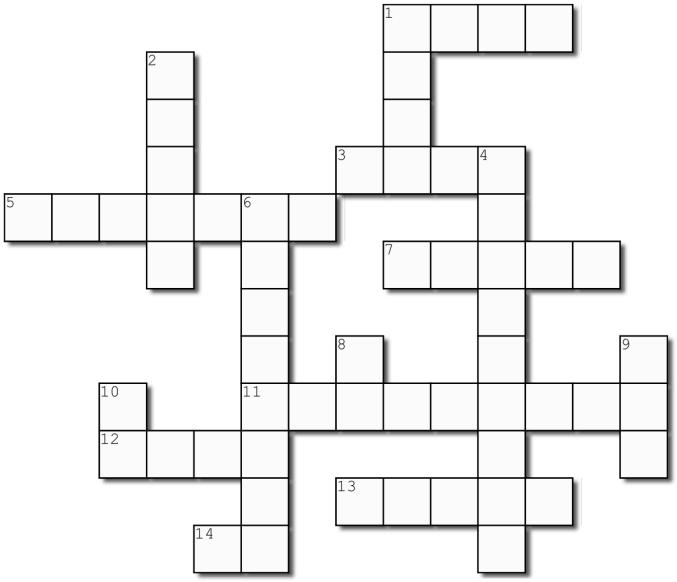
THE EUROAVIA FORLÌ-BOLOGNA MAGAZINE

EUROAVIA
Forlì - Bologna

Name:_____

EUROAVIA

Complete the crossword puzzle below



Created using the Crossword Maker on TheTeachersCorner.net

Across

1. Every Friday there is a...
3. The International Board is elected every...
5. Nationality of the president of EUROAVIA international
7. The one of EUROAVIA is 'build the wings of your future'
11. The hacker marathon
12. Swiss Institute for Disruptive Innovation
13. The bar that often hosts our events
14. Working group

Down

1. The number of working groups in EUROAVIA Forlì-Bologna
2. The most famous EUROAVIA Forlì-Bologna workshop
4. Competition recently won by EA members
6. Airbus ... Rocket Workshop
8. Initials of the president of EUROAVIA Forlì-Bologna
9. Train New Trainers
10. Affiliated society

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From the Editor

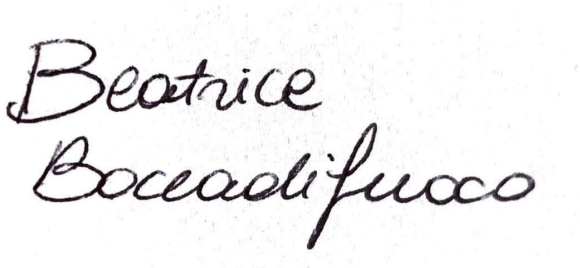
Dear readers,
Christmas is over and the EUROAVIA Local Board is here to wish you happy holidays with a new edition of the Local Magazine.

As you already know by now, the LB has changed. Therefore, at the beginning of the issue, you will find the personal experiences of the new Board. You will also read about new projects, as well as a new captivating interview, several interesting curiosities and a partnership created especially for you!

I would like to thank all those who have contributed to making this magazine a reality and, of course, Millene, our official corrector, without her attention it would have been impossible to enjoy the articles as they deserve.
In particular, I would like to thank the Local Board. Guys, you are precious traveling companions. Everything that is in this magazine is the result of work, perseverance and dedication. Thank you for having trusted me, I hope that each of you can find its own way and be happy, I send you my best wishes.

Finally, I thank you, EUROAVIAn, for giving us the opportunity to work with passion. I trust that you will find, among these pages, something that will inspire you.

Best regards,
Beatrice Boccadifuoco
Treasurer of EUROAVIA Forlì-Bologna



LOCAL BOARD

Andrea Curatolo
President

Johan Birnie
Secretary

Beatrice Boccadifuoco
Treasurer

Chiara Paceschi
Vice President

Giovanni Mussoni
International contact member

Meet the Local Board

The President

Hello there, my name is **Andrea** Curatolo and since July 2021 I am the **president** of EUROAVIA Forlì-Bologna.

Contrary to what one may think, I have not always been so active in the association, and I would have never imagined being here 2 years ago.
Indeed, I started my Journey in EUROAVIA in the Autumn of 2019 but was only in October 2020, when I joined the **Communication** WG, where I (re-)discovered the passion for writing. Some months later I attended the **EUROAVIA Odyssey**, an online training in soft skills, which incidentally is another passion of mine. Since then, my participation in the association increased exponentially. I attended a lot of online events, training and competitions.

At some point, the idea of candidating for a position in the Local Board was mature enough.
I presented my vision for the **future** of EA, a future in which people participate actively in the association and are aware of the great opportunities that it can offer. That vision was rewarded and luckily, I am not alone in this journey, since many hard-working and talented people work actively to make all of this possible.

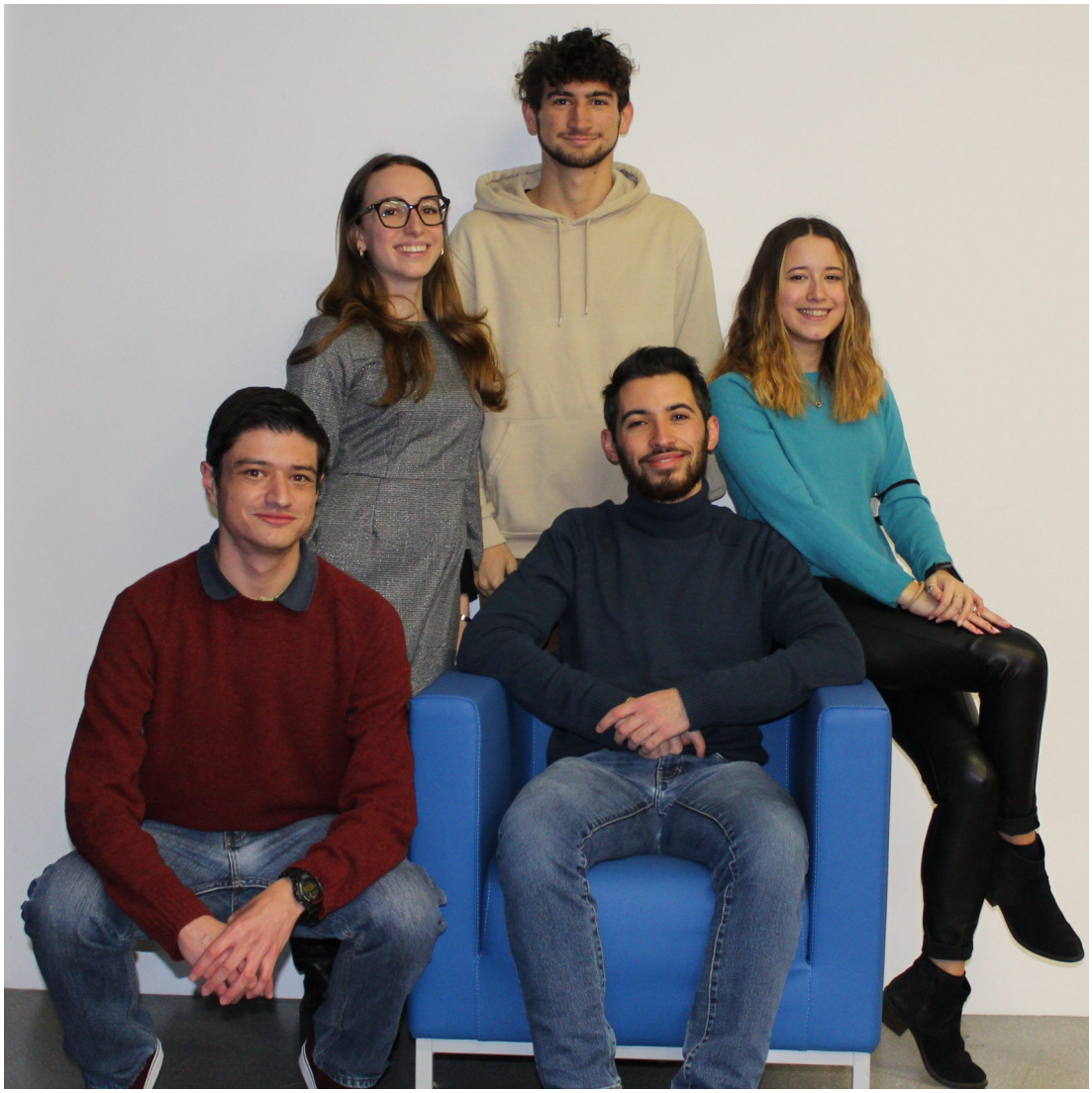
At the moment, apart from being the president, I coordinate the **Public Relations Working Group** and I am a member of the **Communication**, **Events** and **IT** WGs. Recently I joined the **International Communication WG** and the **EUROAVIA Training System WG**.

The Secretary

Hello! I am **Johan**, and I am the **secretary** of EUROAVIA Forlì-Bologna for this business year.

I have been a member since September 2019 when I started the master's degree and I've tried to be active since then. And I'm also part of the **Communication Working Group** in **EUROAVIA International.**

As **secretary** I have several responsibilities, such as taking the **minutes** for each



The local board. From left to right: Johan, Beatrice, Giovanni, Andrea and Chiara

of the LB meetings, supporting the president in **BoPs** (Board of Presidents with other AS from EUROAVIA) and other **meetings** with organizations in contact with the association, and support with all the **bureaucratic documents compliance** along with the president.

Apart from my tasks as a secretary, I work together with the **LB** and **WGs** to organize events and create content for all our members.

Every week inside the local board is a new challenge but, in the end, it is rewarding to help the association grow.

The treasurer

I am **Beatrice** and I am the **treasurer** of EUROAVIA Forlì-Bologna, as well as the coordinator of the **Communication Working Group**.

My main task as a **treasurer** is to draw up the **balance sheet**. This means that I have to write down all financial movements including both incomes and expenditures, in order to present the final balance at the general assembly for the approval by all the other EA members.

Moreover, as **coordinator** of the **CM Working Group** I have the main task of orga-

nizing the **calendar** of publications and **monitoring the writing** of the various posts that will be made public on social platforms. I also have the pleasure of drawing up the work plan of the **Local Magazine**, which I care a lot about and of which I am **editor in chief** for the second time.
I must say that it is difficult to always have everything under control so that nothing goes wrong, to respect all deadlines and to be able to meet everyone's needs, but this is why EUROAVIA is teaching me so much. As we go on, I always learn more about being **organized** and always **careful**!

