

Democratising space

Entrepreneur Raycho Raychev is banking on a growing demand for space data sparking a consumer satellite boom, he tells **Antoaneta Roussi**.

On a quiet street in Sofia one building looks conspicuously sleek among worn, Soviet-style apartment blocks. The sheen is no mere facade. Outside, babushkas hobble through Bulgaria's capital with their day's shopping, while inside a company called EnduroSat is working on launching a cluster of nanosatellites.

The firm serves as an example of the kind of small, tech-focused launches Europe has strength in and the kind of ventures with which the EU institutions are hoping to take on the world.

EnduroSat's founder Raycho Raychev is a 34-year-old former Silicon Valley dweller who believes that satellites will become a consumer product in the near future, as smartphones are today. His vision is to change how people see space technology. "No one cares about how the central processing unit of the smartphone is communicating with the graphics processing unit; people use a phone for its applications," Raychev says, holding up his iPhone. "We're trying to do the same with satellites."

In June, EnduroSat plans to launch its inaugural satellite from Cape Canaveral in Florida, the United States. The company's cubesat nanosatellite measures just 10cm³ and weighs just over a kilogram. If all goes well, it will be placed in a low-Earth orbit travelling at 30,000 kilometres per hour. From there it will transmit data to EnduroSat's ground station in Bulgaria. The mission will focus on communication, education and the testing of a new type of satellite module. Soon, EnduroSat will offer data relay for applications such as Earth observation, meteorology and precision agriculture.

"Through a cloud server the client can be in Antarctica and still download the data," Raychev says. "We can also give these models to universities or research institutes in Europe, many of which would kill to have the capability to download more data from space."

But the Bulgarian didn't set out to create a satellite company. His first venture was a university-level online space education programme, which he set up after graduating from the International Space University near Strasbourg, France. He was able to attend the ISU through a scholarship, but with tuition fees at €25,000 for a masters, this is an education few can afford. "I decided to change that," he says.

After convincing several leading astronauts and directors at the European Space Agency and NASA to contribute lectures, Raychev launched Spaceport Academy with funding from technology companies and

the US4BG Foundation. The result is an educational platform very much like a game, which has attracted thousands of would-be space engineers and now also the European Commission.

Visiting Raychev along with Research Europe was Robert-Jan Smits, at the time the top official in the Commission's research and innovation directorate-general. Raychev, huddled behind his Mac, landed us on Spaceport Academy's Moon and navigated through various bases he had accumulated from "playing".

"You need a commander HQ? Then you have to earn nine points in space applications by watching the lectures, taking the quiz, earning the points and then upgrading your base," he said to Smits. "Impressive, it's like Farmville!" exclaimed Smits, perhaps outing himself as a fan of the Facebook game that simulates farm management.

Raychev says he almost went bankrupt twice while developing the programme. But in 2017 he secured €1.2 million from Horizon 2020, which he will use to build up EnduroSat's next generation satellite, communications system and ground system.

Digital entrepreneurs such as Raychev are regularly poached by the United States or China, but he says Europe is the "perfect place" for his company. The more EnduroSat develops, he says, the more he appreciates the EU's open but regulated market and the skills the bloc has to offer. "We have access to a very strong engineering and tech workforce, and the EU provides great competitive opportunity in terms of niche high-tech production capabilities," he says. "It's not mass-production we're doing: it's a boutique type of engineering."

The goal is to provide data from space to researchers and small companies at an affordable price, without the complexity of a large-scale mission. It's an opportunity for the company to grow, and Smits encouraged Raychev to apply for more EU funding. The Commission has launched a European Innovation Council in Horizon 2020 to encourage this kind of entrepreneurship.

There are more than 2,000 cubesats in space already, according to the EU's nanosatellite database. Raychev says that EnduroSat's aim isn't to launch endless numbers more, but to optimise the use of low-Earth orbit and eventually create a swarm of satellites that interconnect and work more efficiently. "Everything a big satellite can do, our satellites can do," he says proudly.

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