The Sound of Economics by Bruegel

**'To infinity and beyond: the European space sector and industrial policy'**

Guiseppe Porcaro: Welcome to the Sound of Economics, the podcast series by Bruegel, the Brussels based economic think tank. I'm Giuseppe Porcaro, and in this episode, we begin a conversation around space policy and why it matters for European economy. We are particularly happy to have this conversation today with Reinhilde Veugelers, Michel Praet, head of the European Space Agency's process office, Jérôme Béquignon and Eleni Paliouras, also from the EU relations office of the European Space Agency. Michelle, Elena and Jerome. Thanks for joining us on the Sound of Economics.

Michel Praet: Happy to join.

Guiseppe Porcaro: This is a very special moment for space exploration. At the beginning of April, we will see the maiden flight of the first helicopter to another planet. The Artemis accords are bringing back men on the moon, and ESA is building Dedalus, the first robot that will crawl inside lunar case. The United Arab Emirates and India have successfully entered Mars orbit on the first try, and Elon Musk has just stated that he will land his starship there before 2030. This is a new space race, this time not as a proxy of the Cold War back in the sixties, but as a multiplication of the actors, both private as well as state across the globe. It boils down to increased innovation, accessibility and affordability to invest in the outer space. In this episode, we would like to better understand where the European space sector is standing in this brave new world, what are the consequences for industrial and innovation policy, but also have a closer look at the institutional setup which should foster this innovation. So, Michelle, I would like to start the conversation. Perhaps you can give us a general overview of where Europe stands in this global race for space and specifically the role of the European Space Agency in this as one of the top space agencies worldwide.

Michel Praet: Yes, thank you. As you say, we in Europe have the European Space Agency since 1975 working very well. It's an intergovernmental agency. And this helps also to understand how we have built what I could call the space system in Europe, meaning member states joined. And they are not obliged like it is in another system that is more communitarian system. And this is not a criticism with vis a vis the communitarian system. But the intergovernmental way allows member states to participate or not to participate through programs. And so, you can be quickly on the ball if I may say so on the rocket around the satellite, because it's enough that two member states and usually it there are many more decide to launch a program that is program agreed by the European Space Agency in order to go on with this program. I remember the beginning I'm a little bit old now, so I can remember the Ariane adventure. In the beginning, there were not so many member states participating in Ariane, but it was enough to develop a launcher in Europe. And to start with that, it would have been impossible if there was an agreement needed by 15 member states or by 22 member states or 27 or 28 member states. And that's important to know again, ESA had started with the idea to develop an industrial policy in Europe and to have a policy that was flexible enough in order to have programs to start with.

Guiseppe Porcaro: And we're going to go a bit more in depth into this role on the role of ESA and the industrial policy and innovation in a second. But before going to that, perhaps you can tell us which are the most exciting projects that the European Space Agency is working at the moment. Also, to understand which is the positioning of the European space sector within this global scenario that I was speaking before where we have new countries rising and sending probes to Mars, the private sector sending humans in outer space and so on. What are the challenges and what are the things to come as in the next few years?

Michel Praet: To be bold, I could say that there are two sorts of programs in ESA: the programs we do on our own. When I say on our own, it can be together also with the United States, with Russia, with China with other parts of the world. And these are programs linked with science, with exploration, all that is linked to

better know the universe we are living in. You spoke about the moon; you spoke about Mars. I think this is very important for the years to come and there we will work with international partners because as you said we are not in a new space race or in a competition between Russia and the USA, we are mainly as we can already see it with the space station (ISS) in an international cooperation. And that will develop because the future of space science the future of space exploration, is not linked with one particular continent with one particular power developing it alone. More and more, you have space as being an enabler for what I could call international cooperation. That's one part of our programs. The second part of our programs is more I'm not saying Eurocentric, but we develop it also, in cooperation with the European Union and with the member states of the European Union. Even if they are practically the same than in ESA. But there is still a little bit of difference. We are developing with the union because it's our programs linked with the European citizen and of course, also with citizens that are outside Europe just to speak about Galileo, the navigation program that is today very well known. It's important because it is for the European citizen he can or she can feel the use and the utility of the program every day by opening the television by opening the smartphone. So, its economic importance and social importance of these programs. That's another part of the programs we develop inside ESA, this time more in coordination with the union.