I met the association by chance, during the science night at the Predappio wind tunnel. I was in the first year of university and I immediately enrolled, the following year I was already part of the Local Board with the role of treasurer, reconfirmed this year.
EUROAVIA gave me the opportunity to discover an **alternative** to the usual frontal lessons, to have a thought that was distant from my course of study, but not too much. There are times when you need to take your **mind off** and EUROAVIA often helps me to do it.

Summing up, my experience in the Local Board helped me to be more **reliable**, **efficient** and **focused**. I learned to respect deadlines and to be ready when somebody needs help, which is the reason why I care a lot about EUROAVIA.

Last but not least, I had the opportunity to meet a lot of new people and, obviously, making new friends is always a pleasure!

The Vice President

My name is **Chiara,** and I am attending the third year of Aerospace Engineering Degree.
I have the pleasure to represent EUROAVIA Forlì-Bologna as the **Vice-president** of this association, which means I am the **substitute** of the president.
I have been an active member of EA Forlì -Bologna ever since the beginning, working in the **Design WG** and then after one year I achieved the **Local Board**.

From the get-go, I truly believed in this association, and I am really grateful to be part of all of this. EA Forlì-Bologna has given me so much, both at a **personal** and **professional** level, helping me see a world completely new. A world where I would like to realize myself **after university**.

The experience in the **Design WG** allowed me to express my creative and communicative side by the creation of banners and posts.

Thanks to the conferences that I participated in, I was able to increase my **knowledge** and **skills** and thus understand the prospects as an aerospace engineer.

I'm glad for taking an active part in EUROAVIA because I can leave my footprint in the story of this unique association, so come on leave your mark too!

The International contact member

My name is **Giovanni** and last June I was elected in the Local Board as an **executive member**. I'm the **international contact member** and the **IT local WG coordinator**.

Currently, I am a second-year student of aerospace engineering. I participate in the **BoPs** meetings that are useful for our AS to obtain different opinions and ideas from other EUROAVIAns in Europe.

I manage the **IT WG**, this task consists of **managing the site** and the **other platforms** and **online services** that we use. I'm also helping in the **Communication WG** by writing some articles.

Being part of the **Local Board** increases your responsibility inside EUROAVIA, but it is very fulfilling to see that your work is helping the association to grow and creating value for the members.

Another positive effect is the development of various **soft skills** like **coordinating** a team, respecting **deadlines** and **managing** a **website**.

Podcast presentation

We started a new project and you probably have heard it: it's the **EUROAVIA Forlì-Bologna podcast**!

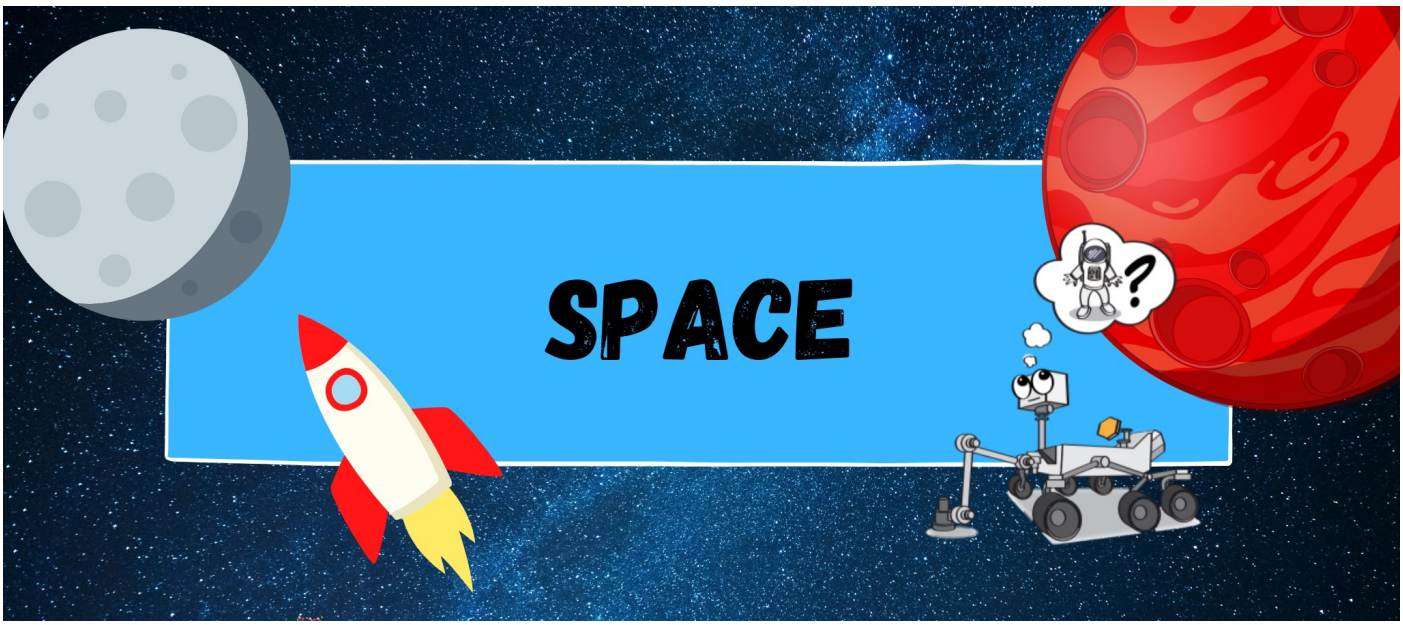
Why did we start it? **Podcasting** is an increasing trend in Europe and for a good reason. It is a way to convey information that doesn't require your full attention, differently from a video or an article. People listen to podcasts to learn a new language, to keep themselves informed or just for entertainment. They can do that while doing something else, like commuting, cleaning home or doing a walk.

Here at EUROAVIA Forlì-Bologna are aware of this potential and we have a **lot to tell**. Being a member of EUROAVIA provides you with a lot of worth-telling stories, that can be **trips** within Europe or participation in a **competition**. But EUROAVIA is also about **personal development** and hearing the experience of more experienced members can add value to our community. Furthermore, the **aerospace** field is very permeable to breathtaking **innovations**, and you don't want to miss that. In a few words, it is a podcast about **careers in aerospace**, **innovation** and **personal development**.

The guest for the first episode is **João Amaral**, the former president of the International Board at EUROAVIA. With him, we talked about his path towards and in the **IB** and about his vision for the **future** of the association. We hope that you enjoyed it (if you haven't listened it, you can do it here), and more episodes are coming in the future.

To conclude, we really appreciate your feedback, so don't be afraid to **contact** us.

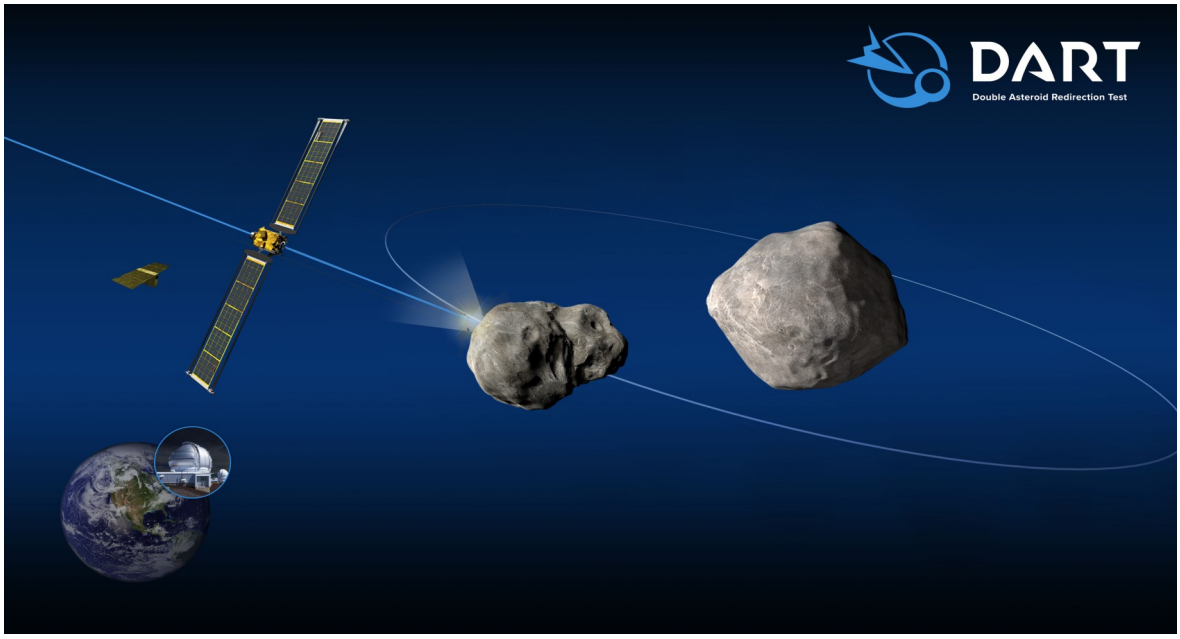
Andrea Curatolo



DART and LiciaCube

Let's imagine this situation: we discover that a **100 m wide asteroid** is directed towards Earth, and it will hit a large city. How could this thread be faced? Panic is not an option, and neither is using a nuclear weapon (imagine if something goes wrong with the rocket bringing it!).

What we could do instead is to **deviate the trajectory** of the asteroid with a **kinetic impact**, that is to hit the asteroid with a spacecraft. Even if no large asteroid is a threat to Earth in the short period, NASA will try to do this with its mission **DART** (Double Asteroid Redirection Test) that took off in November 2021 and will reach its target in September 2022.

