotiations”, says Torben Schütz, associate fellow at the German Council on Foreign Relations, a Berlin-based think tank.

The EU seems most interested in improving synergies between civilian and military funding – to the extent possible – and urging

further cooperation between member states. For instance, a defence-innovation hub, created this year, seems mostly to be a networking platform for academics, technologists and the defence industry, housed in the EDA – which itself has a budget of just €38 million for 2022.

Another possibly significant avenue for collaboration will be a NATO defence-innovation accelerator called DIANA, which aims to help apply technologies such as AI, biotechnology and materials science to defence and security. It will run a network of more than ten accelerator sites, some at universities in Europe. That too, however, had been in the planning before Russia's invasion. This June, NATO announced a \$1-billion multinational venture-capital fund – described as “complementary” to DIANA – to invest in start-up firms developing dual-use technologies (which can have both civilian and military purposes).

Some academics in Europe have long criticized plans to increase spending on defence research. That could mean less funding for global dangers, such as pandemics, health inequality and climate change, argues Stuart Parkinson, executive director of Scientists for Global Responsibility, a lobby group in Lancaster, UK, that is allied with a European-led campaign group called Researchers for Peace, which opposes EU funding on military research.

National responses

Although the EU has little ability to massively increase spending, European nations on their own have more latitude to make quick infusions of cash. After the invasion of Ukraine, some national defence budgets rose sharply. Most notably, Germany's defence budget increased by €100 billion (to be spent over an undefined time frame). Most of this goes to defence industries and RTOs, and is focused on procurement for an urgent war, not research budgets. Still, Germany also added more than €400 million to its defence R&D spending.

Simona Soare, who analyses defence and security at the International Institute for Strategic Studies, headquartered in London, thinks that France is likely to increase R&D as well, probably to get defence technologies already in the pipeline to the testing stage.

Still, because rising defence budgets are mostly going to be focused on procurement, says Soare, military-focused R&D is likely to rise only modestly. “Projects in R&D take longer to mature,” she says, and even with the invasion of Ukraine, she argues, Europeans don't see the long-term urgency. “In Europe, the clarity of threat assessment hasn't been there. We're not understanding that war in Europe is a distinct possibility,” she says.

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