Guiseppe Porcaro: This really brings a perspective about the work that you're doing and also, I suppose, the work that you do in the Brussels office of the European Space Agency. You are especially working on the coordination between the operations of ESA and the European Union. Maybe you can also say a few words about kind of role that you have sitting here in Brussels. You know, not many people know that there is an office of the European Space Agency here in town

Michel Praet: To elaborate a little bit on that: usually when people ask me what I'm doing, I'm saying I'm a bridge, a bridge between my institution, European Space Agency and the European institutions being the commission with the parliament paid the council and even the European Council. So to be a bridge is to try, and I don't say that we succeed every time, but is to try to make a link for having a better space policy in Europe. And when I say a better space policy in Europe, I mean a space policy that is interesting to users in Europe. Just one example: meteorology. It's years that we develop inside Europe a meteorological system, ESA is doing this with EUMETSAT, the Meteorological Agency in Europe. And we are doing this because of what? Because they are users and at the end, it is the users the meteorological users asking us to develop new satellites to develop modern innovation and new satellites in order for their users being you and me to look at TV the evening and to say I yes, what will be the weather tomorrow? And that's very important. So, we are driven more and more by the users, but it's prejudging our conversation. But that's also the idea of Commissioner Bretton for his secure connectivity program. How do we get the users onboard? How do we get the European citizens on board and what can space bring to Europe and to European policy? And that's as to me fundamental

Guiseppe Porcaro: That's exactly one of the core questions I would say, you know, like if we have an investment in the space sector in Europe that is, citizens oriented and to this regard, when you speak about users and you speak about citizens, to my mind, it also comes the value for the general public, but also what kind of value is produced for citizens that are entrepreneurs that are trying to drive innovation. And here, the link that you were speaking before with the industrial policy the space sector has created, uh, I think quite a few 100 thousand of jobs across the continent, ranging from manufacturing to space operations and the question on the table, especially seeing how the private sector is being involved in other parts of the world, of course, we mentioned Elon Musk, which is the symbol of that, but there are many other examples that could be made: What is this ecosystem? The European Space Agency? But in general, how can we

explain what is going on in the space sector in Europe and how we can judge it as a driver of innovation in the industrial policy scheme?

Michel Praet: Before dealing with industrial policy, I would like to give the floor to Jerome because we have a European system that is called Copernicus for us observation and the data provided by the satellites is tremendous. We are a sort of Google system in Europe and Google system, free of access for scientists and for the European citizens. So, it's important because this gives the opportunity to the users to use a system and using a system means also, and there you are completely right, to develop entrepreneurship, to develop an SME, knowing that they have the capacity to have the data and to interpret the data because data is fine. But you have to do something with the data. Otherwise, rough data, you can do nothing with it, but just to use this data to transform, if I may use this terminology the data into an economic activity

Jérôme Béquignon: Yes. To go on with this, you know, we have the freedoms like observing the Earth a continuous manner and gathering a huge amount of data. We're talking of terabytes of data today. So, this data these images or take other. Not always this all too. Measurements of gases in the atmosphere are free for you, and it's a big change with respect to 30 years ago where you have to pay to access them. We have a huge number of users in Europe and in the world. Many of these data are also copied in by the U.S. And it's fine. So, the number of users the big unknown to us because we don't know how many people are copying it. So, what can you use the data for? You know, we all have very nice apps on our platform, and there are plenty of apps which are developed from this data,for instance surfer. So, if you want to go surfing provided that it is possible, you can have an app which will give you the quality of water, temperature of water and all this is possible thanks to the Copernicus data. Likewise, you have an agriculture worker who can use an app to verify the status of the fields and use them to decide on the use of fertilizers and irrigation. And all this is possible through this kind of data. So there we are going into an economy which goes much beyond the sole economic sector of space. It goes through various services, like agricultural, leisure and so on and so forth. So very often we use the figure for every 1 euro spent on space, you have 10 euros generated in the whole economy so that the comparison with the iceberg you know you have the tip of the iceberg spending this kind of infrastructure.