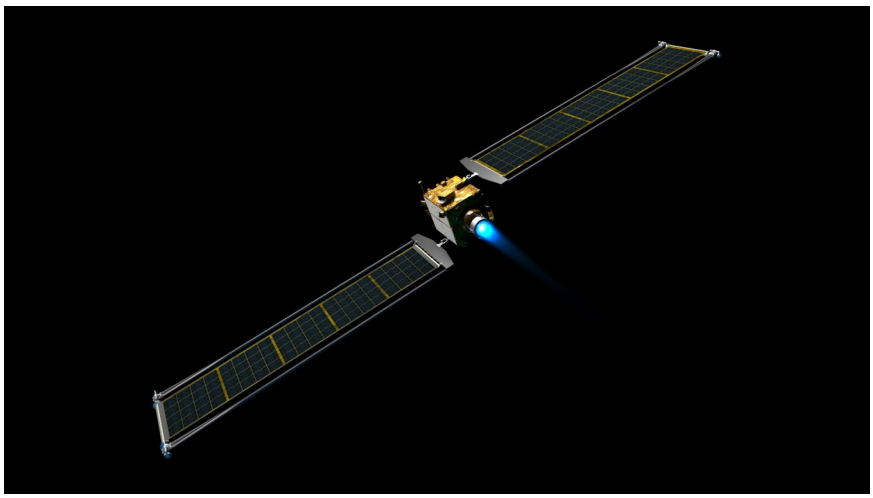


The DART mission

The DART spacecraft will hit the 160-m wide moon (or moonlet) of the 780-m in size Didymos asteroid at the modest speed of 6.6 Km/s.

Credits: NASA

This asteroid is **NOT** a threat to Earth, but the results of this mission will test our ability to **change the course of a small celestial body**. Indeed, even if the kinetic impact method works on paper, the material composition and distribution of the asteroid can change drastically the effectiveness of the impact. Put in other words, we want all the kinetic energy of the spacecraft to be transferred in the kinetic energy of the asteroid and a minimum amount to cause the **dissolution** of the asteroid or to be lost in heat.



DART Spacecraft.

The DART spacecraft won't be alone in its mission but will have a companion in the **Cubesat LICIACube** (Light Italian Cubesat for Imaging of Asteroids) of the **Italian Space Agency** (ASI). The 6U CubeSat is equipped with two cameras with iconic names, **LUKE** and **LEILA**, that will document the impact of DART with the asteroid. **LICIACube** indeed will **separate** from the DART spacecraft 10 days before the impact and will perform a **maneuver** that will alter its trajectory, so it flies past **Dimorphous** around three minutes after the **DART impact**. Such delay will allow the observation of the impact crater and plume, which will provide crucial information on the effect of the impact. The mission will see the collaboration of the **Italian National Institute of Astrophysics** INAF, the **Parthenope University of Naples**, the **Polytechnic University of Milan** and of the **University of Bologna**. In particular, Unibo will participate with the **Radio Science and Planetary Exploration Laboratory** of **Forlì**, which will determine the **trajectory** of the **CubeSat** after its separation from DART.

The success of this mission would put the human species on the right track to **defend** itself against external threats and remember: dinosaurs did not have a space agency.

DART and LiciaCube approaching Didymos

Andrea Curatolo

Credits: NASA

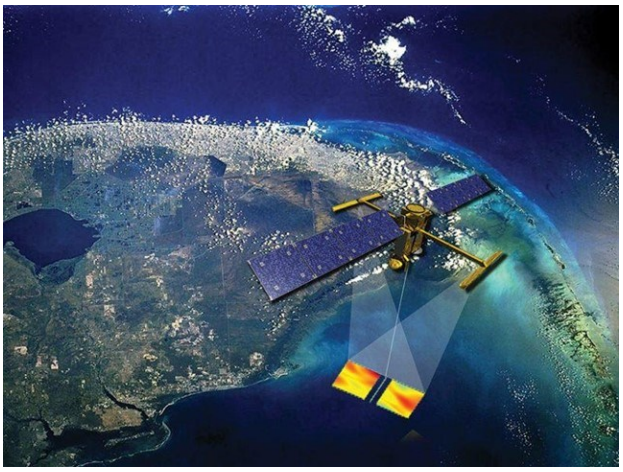
Fighting a new global challenge

On the 14th of February 1990, looking at the photo of the Earth taken by the probe *Voyager 1*, the astrophysicist Carl Sagan defined our planet as *a pale blue dot*. Few words that expressed the only characteristic of the Earth visible from the position of Voyager 1, over 6 billion of kilometres far from its home planet, the blue of clear waters. The presence of liquid **water**, in fact, makes the Earth such a unique and extraordinary planet, as it's the main resource we mostly depend on.

A pale blue dot

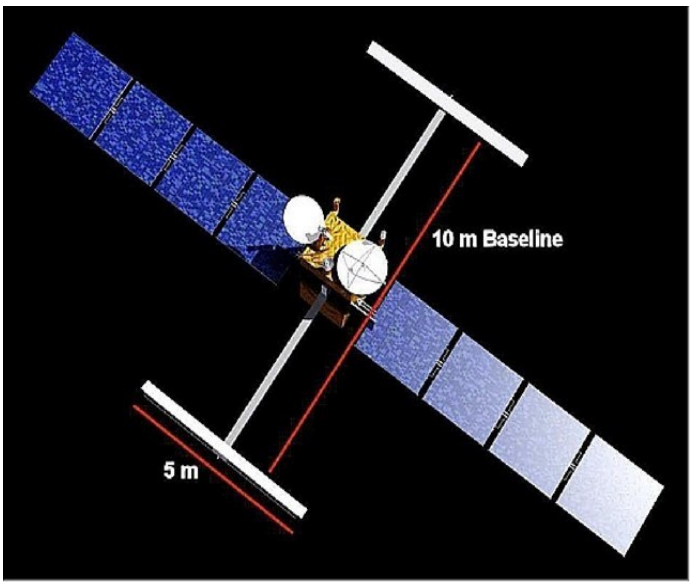
As stated in the last **IPCC** (Intergovernmental Panel on Climate Change), **pollution** and climate change are threatening water cycles and their planetary equilibrium. Now more than ever, monitoring the water present in lakes, rivers and oceans is of great importance. During the last few years, droughts and extreme events caused the Paraná River to dry up in South America, as well as the Colorado in the USA, and the Mekong in Asia. The **hydric crisis** is affecting every continent of the world, no one is immune to such effects of climate change. That's why in November 2022 NASA will launch the ***Swot*** mission which will take into orbit a satellite that, for the first time in human history, will **analyse the superficial water** of our whole planet.

The satellite, positioned at **900** kilometres from the Earth surface, will monitor the change-in-time of volume and position of water all around the globe. It will examine the amount of soft water entering and exiting from lakes and rivers, and the change in level of seawater, with an astonishing accuracy ranging between 70 and 10 metres. For the first time, scientists will understand how the carbon moves in the sea environment and will get more information regarding the overall quality of the surface waters of our planet.



Artist's impression of the future SWOT satellite making sea surface height observations

Credits: NASA/JPL-Caltech, CNES



KaRIn interferometer baseline

To obtain such measurements, Swot will combine the usage of a new **radar** interferometer in Ka band (KaRIn) at high resolution, and a more traditional **altimeter**. Additionally, a **radiometer** will measure the presence of water vapour in the atmosphere, correcting the errors generated by the latter on the data acquired. Lastly, precision orbital positioning systems, including a **GPS** system, will allow the localisation of the satellite.

In the following years, the knowledge acquired thanks to Swot will become more and more crucial for the understanding of **long-term effects** of climate change on our planet. Many scientists already believe that securing clear water will be the challenge of the next century, allowing for economic security and wellness of all humankind.

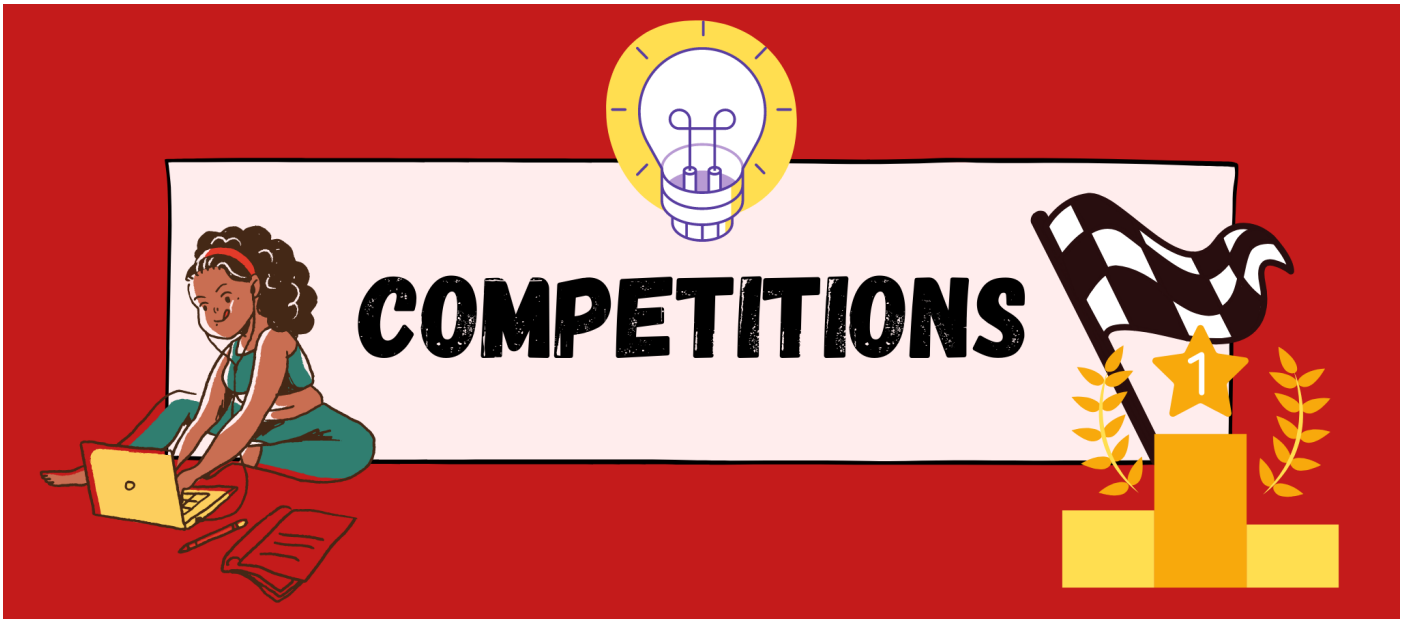
New innovative ideas need to be developed to solve this problem...
Will *yours* be the *game changer*?

