Beyond The Horizon

An interview with Francois Lambert of Orbital Reach, Principal, at the public meeting of The Foundation for Bioethics in Technology in The Idea Studio at the Warwick Public Library, 600 Sandy Lane, Warwick, RI USA on January 13, 2024. https://bioethics.tech/beyond-the-horizon/

Who are you?
I'm Francois Lambert. I'm the Principal at Orbital Reach (https://orbitalreach.space), a consulting firm dedicated to guiding organizations in the rapidly evolving space economy. I bring extensive experience in space and regulatory law, having supported significant projects like Amazon's Project Kuiper and European space programs such as GALILEO and EGNOS. My background spans diverse sectors including aerospace, defense, and IT, and I'm passionate about leveraging this expertise in the realm of space law and entrepreneurship to support the Space Economy.

What is Orbital Reach?
Orbital Reach is a consultancy focused on the space economy. We provide tailored insights and strategic guidance to help organizations navigate the complex landscape of space law, regulation, and infrastructure. Our expertise extends to supporting major space initiatives, ensuring compliance with international space law, and fostering sustainable practices in the burgeoning field of space exploration and commercialization. We're dedicated to empowering our clients with the knowledge and tools they need to succeed in this dynamic and rapidly evolving sector. You can find out more at https://orbitalreach.space.
We are also launching soon a Newsletter dedicated to the Space Economy (planned for end of this month). You can find out more at Trailblazers. The Space Newsletter.™ (jointrailblazers.space).

How did you decided to get into Space Law?
My venture into space law was a natural progression fueled by lifelong passions and key personal experiences. As a young exchange student in Texas, I was captivated by the US spirit of "nothing is impossible", which planted the seeds of ambition in me. This ambition only grew stronger during my time in law school. My fascination with outer space, inspired by science fiction greats like Arthur C. Clarke and Frank Herbert, intertwined with my legal studies, guiding me ultimately towards the niche field of space law. At the time, space law was confined to international institutions and academia and there were not many dedicated positions for space lawyers. I wanted to be in the action, so I went to working with Airbus, the European Commission, and in technology sectors, including significant roles at IBM and Amazon, which provided a broad foundation. These experiences cemented my interest in ensuring space exploration and commercialization were governed ethically and sustainably. Founding Orbital Reach was a culmination of this journey, a platform where I could harness my legal expertise, passion for space, and commitment to futuristic technologies to create meaningful impact in the realm of space law.

Who rules space legally?
Legally, space is governed by a set of international treaties and agreements, the most significant being the Outer Space Treaty of 1967. This treaty, ratified by over 100 countries, establishes that space is free for exploration and use by all nations and prohibits any nation from claiming sovereignty over celestial bodies. It also sets principles for the peaceful use of space, barring the placement of weapons of mass destruction in orbit and holding nations responsible for their space activities, including damage caused by their space objects.
No single country or entity "rules" space. Instead, it is a global commons, with regulatory oversight provided by international law and individual nations' space agencies and regulatory bodies. This collaborative and multi-national approach ensures space remains a domain for peaceful exploration and use, benefiting all humankind.

How are the laws in space different than the laws on Earth?

You know, when we talk about space laws, it's like stepping into a whole different legal universe compared to what we're used to on Earth. For starters, think about ownership and territory. Up there, no country can claim a piece of the moon or Mars – it's all about shared space. The Outer Space Treaty really set the tone for this, making space a global commons, open for exploration by everyone.
Then, there's the matter of who's responsible for what. On Earth, it's usually down to individuals or companies, but in space, it's different. If a satellite from, say, Australia, causes trouble up there, it's the Australian government that's on the hook, not just the company that launched it.
And here's a fascinating bit – space is all about peace. The treaty bans any weapons of mass destruction up there. So, thankfully, space isn't militarized like we see in many parts of our world.
Also, astronauts are pretty special in space law. They're considered 'envoys of mankind,' and if they're in trouble, everyone's supposed to help, no matter where they're from. It's a beautiful example of international cooperation.
We've also got to think about keeping space clean and safe, just like we worry about our environment here. There are rules to prevent harmful contamination during space exploration.
Lastly, the business side of things is still a bit wild west. We're figuring out how to manage things like mining on asteroids legally. It's a mix of new ideas and old principles, and it's constantly evolving.
So, in a nutshell, space law is this unique blend of international collaboration, responsibility, and forward-thinking. It's not just about what we do up there, but how we do it together, for the benefit of all.