Guiseppe Porcaro: This is extremely interesting because, first of all, it's an example of public open-source data that is provided by the European Union and the European Space Agency at the same time, to a huge number of users worldwide. But then, as you say, the actual everyday application of our presence in space, which is something that can make a tremendous difference for individuals or, as you say, a small agricultural farm in the middle of France, for example, or a start-up trying to build an app in the suburbs of Berlin that really makes it a very concrete. This is embedded kind of industrial policy; I mean to me. I don't know what Reinhilde thinks because she's the expert on industrial policy. What is your take or your comment on these first elements that we're hearing from our friends from the European Space Agency?

Reinhilde Veugelers: Yeah, I think it's really very important to move away from seeing space as a very isolated sector. But seeing really and talking about space economy here and the contribution of space sector to the economic sector. And then, of course, you think first, in terms of its an important procurer because of space infrastructure, which it has an important role, particularly, you see it within a dual use issue. But then I think there is also increasingly way more emphasis on the role that the space sector plays through all services that can be developed on the basis products and particularly the data that is generated from satellite operators as Earth Observatory. And we do see that increasingly, these services, based on data that comes from space, are the most important and dynamic sectors and benefits from space here. And that's really where the increasing contribution is of the space sector two with the economy through these services on built data. But of course, with data comes along a lot of digital technologies that could be new players

that can really develop services based on this data. But of course, also big tech is definitely also important contributor here. And so, we really have to think carefully about who can actually develop the service is built on the space sector here, particularly because the services we really where the growth is, and particularly on the digital players here and then also, from a European perspective: Can we have enough of our own digital players taking advantage of this here start-ups, but also start-ups that can actually scale up here? So, I do think that really in that respect space and certainly the future will become an even more important part of industrial policy discussions of the EU linked to its digital sector, but also its digital strategy, but also linked to its climate change and green technology sectors here. Because also, a lot of these services will run and will enable new services like asmart cities like monitoring big weather events, pandemics, so there's lots of applications here. Space can no longer be so contained has to have an own industrial policy, but also industrial perspective that links to digital and green. Another important point, I think that space plays is as a driver of innovation here. That's very clear. So, on the one end, of course it will use a lot of innovation and basic science and research, and not just from astronomy but also from new materials and digital technologies. But it will of course, also enable a lot of innovations, particularly again the services component. And that means that any industrials should be built along this triple helix of linking back a team with the space sectors, players and also with the business sector here. And here comes, I think, an important dimension also for European industrial policy. Given that we're focusing more on the services components that are derived from the space sector, there is much more involvement of the private sector will be much more public private partnerships needed here and actually also to some extent, there is also a trend towards having private companies and particularly big companies that are actually themselves developing independently space products here like their own satellites. And so, in that respect, the role of the public sector, which was really strong and predominant in the past, how that will evolve in the future when it shifts to more deeds, services and more interest of the private sector. And then, of course, the question is, what the world can Europe play and particularly does have enough strength in terms of private sector here. Do we need specific, mission-oriented policy forces to make sure that we activate the private sector in Europe here, particularly the start-up scene? But also, I think there is a dimension of strategic autonomy when we're developing an industrial policy especially in space. There is an extra dimension of strategic autonomy here because it's also connected to defence and privacy and the use of these data here. So, also in that respect, I think the whole discussion that we currently have developing a much more mission oriented industrial policy targeted to particular areas question and should we have something dedicated for space where we link the private and the public sector better here. But where we also take into account the position of Europe and making sure that that there is enough autonomy within this space sector here so that we are not dependent on others or ensure that the services for to society. So definitely I think in the future space will become way more pivotal in all the industrial policy perspectives. And we need to really consider how to develop a good industrial policy here. That space no longer becomes a space sector, will becomes a space economy here and a new space economy.

Guiseppe Porcaro: Thank you, Reinhilde for this analysis, I'm pretty sure that Jerome, Eleni and Michelle would like to react to your reflections because there's quite a lot of food for thought.