Chiara Pennuti

Chiara Pennuti

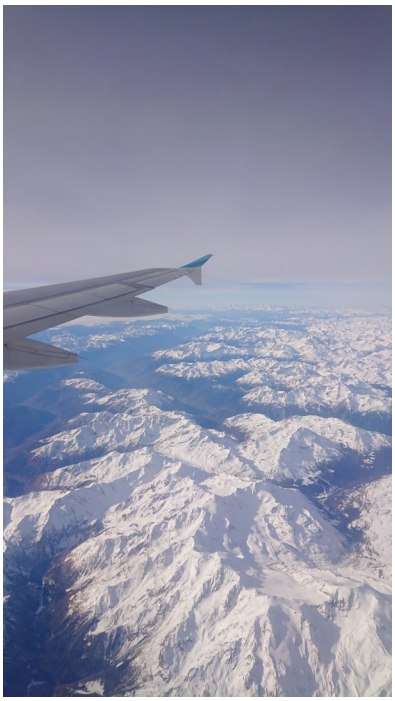
Astronomy enthusiast and space lover. Nowadays she's attending her second year of the Aerospace Master's degree at the University of Bologna. In her spare time she likes travelling and diving into rivers.

Credits: NASA/CNES



The Rotorthon

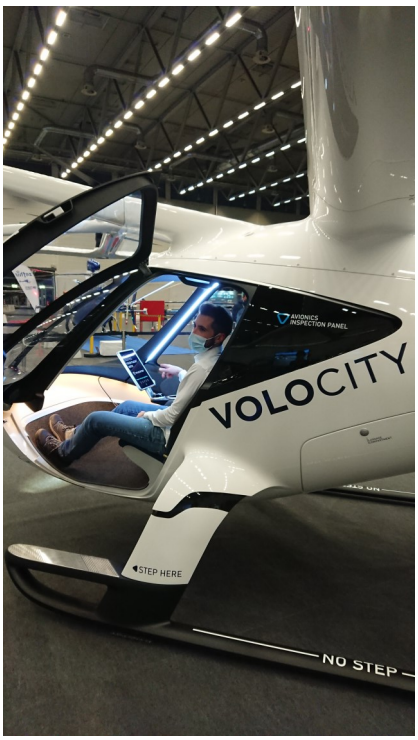
It was an ordinary Tuesday afternoon when my smartphone suddenly started to ring, and a German number appeared on the screen.



On the way to Cologne

I was quite **surprised**, I was not waiting for any calls, but I answered anyway. It was Jan Husemeyer, the Secretary of **EUROAVIA Aachen**, asking me and the other members of the "**Hover Lovers**" team to do a quick call on Zoom. The matter seemed to be very urgent, and I was afraid something was wrong with our submission for the Rotorthon competition. But I had no time for suppositions, so I gathered all the members of the team, and we joined the online call.

« Do you have plans for tomorrow? » asked Nataša, the president of EUROAVIA Aachen, « we would like to have you at the final ceremony at the European Rortos, in Cologne » she continued. Mixed emotions shone through our faces, some of us were confused, others were already smiling. I tried to contain my joy and I stated: « even if I had plans, I guess that now I am free ».



A Helicopter in display at the conference

Needless to say,

the next day we were already on a flight to **Cologne** (not without some difficulty). We arrived in a sunny Cologne on Wednesday morning, Jan and Nataša welcomed us and guided us to the **European Rotors conference**. The fair included more than 150 exhibitors and presented the latest advancement in **Vertical Take-Off and Landing technology**. We were already happy for the unique opportunity of being there, but we did not know that the day after we would have had a bigger surprise. Indeed, on Thursday, at the closing ceremony of the EUROAVIA Rotorthon competition, they announced that our team, the Hover Lovers, **won the 1st prize**!
We did not expect it at all, but our team work together with our ideas gave us the first place on the podium.

On top of that, right after the ceremony, a very special guest arrived on the stage next to ours: it was the ESA astronaut **Luca Parmitano**, the first European commander of the International Space Station. I could not believe my eyes; I attended his conference, and I was able to ask some questions too. It was the best day of my life.

Luca Parmitano during an ESA conference

The morning after, we took our plane to come back to Forlì, exhausted but full of gratitude, for that little corner of Germany and for our EUROAVIAns friends.

Andrea Curatolo

Interview with Malcolm Fridlund

Malcolm Carl Wilhelm Fridlund, born 1952, is a Swedish astronomer. He wrote his doctoral thesis 1987 in Astronomy at Stockholm University and worked since 1988 on **ESA** in Noordwijk in the Netherlands as scientific project manager. Since 1996 Malcolm Fridlund was the scientific manager of the **Darwin project**. Now, he is a professor of **Astrobiology and Astronomy** at the Faculty of Science of Leiden University (NL).

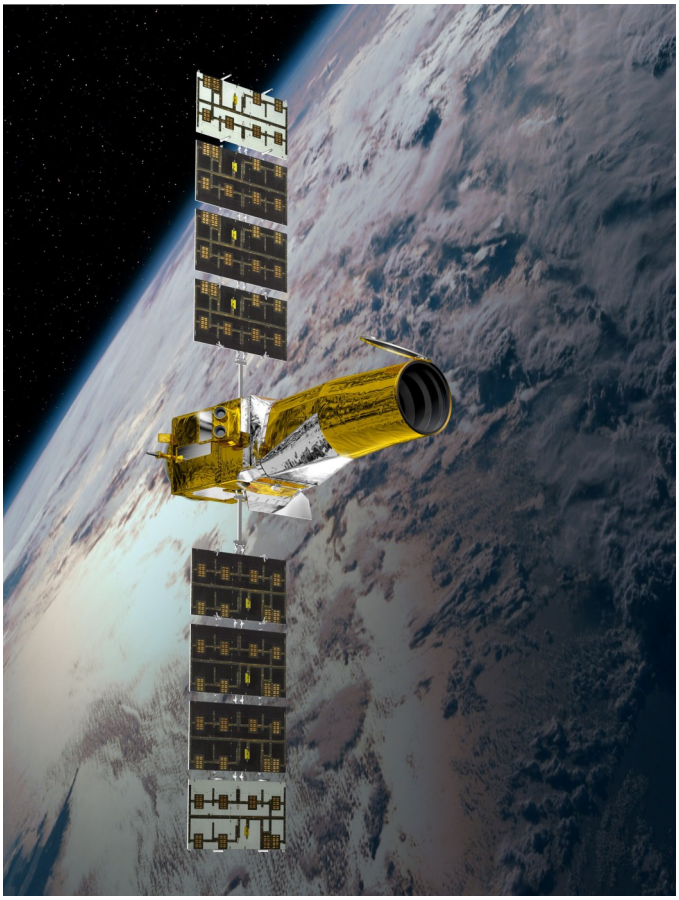
When and why did you decide to pursue a career in the field of astronomy?

Well, at one level I can give you a definitive date, 5th or 6th of October **1957**, when I was 5 years old. That was the evening when my father and maternal grandfather took me out in the evening (we lived on the outskirts of Stockholm which had a dark sky in those days) to **look at the sky**. They showed me some constellations and then they said, "Now you are going to see something that no man has seen before" and up over the horizon came a moving star. This was **Sputnik 1**, the first manmade satellite to reach orbit and launched from the Soviet Union on the 4th of October. It turns out that it was not the satellite but the third stage of the launcher that also had reached orbit but that I did not learn until decades later.


Malcolm Carl Wilhelm Fridlund

This event changed my interests. I became interested in astronomy and space

Credits: ESA



CoRoT satellite from ESA

and wanted first books of astronomy and space flight, then eventually equipment. I got a 6 cm refractor for Christmas when I was 9 and started out by observing **Jupiter** and **Saturn**. After that there was no turning back. At one point I was the youngest member of the **Swedish Astronomical Society** (10 years) and when I was 13, I worked for one week (Swedish schools had a program where pupils worked for 1 week in the fall semester and another week in the spring semester at "normal working places") at the **Stockholm Observatory**.

I eventually ended up studying mathematics, physics and astronomy at the University of Stockholm, working for two years at the **SRON** in Groningen, **NL** between my bachelors and PhD studies (1979-1981) on a balloon-borne infrared telescope called **BIRAP** (I participated in 6 successful flights in those years). I did my PhD (again in Stockholm) in the field of star formation 1982–1987.

How did you start to work at ESA?

After I got my PhD in Stockholm in 1987, I applied for postdocs and the one I started on that fall was at **Queen Mary College** in London, UK. I had only been there six weeks when I got a message to come for an interview at **ESTEC**. That was like a visit to the promised land. They offered me a 2+1-year post-doc position so I abandoned my position in London (I had no qualms in doing so, since when I arrived in London, I came across a sign on my supervisors' door stating he was in Japan for half a year and if I could please look after his students!).

I began my position at ESTEC on the 1st of February 1988, and by November I was given an interview for a **staff position** (4 year+10-year permanent contract), and I never looked back. I stayed until one year beyond mandatory retirement (at 60 years of age) and left ESA on the 1st of July 2013 after 25 years of almost 100% satisfaction.

You were the scientific and project manager of the Darwin and CoRoT projects. What was the aim of these missions and what was your contribution?