How can a normal person on Earth interact with the legal system of space should they get harmed?
Let's say you're just a regular person, living your life on Earth, and somehow you end up getting harmed by something related to space. Maybe a piece of satellite debris falls and damages your property, or something similar. You might wonder, 'What now? How do I deal with this in terms of space law?'
Well, here's the deal. Space law has this interesting part where the country that launched the satellite or spacecraft is responsible for any damage it causes – not just in space, but also back here on Earth. It's like an extension of their responsibility into outer space.
So, if something like this happens, you'd typically start by approaching your own government or legal system. They would then interact with the government of the country responsible for the spacecraft or satellite. It's kind of a government-to-government thing, based on international treaties.
For instance, there's the Liability Convention, an agreement that specifically deals with damage caused by space objects. It outlines the process for making damage claims, which your government would handle on your behalf.
It might sound a bit daunting, but the key here is that you're not alone in figuring it out. Your government steps in to help navigate these complex international laws. So, while you might not directly interact with 'space law' as an individual, there's a framework in place to support you if space-related incidents impact you here on Earth.

Are all the nations on earth in agreement that Space can/should be developed?
That's a great question, and the answer is quite interesting. When it comes to developing space, not every country sees eye to eye, but there's a general sense of excitement and curiosity about it. You've got countries with advanced space programs, like the US, Russia, China, India, and members of the European Space Agency, who are really pushing the boundaries. They're all about exploring, setting up satellites, and even talking about mining on the Moon or asteroids.
Then, there are many other countries that might not have their own space programs, but they're still keen on the idea of space development. They see the potential benefits like advancements in technology, communications, and maybe even resources in the future.
However, there's also a bit of caution in the mix. Some countries and organizations are concerned about the risks, like space debris, the militarization of space, or even the environmental impacts of space exploration. They argue that we need to tread carefully and make sure space remains safe and accessible for future generations.

So, to sum it up, while there's no unanimous 'yes' from every nation, there's definitely a shared global interest in developing space. The key is balancing this ambition with responsible stewardship to ensure space remains a place for peaceful exploration and benefit for all.

From your point of view, are consent, ethics and, of course, bioethics considered in earnest as humans, machines and their associated "bugs" become introduced into the layers of earth's atmosphere and the Moon?

Absolutely, and this is such a vital point to discuss. As we push further into space, with more human missions, advanced machines, and even the possibility of living on the Moon, issues of consent, ethics, and bioethics are really coming to the forefront.

Let's start with consent. When it comes to sending humans into space, it's not just about the physical risks. We're talking about psychological impacts, long-term health effects, and even the ethical considerations of sending people on potentially one-way missions. It's crucial that those involved fully understand and consent to these risks. Plus, there's the question of consent when it comes to experiments conducted in space, especially those involving biology or human physiology.

Now, on ethics and bioethics, the conversation gets even broader. We're looking at how we treat other planets and moons – like, should we be careful about contaminating them with Earth microbes? What if we find extraterrestrial life? How do we handle that ethically?

And then there's the whole aspect of machines – like AI and robots – that we're sending up there. We have to think about the potential 'bugs' or malfunctions and how they might affect missions, or even interact with extraterrestrial environments. It's not just about technical failures; it's about the ethical implications of our technology in a realm we're still learning about.

So, in short, as the space domain gets busier with humans and machines, these considerations of consent, ethics, and bioethics are not just important – they're absolutely essential. They're at the core of making sure our space endeavors are responsible, safe, and respectful of both humans and the environments we're exploring.

How many satellites / space stations are currently aloft?

You're tapping into one of the most dynamic aspects of space right now! The number of satellites and space stations up there is really something. So, as of the last count, and you know these numbers keep changing almost daily, there are around 8,000 active satellites orbiting Earth. This includes everything from communication satellites, Earth observation satellites, to scientific satellites.

And when we talk about space stations, there's the big one everyone knows – the International Space Station (ISS), which has been up there since 1998. It's like a multinational collaborative project involving NASA, Roscosmos (Russia), JAXA (Japan), ESA (Europe), and CSA (Canada). But there are talks and plans about adding more stations in the future, especially with the growing interest in space tourism and commercial space activities.

It's a busy and crowded space up there, and it's only getting more so. It's like a whole new world orbiting right above us, with all these satellites zipping around and the ISS circling the globe. It's pretty fascinating, and it also highlights why we need those space laws and guidelines to manage all this activity responsibly.

How many countries/corporations are planing on setting up on the Moon?

There's a lot of buzz about setting up shop there, and it's not just countries anymore – corporations are getting in on the action too. Let's break it down.