Michel Praet: Just about what you said at the beginning Reinhilde, it's that very important space is not just there for space engineers to have new, beautiful satellites not used by anyone. I don't say that it was like that in the past, but it was more like that in the past than these days. Of course, space is there to better define and to allow to better implement what I could call European policies. Being as Jerome said before agriculture being transport, we see it for Galileo also being climate change and being when you take the major challenges of this commission and they are fully right by doing so, the challenge of the digital divide and the challenge of the Green Deal. Space can bring something in a better definition of these policies and in

a better implementation of these policies. So, this is as to me, very important. I tend to disagree for once, and you will allow me with you under what you call the more implication of the private sector. I don't say that it is not true. And I'm not saying that in a new space, the role of the private companies are not different than in what we could call traditional space. But what is new space? We often say, well, it is, SMEs new companies entering into, into a field where you can develop because there is a huge market. No, for the moment, what we see also in the United States is that there is the link between, for instance, what Elon Musk is doing and doing very well space. It has a strong link with the administration and with the U.S. institutions. If you don't have such a procurement policy, if you don't have such an ankle tenant policy and that's what we miss in Europe, then you cannot develop in a new space venture. I mean, new space is not just then SMEs more. It's a way of thinking. It's a way of, as I said, an anchor tenant policy. It's a way of sharing the costs and the risks between the public side and the private side and the industry, and that's very important to know who is taking the risk of this and how are the costs are shared? That's important, then you have also the transfer of control of key program elements that are very important if you want to embark into a new space. I think these are the main elements that explain the success of what the U.S. is doing, for the moment. It is a good understanding between what the private sector is doing and what the public sector is doing, and a good mix of this in a procurement policy and in an anchor tenant policy. I spoke at the beginning of this speech about meteorology. Well, we have today a good meteorological system because we have users asking for data. And if they see that data is going to be missing in five or six years' time, they say you should embark into the development of a new satellite. That's what we need everywhere. That's what we need in Galileo tomorrow, and it will come. That's what is already the case in Copernicus, meaning a user community saying, don't forget to build satellites because we are depending on them. That's what we will need in the defence sector and because we didn't speak about that. But that's important space traffic management and other things. So, I would like really to put the emphasis on the fact that what we need is a sort of intelligent collaboration between the private sector that is just not little SMEs, that is also a Airbus, TAS, the bigger companies, because they are essential and as fast if we want to reach something because they know how the system works and they can develop into this system and the public sector and this is very important. Sorry to be perhaps a little bit brutal, but I hear too many times people saying that we should embark on new space. New space is fantastic! It's the creation of new companies and they are going to develop! No! They are going to develop if the elements are there to develop. If the conditions that we can create through the public sector, being the European Space Agency, being the Commission, being other people that are working for and in the public service are in a way give them the possibility to develop, otherwise it will not work.

Guiseppe Porcaro: Michele, I agree with what you're saying. Basically, it's a matter of ecosystem: what you said about Elon Musk, if the contracts with NASA wouldn't be there, probably, he wouldn't be where he is now

Michel Praet: And again, this is not a criticism vis a vis Elon Musk, he is doing a very good job, but I mean, this is how it works. This is the key of success to be clear.

Reinhilde Veugelers: So, I fully agree that indeed this public private partnership we really have to look at the ecosystem and the ecosystem doesn't only include young start-up companies like SMEs, but also established players here, definitely. But I think we should also make a distinction between still very big part of the space market, which is by public procurement and that comes from defence, but also from other national procuracy. Indeed, the public sector is the important clients, and that still is important. That explains, indeed, the success of the U.S. with its DPT, but also Department of Energy and increasingly so that's really for sure the case. But I think there is also still a growing segment of the markets where there is commercial

interest in space that has to be with companies that want to have their own satellite system. So other big players here and so in that respect there is also next to public a growing part where, actually, the private sector itself is also customer here and can actually supply its own satellites. And that's definitely also a new angle that we have to take into account. And so, I'm not talking only about even risk or Jeff Bezos and philanthropy that really looking more at the public procurement. More companies like Google or like Amazon, will be interested in having their own satellites and connections with the new technological development. We also much more able to operate in space.

Michel Praet: The one is, Reinhilde, not contradictory with the other, right? I mean, it's as you say. I said It's an ecosystem.

Reinhilde Veugelers: No, of course!