Together with the **Lunar** study (at the be-

Credits: ESA

CoRot Satellite towards a planet

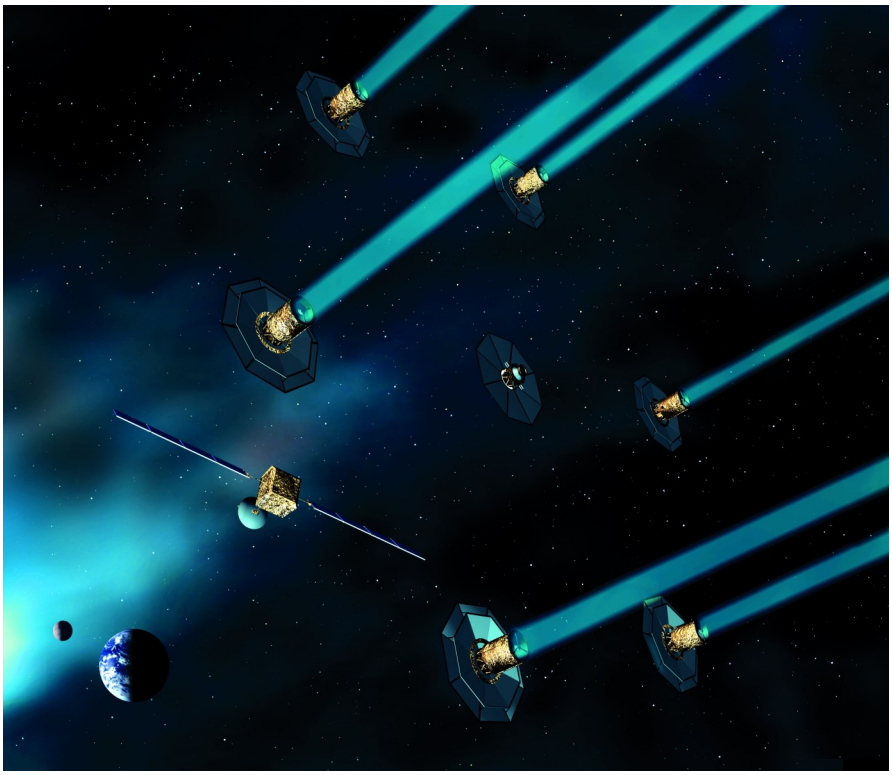
ginning of my tenure at ESA) and the **PLATO** study (at the end of my tenure there) these two projects were the most important work I did at the agency. During the period between 1990 and 1995 I was the study scientist of two missions aimed at **asteroseismology**. The second one, "**STARS**", acquired in the beginning of 1995 an exoplanetary element, very similar to the current CHEOPS mission, i.e., the detection of the dip in the photometric light curve of a single star (being primarily studied for aster seismological reasons) as a potential planet would be passing in front of it. This was seen as a simple add-on to the mission until late October 1995, when Mayor & Queloz (Nobel prize in physics, 2019) reported the first discovery (through radial velocity observations) of an **exoplanet** orbiting the solar-type star 51 Pegasi. Literally overnight, the "add-on" took on the role as a full partner of the mission. STARS was, however, in competition with what became the PLANCK Cosmic Microwave background mission and in April 1996 the Agency selected the latter mission as M2 of the Horizon 2000 program. Nevertheless, the exoplanets had entered the stage, and in late 1996 I was asked if I wanted to take on a preliminary feasibility study of a proposal for a mission called "**Darwin**".

Darwin was aimed at **finding an Earth** and **searching for life** on it which of course was seen as a mega project. Darwin built on a technology that had been proposed more than 10 years previously as the only method through which it would be possible to discover the Earth orbiting the Sun at a distance of 10pc or more. Darwin outgrew itself. As late as 2004 we were convinced that Darwin would fly

Credits: ESA

(after the Gaia mission) in 2014. But by 2006 it was clear that the costs and complexities had outrun what was available. Also, NASA had put it on the backburner until JWST was launched.

I was then considering leaving ESA and applied for a job at **ESO** (which I also got) but at that time the project scientist for **CoRoT** was leaving for an administrative job at ESA HQ in Paris and he had recommended me to take over. CoRoT was slated for a launch less than one year in the future and I accepted at once. CoRoT launched at the end of 2006 and operated until 2013. It was a total success, and it discovered the first **exoplanets** from space, as well as introduced asteroseismology into the field for real.



Darwin concept from ESA

What is the biggest challenge you faced in the development of these projects?

With **Darwin**, basically everything put completely new requirements on both **technology** and **science**.
For instance, **scientifically**, we had no known exoplanets when the STARS mission was designed. When I got the job of starting the Darwin feasibility study there were a total number of two! One of the first issues was very clear: What are we going to look for? The technology that we needed to develop, and implement would have depended on how **exoplanetary systems** look in terms of structure, size and type of planets, how common they are, etc. Essentially every expert we asked made the following statement: "All planetary systems will look like our own and all planets at the right distance from its star and with the same size as the Earth will be habitable and a lot of them will actually have life – otherwise we wouldn't be here!" So, we designed an instrument to look for **another planet like Earth**. It turned out that after discovering more than 4500 solar systems **none** of them look exactly like our system. We still have not found an analogue of our Earth.

Technologically, optical interferometry in space at IR wavelengths was the biggest challenge. Flying multiple spacecraft with

Credits: ESA

cm precision as well as carrying out achromatic phase control of light beams at submicron precision in space was tough but doable as proven by the LISA pathfinder mission.
With CoRoT the biggest challenge was the realization that one needed a **strong accompanying ground-based program** to support the unique photometric observations carried out in space. It was thought before the launch that all **variations** detected in the photometric light curves would be due to either **transiting planets** or **intrinsic stellar pulsations**. Stellar activity would not be a problem. This was because the Sun was considered to be an average star, and one used the solar activity as the "standard" for variations. CoRoT and Kepler found that the Sun is among the least active percent of stars and that essentially everything out there varies. So, we had to build a ground-based support program using the top-level available instruments from scratch. So, the problems were mainly organizing these parallel programs.

And what is the thing you are most proud of having accomplished?

Being part of the **development of exoplanet ology** from its beginning. When I got involved, it did not exist at all, and I have played continued a leading role for most of my career.

What will the hot topics in space exploration be in the next decades?

Life in the Universe, the **fundamental physical laws** (understanding dark matter and dark energy), and the 'proper' **exploration of the solar system** with (manned) in situ missions/exploration. This is what I expect to happen.

Lastly, what advice would you give to young engineering students who aspire to work in the space sector?

Apart from **studying aerospace engineering**, I would suggest taking **courses** in the scientific aspects of space. And this could be anything from Biology via Earth observation to all the different aspects of solar system physics and astrophysics.

Thank you for your time.

It was my pleasure, thank you for having me.

Elena Tonucci

Elena Tonucci

A girl from Fano who loves to sing and conquer the world. Divided between science and space exploration on one hand and music, literature and languages on the other.

CYCLING DIARY: *FROM BALTIC SEA TO THE MOON*

A JOURNEY IN PEENEMUNDE

"The world's first fully functional rocket was built in Peenemunde. The technology contained in this missile formed the basis for all later developments in rocket engineering. The booster rockets used in space exploration as well as the guided missiles of the Cold War have their roots in the research and development performed at Peenemünde".

This is what is reported in an incision inside the museum of **Peenemünde**. You may wonder whether I am inside a compartment of Fort Alamos or not and the answer is no! I was where the biggest shame of Nazism met the most advanced technology, the same which we still benefit from nowadays. Where exactly is this mysterious place?

Close to the coast of the Baltic Sea there is an island called **Usedom**. Its majority belongs to Germany, whereas the further East part to Poland. However, today we will not have a lecture about European geography. I will tell you about my **cycling** adventure on this site, and why it should be much more important than it currently is. From the **modern aircraft** to the **conquest of the Moon**: everything happened in the far West part of Usedom, in a special location named Peenemünde.


Damaged nose cone

I have always been fascinated and curious to explore what remains of it, thus I took my bicycle, a couple of bags and a tent and I started my adventure. This is what I am going to tell you today, are you

ready for the trip?

It was September 2020; I was following the Baltic Sea cycle path. That morning I started cycling from **Rugen Island**, a naturalistic paradise 80 km from Peenemünde. I scheduled to reach it by mid-afternoon, and so I did it. However, to reach the island itself it is mandatory to take a ferry if you arrive from the West. As I had to wait an hour for the next boat, it was not enough time to visit the museum, hence I decided that I would have to go back the following year.

The Peenemünde Historical Technical Museum

As promised, in September 2021 I took a train from Berlin towards "**Ostsee**" (namely Baltic Sea in German). Once I reached the closest point to Usedom, I got off the train, I put my bags into my bicycle, and I started cycling towards Peenemünde. I crossed forests, railways and villages that reminded me of a miniature "fairy tales" world! After 30 km I reached my destination and saw what remained of it.

To dominate the landscape there is the former **power station**, which contains the majority of the exposition. Then there is a small harbor where, with a supplementary ticket, it is possible to visit a **U-boot**, and a small airport that belonged to the original complex is still active. That is what remained of the "**Peenemünde Army Research Center**".

Once I reached the entrance of the museum, I found a safe place to lock my bicycle, and by entering I discovered a very interesting fact. There was an old electric train from the 40s. You may wonder what made it so special? If I tell you that Peenemünde was the third place in Germany (after Berlin and Hamburg) to be provided by an **electric suburban railway**

Wing missiles models in display

Various electromechanical components

(S-Bahn). Unfortunately, the main task of such wagons was carrying the prisoners to the site. They worked in extreme conditions and several of them died while working there.

Later my attention was caught by a **V2** authentic reproduction, which is collocated close to a **V1** launch pad. What are V1 and V2? They were the **first cruise missile** in history. Adolf Hitler craved for a lethal weapon capable of reaching and striking each corner around the globe, directly from Germany. To satisfy his request Fritz Gosslau projected a prototype, known as **V1**. Since their first employment, they proved to be destructive, causing a lot of damage in cities such as London. Meanwhile a young engineer was making his experiments about a new generation of **rockets**, and, after different tests, it became operative. We are talking about **V2** and his creator: Wernher Von Braun.

Born in 1912 from an aristocratic German family, he grew up in that historical contest where the nobility was in free fall. Since his father realized that the future and the progress were in the science field, he pushed Wernher and his brother to study technology. Thanks to his research, he was ranked as an officer in the SS corps, the key to joining Peenemünde, where he could nurture his ambitions. After different experiments, tests and crashes, the most **innovative rocket** of the war was ready to be used! It was the beginning of a new chapter in history.

Following the path, I entered the main building. What remained of a nose cone of a V2 appeared in front of me, a **debris** from the experimentation during the war. I turned left, along a corridor where I admired an exposition about military pilots of WWII and their lifestyle. It consisted of

Fuselage remains

posters and emblems that made me feel into that atmosphere.
Going on along the museum I recognized some **electrical** tools, then something close to a **giant computer**, I supposed that by then I had reached the control room of the electrical power plant. I was surprised by its structure similar to a modern plant. This was an absolute proof of the Germans technological advantage in respect to the Allies.

Finally, after having seen some WWII fighters' reproductions and some techni-

Museum's room showing the history of the projects

cal facilities to project it, calculate their performances, and also some old military helmets drilled by bullets, it was time to approach the exposition about the benefits that a missile as V2 gave to humankind. The remaining examples and also the technical personnel were captured by the US, Great Britain, France and USSR. The rockets were used for **meteorologic experiments**. Then all the above-mentioned countries and interested parties started from the newly acquired power a process of **reverse engineering** to get their own rockets. This is how the space programs of these nations started.