On the country front, you've got the usual big players in space like the United States, Russia, China, India, and some European countries, all showing serious interest in lunar missions. The U.S. has been pushing the Artemis program, which aims to land astronauts on the Moon again, including the first woman and the next man. Then there's China, which has been making strides with its lunar exploration program, even landing on the far side of the Moon, which was a first. The latest to land on the Moon was Japan, last week.

But it's not just about government space agencies anymore. Private companies are eyeing the Moon too. You've got big names like SpaceX and Blue Origin, founded by Elon Musk and Jeff Bezos,

respectively. They're looking at the Moon for various reasons – from scientific exploration to the potential of mining resources.
And then there's the Moon Village Association (MVA), which is a really interesting group. They're not a country or a corporation, but an international organization that's all about collaboration in lunar exploration and settlement. Their vision is kind of unique – they see the Moon as a shared resource, a place where different nations and groups can come together to establish a sustainable presence.
MVA is thinking about the Moon in terms of a 'village' concept. It's not just about planting a flag or setting up a base; it's about creating a community, a place where science, business, and even cultural activities can happen side by side. They're encouraging not just technological and scientific development, but also focusing on things like governance, cultural exchange, and ethical approaches to lunar exploration.
So, when you consider who's planning to set up on the Moon, MVA brings this collaborative, international perspective that's really valuable. They're helping to shape the conversation around not just getting to the Moon, but how we can all live and work there together, responsibly and sustainably. It's a pretty inspiring vision.
Now, the actual number of countries and corporations with concrete plans to set up on the Moon, that's a bit fluid. Everyone's in different stages – some are in the planning phase, some are testing technology, and others are still securing funding. But what's clear is there's a growing interest. It's like we're on the cusp of a new era of lunar exploration, not just for scientific discovery but potentially for commercial ventures too.
So, to sum up, it's a mix of several countries and a growing list of corporations, all with their eyes set on the Moon. It's an exciting time, and it really shows how space exploration is evolving beyond just government missions to include private enterprise as well.

What, besides the laws or lack thereof, makes space a preferable place for bio-med experimentation?
Space is such a fascinating place for bio-med experimentation, and it's not just about the laws, or the lack of them. There are some unique factors up there that make it a really special lab environment.
First up, there's microgravity. That's the game-changer. In space, where the gravitational pull is much weaker than on Earth, you can study biological processes in ways you just can't replicate down here. For instance, how do human cells or tissues behave in such an environment? It can give us insights into things like muscle atrophy or bone loss, which are big deals for astronauts on long missions.
Then, there's the radiation environment. Space has higher levels of radiation than we're used to on Earth. This can lead to different cellular responses, and studying these can help us understand things like cancer risk, DNA damage, and how to protect against it – not just for astronauts, but also for us on Earth.
Also, let's talk about isolation and confinement. Space missions, especially long-duration ones, are a bit like being on a submarine. Studying the psychological and physiological effects of this can help improve conditions for astronauts and also has applications for similar situations on Earth, like in remote or extreme environments.
And don't forget the cool factor of crystal growth in microgravity! It's way different up there. This can lead to the development of better pharmaceuticals and an understanding of protein structures, which is huge in biomedical research.
So, it's a mix of factors like microgravity, radiation, isolation, and even the unique way materials behave in space, that makes it an incredibly rich and, frankly, irresistible environment for bio-med experimentation. I think it's like unlocking a whole new dimension of science!

Please describe the "tracks" around earth and how someone gets their satellite into a track.
Talking about 'tracks' around Earth, or what we technically call 'orbital slots,' is like diving into a mix of science, logistics, and a bit of space diplomacy. Let me break it down for you.
First off, imagine Earth surrounded by invisible paths or highways in space. These 'tracks' are specific orbits where satellites operate. The most popular ones are the Geostationary Orbit (GEO) and the Low Earth Orbit (LEO).

GEO is like the high-altitude expressway, about 36,000 kilometers above Earth. Satellites here move at the same rate as the Earth's rotation, which means they stay over the same spot. It's perfect for communication and weather satellites because they can constantly cover the same area.
LEO, on the other hand, is much closer, just a few hundred kilometers up. It's bustling with activity – think Earth observation satellites, the International Space Station, and now some large telecom satellite constellations. These satellites zip around the Earth pretty fast, completing an orbit in about 90 minutes or so.
Now, getting a satellite into one of these tracks, that's where things get interesting. You don't just launch a satellite and hope for the best. There's a lot of planning and coordination involved. You need to choose the right orbit for your satellite's mission, get a launch vehicle to take it there, and make sure you're not going to interfere with other satellites.
And here's where space law and international cooperation come into play. You see, those orbital slots, especially in GEO, are limited real estate. Countries and companies can't just claim them willy-nilly. They have to coordinate through international bodies, like the International Telecommunication Union (ITU). The ITU helps manage these slots, ensuring fair access and preventing interference between satellites.
So, to sum up, these 'tracks' around Earth are like designated highways in space, each suited for different types of satellite missions. Getting your satellite into one of these tracks involves a mix of technical, legal, and diplomatic efforts to ensure everything goes smoothly and everyone gets along up there in the cosmic neighborhood.