Guiseppe Porcaro: If I may interrupt you, I was watching Eleni nodding, so I would like to hear if he has something to add.

Eleni Paliouras: Sure, thanks. And I was very much agreeing that there are many cases where it seems like the commercial success of a particular overseas company is miraculous in the sense that they're building something out of nothing but really behind the scenes are a number of contracts with the public sector which enabled them to move forward. I mean, one thing that I wanted to mention was that there's other space activities which are important to protect other industrial sectors. So, for example, ESA has a space safety and security pillar where one of the aspects that's being looked at is understanding and helping to model, say, solar flares, and to build a space weather predictive model so that we can protect assets on the ground or in the air in the in the case of spacecraft or even astronauts on the ISS from the effects of a solar flare. So, there are many services that are being developed, which may not have a commercial application directly, but they can be used to protect other commercial sectors. I mean, this is another one of the reasons why investments in space okay, while not building directly the applications, areas such as Jerome covered are still very needed and valuable to protect other economic activities.

Guiseppe Porcaro: No, absolutely, I completely agree. And that's part of this ecosystem building that we were speaking before. Jerome, you want to say something, please?

Jérôme Béquignon: In complement to this, there is clearly a multiplication of satellite space for all the reasons that were mentioned before, and that somehow creates a problem in the sense that sometimes after the end of their life and satellites either break into smaller pieces or stay where they are without control. A problem which called space traffic management of that debris. So that's very much a concern for, let's say, a government organisation. And it's very much a concern for Europe. Um, now it's something which is probably less known is that in Europe we have a number of small companies which have proposed very innovative concept to remove some of this debris. And this is something you don't necessarily find in China or in the US. So, I think Europe can be proud of this. And certainly, we'll have something to bring to this brave new world, which is different from the others.

Guiseppe Porcaro: Thank you, Jerome. We are coming to the end of this episode and of course I could stay for hours to speak about it because I'm very interested in space, as a space enthusiasts and a space geek, basically! I would like to maybe to conclude this conversation since we started with the role of Europe and with the role of the European Space Agency as a bridge. As Michelle has been pointing out at the beginning of the conversation, perhaps a last question about the next budget of the EU because the EU. The EU is going to institutionalise for the first time you space program, basically putting together the different parts that we've been already mentioned. We mentioned Galileo. We mentioned Copernicus. They're all part of this.

Also, to conclude what are the stakes on this new cycle? And how do you see the evolution of the European space programs in general? And how do you see the evolution of the European space sector?

Michel Praet: If I may, for the first time, the European Union has gotten very, very large and a very important space budget with more than 13 billion euros over the next seven years over the MFF period. And that's fundamental because you can have all strategies in life that you want. If you don't have the money to realise them, it's just a dream. Of course, you can dream and it's fine to dream. But to make dreams reality, you need money. And thanks to civil servants of the commission, thanks to all the member states in the Union, thanks to Commissioner first Bieńkowska and then Bretton there was a will to realise this and to have an important budget, and they have today a very important budget. At ESA, we have what we call ministerial meeting with that each ministerial we receive some money to go on with programs and the latest one was in Sevilla and we obtained more than 14 billion euros for a period of 2 or 3 years, depending on the program. So, this is very important. This means that the bridge can work if you have one partner that has no money or practically no money, and another part of that is great and that is working very well and so on. You cannot build an interesting bridge. To build an interesting bridge, you need strong partners. Today, the commission is strong. Today ESA is strong, and you have a, I hate the expression but I will still use it, a sort of win win situation where you can develop something for space and for the users, thanks to a strong European policy and strong ESA policy. And that's as to me the most important.

Guiseppe Porcaro: This is very exciting because it means that they is going to be more interesting stuff that is going to come in the space area to come in the in the next few years. And as I say, this is for us just the beginning of a conversation around space policy, the space sector as an industrial sector and how important this is. And this is becoming for understanding economic policy in general, which is what we do on a daily basis at Bruegel. So, I would like to thank all of you. And as I said, this is just probably a first conversation around space policy here at Bruegel so, stay tuned for the next steps. Thanks a lot for joining the sound of economics. And as usual, you can read the full library of the open access analysis and studies by our scholars on our website bruegel.org! Until next time - Bye bye!