The **Soviet Union**, thanks to V2, some German scientists and the brilliant mind of Sergey Korolev was able to send the **Sputnik 1** in orbit. This was the beginning of the **space race**! A good redemption for a missile projected with the aim of killing people and to destroy things.
In parallel to the progress made by Russians, the French were developing their own rocket. Some decades later they created the **Ariane modules**, the rocket used by the **European Space Agency**.

Now it is time to tell you about the most **romantic** story of Peenemünde, what made it so special? It is the destiny of Wernher Von Braun.
Being aware about the tide of war, he decided to surrender in front of the Americans, identical actions were also made by other scientists. This operation has the name of "**Paperclip**". He joined the NACA and then the newborn **NASA**, where he was the chief project of space modules.
At the beginning there was a lot of mistrust towards him, nonetheless he proved what kind of person he was by showing the results that he achieved in NA-

The museum from outside

SA's space programs: "**Mercury**" and "**Gemini**".
Then NASA commissioned a rocket. A rocket that must have been able to bring the men to the **Moon**! For this reason, he created the ***Saturn V***. The 20th July **1969** Neil Armstrong walked on the Moon and became a celebrity!
Despite Von Braun pushing to reach **Mars**, in 1972 the government cut the budget for extra orbital space travels.

Wernher Von Braun, an ambitious man, joined for that attitude SS as an officer, he switched sides and, twenty-five years later, the United States. He was an idol too, even if his ambition was cut...

Some believe that this is karma. In my opinion, he made a big contribution to our progress and knowledge about the world. The V2 had a disreputable purpose at the beginning, however they revealed a very useful **scientific tool** that we still benefit from in our daily lives. Concerning the use of technology, I can say that it is all a question of mindset. Everything can be seen as a **facility** rather than a **weapon**; it depends on the user!

Now the green nature of the Baltic Sea took back Peenemünde creating a marvellous equilibrium between human and nature. I like to think that Peenemünde gave back to the world what it took from it. While visiting the museum I also enjoyed the place, experiencing the nature that only that area of Northern Europe can make you feel!
It was an intense afternoon in Peenemünde, totally different from each Second World War Museum that I have even visited (the site also belongs to the "Route of Industrial Heritage in Europe").

Nonetheless, the most important thing was that once I left the museum my bike was still there, and nobody tried to steal it!

Francesco Pio Marasco

Francesco Pio Marasco

My name is Francesco and I am an explorer of everyday life. By pursuing the discovery of nature's best landscapes and panoramas, I adventure around the world with my bicycle or climb rocks of any type on my path.

The EUROAVIA Roundtable

The EUROAVIA **Roundtable** was an online event held on November 20th with the scope to get to know the **international association** in a more personal way.

Event's Flyer

Here, the members of the International Board (**IB**) and members of the different **working groups** from EUROAVIA International shared their experiences inside the association and presented to the participants what EUROAVIA does on an international level.

The event started with **Victoria**, the president, presenting herself and EUROAVIA along with **Francesca**, the secretary. During this first part of the event, the presentation was very interactive since it was a combination of a presentation and a quiz. The **quiz** had some tricky questions, like: Where was EUROAVIA Founded? How many local groups are there inside EUROAVIA? Which is not a local group in EUROAVIA? And so on.

Then, **Andrea**, the president of AS Forlì-Bologna, presented the local group for all of those who didn't know what the local group does. He presented the structure of the **local board** and the different working groups, the kind of activities done by the AS: Space Rendez-Vous, Online Conferences, Visits, Workshops and participation in international technical competi-

tions.
Then, all the **international working groups** were presented, and a **quiz** was done.

Members of the IB, International WG and LB during the event

In this quiz, it consisted in allowing the participants to guess which was the **main task** of each of the WG. The working groups at an international level are **Communication**, **Design**, **Business Relations**, **Affiliated Societies**, **Human Resources**, **Information Technology**, **International Events**, **Statues & Bylaws** and **EUROAVIA Training system** (Don't hesitate to contact them to join one of the groups! *careers.euroavia.eu*).

Finally, the event ended with the members of the working groups sharing their experiences inside EUROAVIA and what EUROAVIA means to them. It was nice to share the **EUROAVIAn Spirit** with all the participants!

Remember, the whole EUROAVIA association exists thanks to the contribution of all the AS around Europe and its members.

Johan Birnie

Space Rendez-Vous
Artificial Intelligence in Space

This semester's first **Space Rendez-Vous** was held by a **PhD** Student in Aerospace Science and Technology, **Alessandro Lotti**, who works as a research fellow at **CIRI** Aerospace.


Alessandro during the presentation

By working with the *Artificial intelligence techniques for satellite pose esti-*

mation from images, Alessandro was able to talk about the **Artificial Intelligence** in **Space**, linking it to its most interesting applications.

The conference aimed at giving the audience an introduction to the complex topic of Artificial Intelligence. It started by asking everyone

What is AI?

There are different definitions. One of them is *the study of the computations that make it possible to perceive, reason, and act* (definition for systems that think in terms of rationality, as the process to always make the right decision). AI are all programs with the ability to **learn** and **reason** like humans.

Secondly, he introduced the past, the present and what will be the future of Artificial Intelligence in Space.
But the main question is

Why did we consider AI now, and not before?

Machine learning needs a large **amount of data**.

This analogy can help us to understand:

"I think AI is kind of like building a rocket ship. We need a huge engine and a lot of fuel to build the ship. If we have a large engine and a tiny amount of fuel, we will not make it to orbit, or if we have a tiny engine and a ton of fuel, we cannot even lift off. To build a rocket, we need a huge engine and a lot of fuel."

Andrew Nig.

For us the fuel is the data. So that's why we started using AI now.

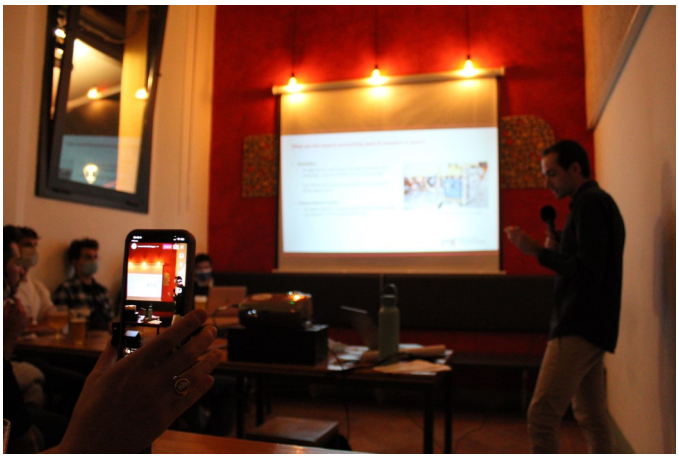
Another main question was:

Why AI in space?

The answers can be divided into three points. Firstly, AI gives us an advantage of **scientific opportunities**. Secondly, it allows us to **reduce** spacecraft operations **costs**. Thirdly, it ensures **robust** operation in the presence of faults.
So, AI in space is really used today for example for **Earth observation**, **space exploration**, crewed **mission support** in the **ISS** ect.

Before concluding the presentation, he told us about his own experience with artificial intelligence when he was a graduate research fellow.
He studied AI for **satellite pose estimation** and the title is *A testbed for Deep learning in support of docking-grasping operations*. The purpose of his project was to **investigate**, through numerical simulations, the **use** of **neutral networks** for **monocular vision-based pose estimation** in a **spacecraft** docking scenario as a solution to overcome such limitations.
The study addressed the application of

Participants during the presentation



The event was also transmitted via social media!

Deep Learning for monocular pose estimation in a docking scenario.

Starting from this event, we collected **feedback** from attendees about our events.

While most people only gave brief positive feedback, some also added that they loved the presentation and who was online also thanked *a lot to EUROAVIA Forlì-Bologna for giving the possibility of attending it online!*

Chiara Paceschi

Space Rendez-Vous

Novel electric propulsion systems: Helicon Plasma Thrusters

Nabil during the presentation

On the 25th of November we held the second edition of the **Space Rendez-Vous** of this academic year at **Bifor**. The relator was **Nabil Souhair**, a PhD candidate who spoke about **helicon plasma thrusters**. The event was presented both in presence, where 15 members followed the event, and online on Teams and with a live on

Instagram.

The lecture began with a comparison between **chemical rockets** and **electric thrusters**, analysing their characteristics: their typical use, the exhaust velocity and the way that each system creates thrust.
It carried on with the **properties of plasma** and how thrusters use this state of matter to function and the equations ruling it.
The final topic was the **simulation** of the **helicon plasma thrusters** using a strategy based on modules that predict the behaviour of the various stages.

This event was a chance to learn something new for all the members that participated and to spend time together as EUROAVIAns while drinking some beers.

Beers were not missing during the event

We are happy that we could bring back these types of events because they create a more united community helping the association grow and mature.

Giovanni Mussoni

The School of Disruption

Promotional post for webinar

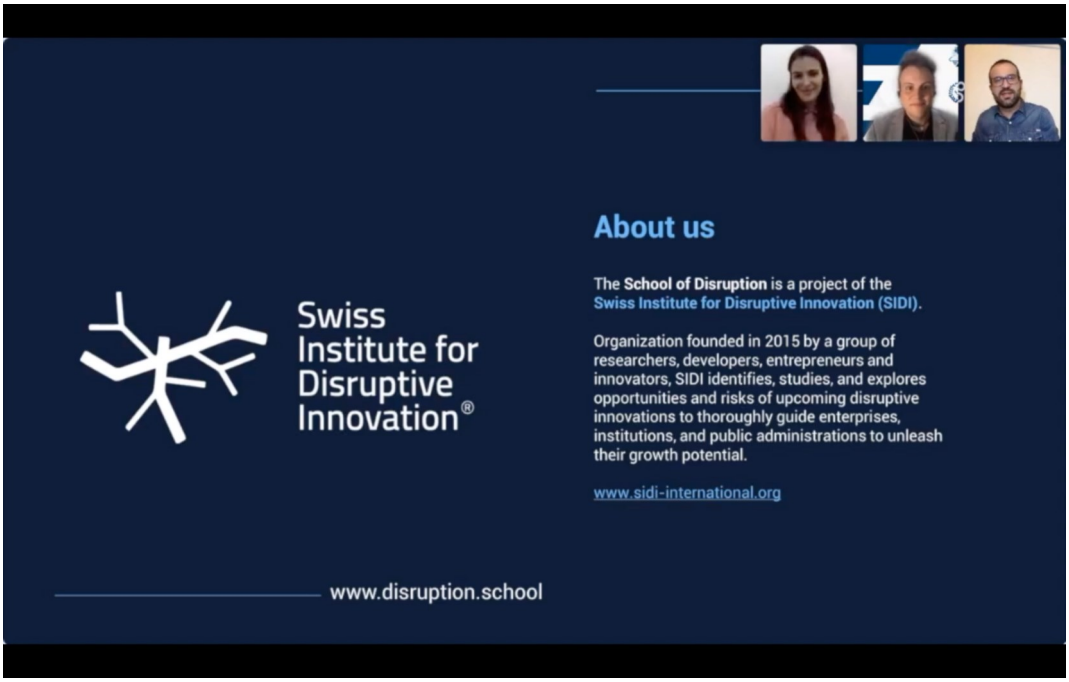
The **partnership** created between EUROAVIA Forlì-Bologna, Naples and Pisa with SIDI, The Swiss Institute for Disruptive Innovation, offers significant advantages for EA members, let's find out together!

The **Webinar** of last December 14 aimed at explaining in detail what the **School of Disruption** is, by whom it is represented, how it is organised and what its main purposes are. The speakers of the Webinar were Igor Ciminelli, Paola Sonni and Raffaele Aucelli, president of EUROAVIA Napoli.

The School of Disruption is a new **SIDI** project and aims to act as a link between the latest technological innovations and companies, public administrations and people who need it.
All this is done through an **e-learning** platform that makes video lessons available **on demand** on various topics, which we will see in detail in a few lines!

Skate to where the puck will be.
The world is changing, new needs exist. Today the need arises to move in advance, take action and have all the tools that are necessary to foresee change and be actively part of it. In short, **being part** of **those people** who **do not undergo** a **change** but **are** an **integral** and **irreplaceable part** of **it**.

In a world that is rapidly changing, new opportunities are emerging.
Some opportunities that seemed absurd yesterday are now possible: space, machine learning, virtual reality, augmented reality, blockchain... but **what will happen next?**



The hosts of the event during the webinar

We are about to experience the **quantum revolution**. The School of Disruption focuses on offering all the tools to better understand highly innovative fields (of which there is very little information) and to allow everyone to acquire basic knowledge that can be used immediately.

Strengths of the School of Disruption:

- The **teachers** of the School of Disruption are not really teachers, but they are people who work every day in their field.

- **Live meetings**: all members have the opportunity to get in touch with the speakers (or an expert in the course sector) through online meetings.

- **New lessons**: new lessons are added periodically, the platform is constantly evolving, every time something new emerges it is added, just like in a puzzle!

- **Private LinkedIn group**: you share extra content, job offers and projects in which you can participate.

- **Extraordinary topics**: "The School of Disruption covers subjects and topics related to the main emerging trends and technologies. This know-how is essential to be competitive in the near future markets, and we inflect it in its practical applications."

- **Time**: "Time is the most crucial resource. The School of Disruption's courses are hands-on, and content focused. No turn of words and no waste of time. We get straight to the point without needless chatter."

- **Accessibility**: "We want to democratise access to innovation and the required innovative know-how. For this reason, we have created courses that will allow you to acquire the knowledge you are

looking for without attending a Master's."

- **International experts**: "We don't believe in gurus. We are a group of researchers who have made innovation their life mission. All the School's instructors are internationally renowned experts with extensive experience in their field. Theory without practice is like power without control."

The **courses** of the School of Disruption:

Space Architecture & Design (43 lessons so far)
Ranked in the **top five** Space Architecture courses in the world.
It gives new notions for the **design** in space.

Parametric Architecture & Design / Computational Design (30 lessons so far)
Gives the **tool** once the elements of the design have been acquired.

3D Printing of Buildings (27 lessons so far)
Tool to turn your project into **reality**.

Disruptive Innovation Strategy (34 lessons so far)
Projects within the Disruptive Innovation explains how to **enter** and **manage** innovation to be able to create completely new projects.

Quantum Computing Basics (31 lessons so far)

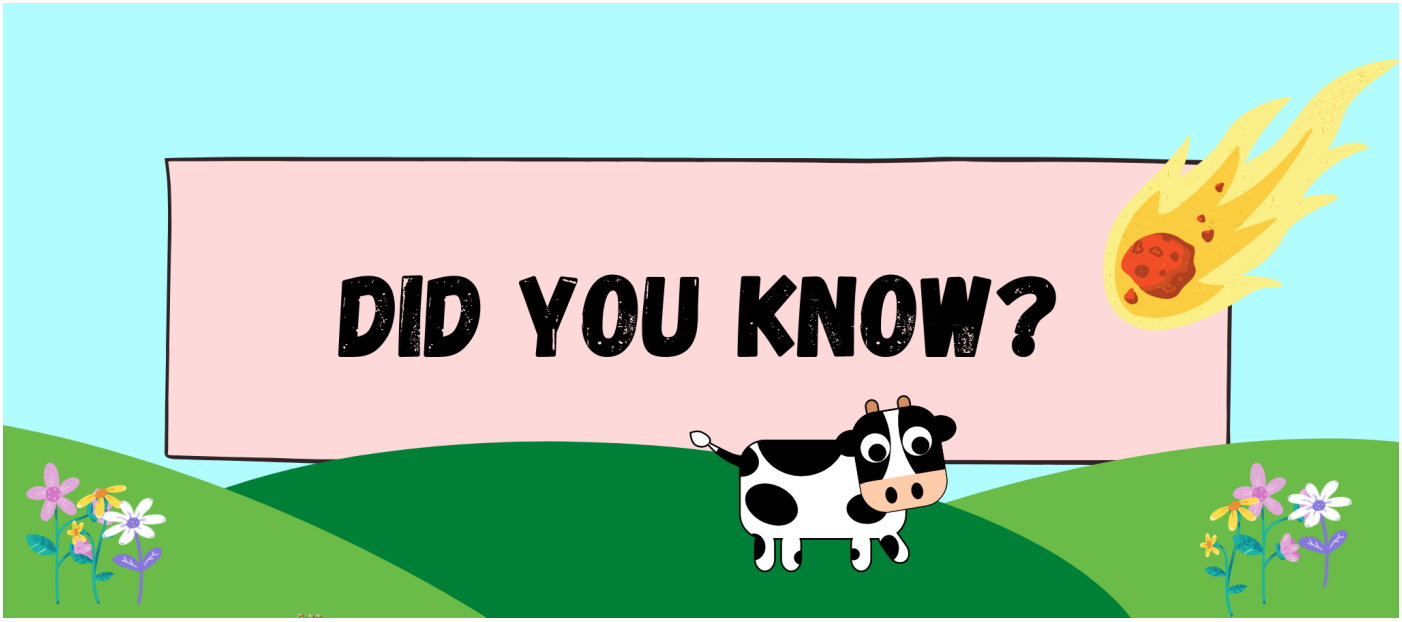
We start from scratch to finally get to know how to program a **quantum code**! It is a **transversal** course that not only explains how technology works but also how it will change the scenario of economics and science.

Courses coming soon...
Global Threats
Start-up Access to Finance
Start-up Investor Readiness
Innovation Safari
Space Biotechnologies
Space Law
Multiverse
Brain-Machine Interfaces

EUROAVIA member students can take advantage of great discounts for courses! For more information on the Student Pass, copy and paste this link.

Ready for a journey into the innovations of the future?
Let's start!

Beatrice Boccadifuoco



PLUTO IN POINTS

Pluto

Pluto is certainly one of the most (non) fascinating planets of the Solar System, let's find out something more about it together ...

A bit of history:

- Pluto was discovered by a 23-year-old **farmer** with no degree in astronomy named **Clyde Tombaugh**, who built his own telescope and spent a week comparing photographs of the night sky, looking for something to change position.

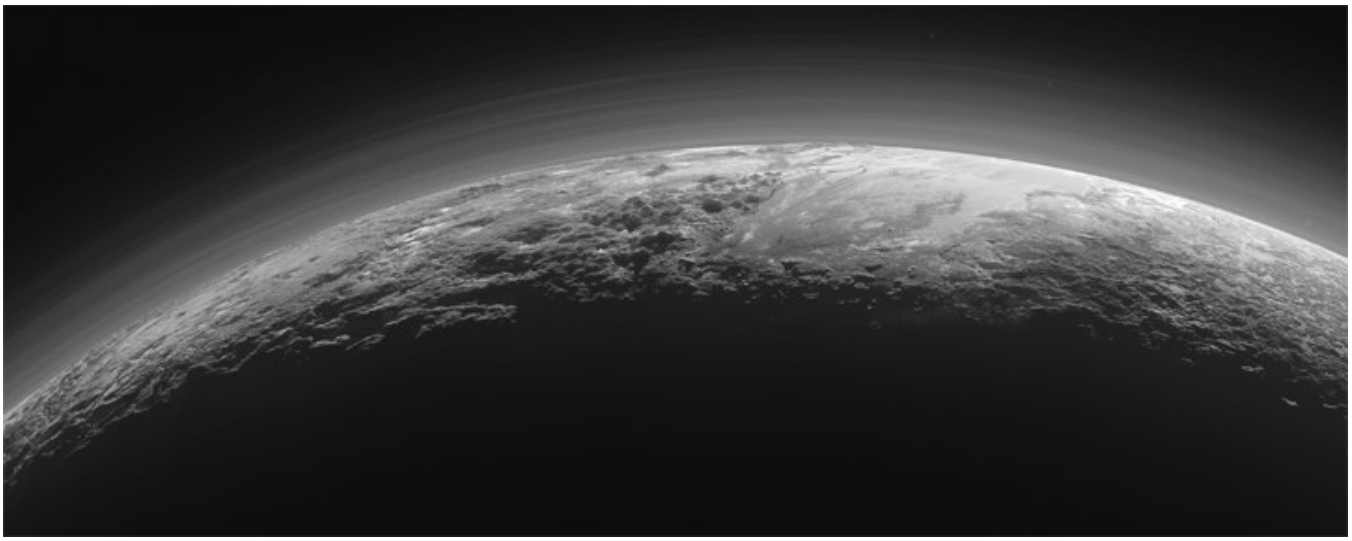
- The Earth's axis of rotation is **23 degrees**. On the other hand, Pluto is **122 degrees**. The poles are almost in their **orbital** plane. In fact, when it was first discovered, the glow of its south pole was spotted. As our view of Pluto changed, the planet seemed to **vanish**.

- Pluto owes its name to an 11-year-old girl who suggested this name by saying that "**Pluto**" would have been per-

fect because it was inspired by the Greek God of Hades who was able to make himself **invisible**, a bit like this dwarf planet.

A little bit of numbers:

- This dwarf planet revolves around the Sun every **247.7** years and does so covering an average distance of **5,900 billion** kilometers.



Pluto's atmosphere

- The mass of Pluto is the equivalent of **0.0021** times that of the Earth or one fifth of the mass of our moon. This makes it too small to be considered a planet.

- Pluto takes **6384** days to turn itself, since it does so in a synchronized way with the orbit of its satellite. For this reason, Pluto and Charon are always on the same face.

- Pluto will complete its first full orbit (since its discovery) around the sun on Monday, **March 23rd, 2178**.

- There are over **900** dwarf planets with a diameter similar to that of Pluto that revolve around the sun, even though Pluto is the largest.

How is it done?

- Pluto has ice made of **water**, plus its sky is **blue**. The discovery of the coloration of the sky helped to better understand the composition of its atmosphere.

- Pluto's atmosphere is **98%** composed of nitrogen, methane and some traces of carbon monoxide. Those gasses exert some pressure on the surface of the dwarf planet. Solid methane is also found, so temperatures are estimated to be below **70 degrees** Kelvin.

- If Pluto approaches the Sun, it will grow a tail and subsequently become a **comet**!

What are the differences between a planet and a dwarf planet?

Credits: NASA

Planet

⇒ It is a celestial body that orbits the Sun.
⇒ It has a mass sufficiently large to generate a **force of gravity** that allows it to acquire an almost **spherical** shape.
⇒ Has captured or expelled all small bodies that came to find themselves near its orbit (**orbital dominance**).
⇒ It is not a satellite of other planets.

Dwarf planet

⇒ It is a celestial body that orbits the Sun.
⇒ It has a mass large enough to take on an almost **spheroidal** shape.
⇒ It is **unable** to **dominate** its orbital zone from a **gravitational point of view** (its orbital belt is not devoid of any bodies of comparable or larger size).
⇒ It is not a satellite of other planets.

Beatrice Boccadifuoco

STEALTH FIGHTERS, FREE BIRDS AND BAKERIES

Imagine you are a colonel of the Yugoslavian army during the **Kosovo war**. Your radar avoids a flying bird, nothing to worry about, it is an everyday routine. A couple of minutes later that "innocent bird" becomes very noisy and starts dropping bombs in your base and in villages around. You realise that there is something suspicious in the enemy's technology. What are we talking about? The answer is the **F117 Nighthawk**! The first **stealth fighter** in history, and now let's explain its unique history.

F117 Nighthawk in ground

Firstly, I am going to explain how **stealth technology works**. A **radar** is a tool that emits electromagnetic waves. When these waves come across an obstacle (may it be vehicles, palaces, mountains, etc...) they will be bounced back. Consequently, a **feedback signal** will be sent to the radar providing the precise shape of the object that had hampered the motion of the waves.

However, during the Cold War, a **Soviet** physicist, Petr Ufimcev, proved that the background **wave's intensity** of a radar is **proportional** to the **corner configuration** of the body and not to its dimension. Thus, the section radar could identify an aeroplane through wings and its border, then it is possible to reduce it acting in their configurations. According to the

Aerial view of the F117 Nighthawk

central soviet committee, such technology was not considered valuable for military scopes, thus he received the permission to publish his discoveries abroad.

The US looked over and seized the opportunity of developing a new technology. After long and secret experiments, it was achieved a bomber characterised as follows: to have a radar section equal to the size of a bird, the twittering of a turbofan. This is the scan identity of a F117 Nighthawk, namely the first stealth fighter in history!

Now that you have realised what this is about, you may think to shoot down one of them. And then, thanks to a network of spies and to an old soviet missile, you are able to catch the right moment, now the plane is on the viewfinder, and the bird is haunted! Thanks to you, Russia can now have access to the debris to study it, and to apply a process of reverse engineering. Some decades later, in 2020 their multi-role fighter became operative. More than 30 years after the Americans!

And what about you? You are the only man who shot down a stealth fighter. Now you are living your retirement as a hero, and you even have your own bakery! What else? Each year to celebrate the anniversary of your glorious enterprise, you prepare and serve cakes with the shape of a F117.

Finally, what should this story teach you? Two things: the first is that if you see only war scope in your state, your regime will collapse! History is full of these examples and has lots of cues to teach us about mankind. Therefore, one should not be surprised that the enemy of the Soviet

Credits: nara.getarchive.net

took these researches to develop their own technology.

Now the most important lesson: if you are tired of classical Balkan food, and are looking for something more typical, go to the small village of Skorenovac. You will find Colonel Zoltàn Dani, who will be proud to serve his **exotic cake!**

Francesco Pio Marasco

FELLO'FLY

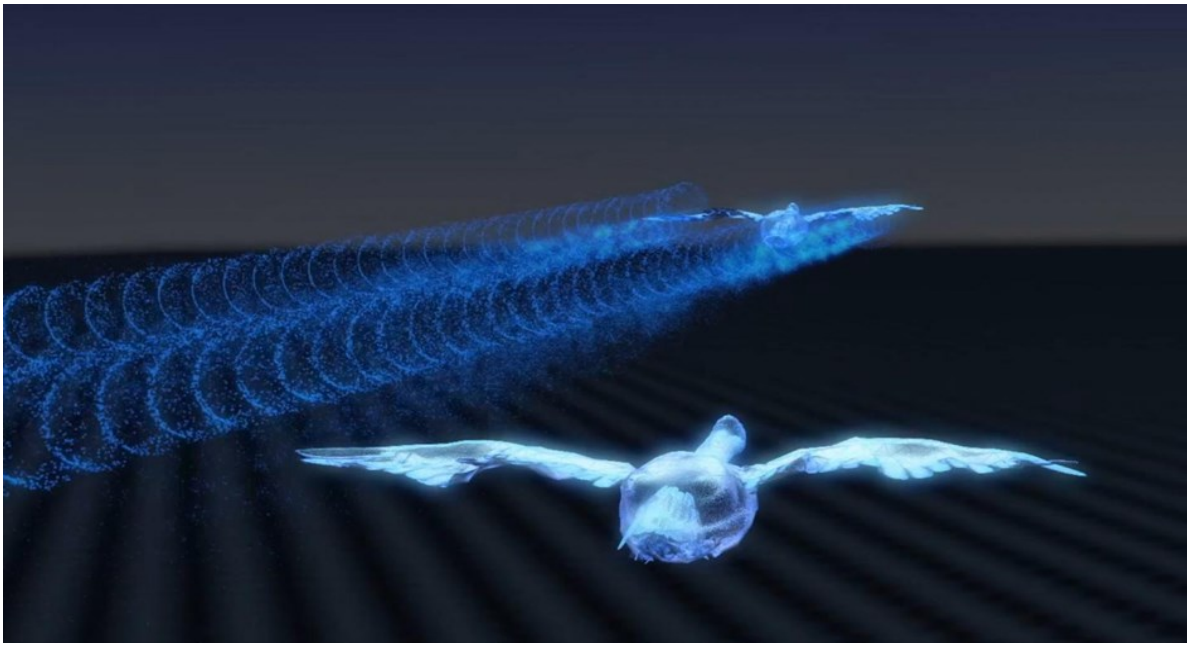
The Airbus A350-100, the most recent Airbus' model

When doing innovation, it is sometimes necessary to take a step back and look at the past and the present rather than the future. This idea lays behind the concept of **biomimicry**: observing nature to develop new technologies.

Aviation itself is a face open challenge to Nature, and while continuously facing the laws of evolution, humans must contemplate those who made of the air their environment: the **birds**. **Airbus UpNext** is a division of the Airbus company that pursues the task of **taking inspiration from animals** to carry aviation to the following step. In 2019, Airbus UpNext developed a new way of organizing civil aviation: through **fello'fly**.

Fello'fly consists in **pairing two airliners together** during their flight in order to drastically reduce fuel consumption. It has been observed that great migrant birds like geese fly in **V-configuration**. Such shape is not casual, as it allows them to traverse greater distances with lesser effort. In fact, as a goose leads the flock, it generates air **upwash** (vorticous air moving upward) that can then be surfed from the following animals.

This same idea could be easily used on **airliners**: as they fly, the followers' place behind the leader, taking **benefit of the upwash created by the front aircraft**. Pilots use flight assistance functions to safely place in position. As the current flight rules command to ensure **safety**, those planes cannot fly closer than 3km and an altitude gap of 1000 feet must always be kept. In November 2021 two airliners crossed the Atlantic Ocean and registered an amount of fuel saved equal to 5%-10%. It has then been proven that it is possible



Birds in formation, inspiration for Airbus

to significantly reduce the amount of fuel burnt during long hauls, therefore the amount of carbon-dioxide released in the atmosphere.

As the world is not perfect, even the brightest of the medals have two sides. Firstly, pilots should be properly **trained** in order to fully exploit such an uncommon way of flying. **Coordination** though is the greatest of obstacles: all dispatchers must be provided with an efficient **software** capable of calculating several possible matches for planes and then select the most suitable pairing. Through **ATC** pilots must then be given the fello'fly instruction together with the **rendez-vous** information, in order to properly meet in a designated location. While the leader communicates with ATC, the follower must enter OPTI position, and the two aircraft must ensure to maintain safety distances.

Despite all difficulties, the successful experiment in November proved this project to have huge capabilities and to be accessible to civilian aviation, through common efforts of both airline companies and air traffic control centers, paired with civilian aviation authorities.

It is not impossible we will be capable of **waving** at someone from an airplane, just as we do from a train.

Elia Ghisellini

Elia Ghisellini

When in need of good vibes, give him a call. He loves laughing, reading and enjoys Nature and always wants to come up with a wierd philosophical view of common everyday happenings.

Credits: airbus.com

It's Christmas time!