How high up does a state's jurisdiction go? Low Earth Orbit? or to Infinity, like Ecuador recently announced?
This is a really interesting aspect of space law. So, the question of how high up a state's jurisdiction goes is actually a bit of a gray area in international law. Traditionally, there's no universally agreed-upon boundary where a nation's airspace ends and outer space begins. But let's unpack this a bit.
Most countries operate under the assumption that their sovereignty extends up to the edge of space, which is often considered to be the Kármán line, at about 100 kilometers above sea level. This is not officially recognized in international law, but it's a commonly used benchmark. So, up to this point, the airspace is under the control of the respective country, just like its land and coastal waters.
When it comes to Low Earth Orbit (LEO), where the International Space Station and many satellites reside, it's generally considered international territory. This means no single country can claim jurisdiction over LEO or any other part of space.
Now, about Ecuador's claim that their jurisdiction extends 'to infinity' – that's a bold statement and quite poetic, but it doesn't really align with the principles of the Outer Space Treaty. This treaty, which Ecuador is a part of, establishes that outer space, including the Moon and other celestial bodies, is the province of all mankind and is not subject to national appropriation by any means.
In essence, while nations have control over their airspace up to a certain undefined point, beyond that, space is considered an international zone, free for exploration and use by all countries. It's one of those fascinating areas where law and science intersect, and where we're still figuring out the rules as we go along!

If someone is interested in this and wants to learn more where should they start? Books? events? University?

Diving into space law and related topics is both exciting and a bit daunting, given how vast the field is. But there are plenty of ways to start soaking up all that knowledge. Here's a mix of resources you can tap into:

1. **Books**: Start with some foundational texts. 'The Law of Outer Space' by Bin Cheng and 'Space Law: A Treatise' by Francis Lyall and Paul B. Larsen are great. For a more general yet insightful read, try 'The Case for Space' by Robert Zubrin. It's not strictly about space law, but it gives a great overview of space exploration and its potential.

2. **University Courses**: If you're looking for something more academic, many universities now offer courses in space law and policy. Places like Georgetown University, McGill University, and the University of Mississippi have dedicated programs. Online platforms like Coursera or edX might have relevant courses too.
3. **Events and Conferences**: Keep an eye out for events like the International Astronautical Congress (IAC) or meetings of the International Institute of Space Law (IISL). These are fantastic for networking and learning from the experts.
4. **Online Resources and Journals**: Websites like SpaceNews or The Space Review offer up-to-date information on space industry developments. Journals like the Journal of Space Law or Space Policy are great for deeper insights. And coming soon, my own Space Newsletter, "Trailblazers" (Trailblazers. The Space Newsletter.™ (jointrailblazers.space)), which will give insights on the space economy for the Next Generation! Follow me on my LinkedIn profile to be informed when we go live ��
5. **Networking and Professional Groups**: Joining groups like the Moon Village Association or the Space Generation Advisory Council can be a great way to meet like-minded people and stay informed about the latest in the field.
6. **Podcasts and Documentaries**: For something a bit lighter, there are podcasts like 'Space Law and Policy' or documentaries on space exploration available on platforms like Netflix or YouTube.

Space law is an evolving field, blending law, policy, science, and technology. So, keeping up with current events in space exploration and technology is as important as understanding the legal fundamentals.
Happy exploring!

Who was your mentor?
I've had many mentors, but for space law my mentors are Prof. Steven Freeland and Donna Lawler, from Australia. They've been a huge influence in my space law journey. They're not just knowledgeable but also have this amazing way of making complex space law issues understandable and relevant. Learning from them has been a blast and tremendously helpful. They've been instrumental in shaping my perspective and approach in this field – truly invaluable mentors.

I'd love to get into Space Law but I'm afraid the cost/benefit of this endeavor at this point on my mortal coil is probably null. However, it's extremely interesting to me!
Go for it! ☺ Now, there are also other interesting aspects where to get involved, like space policy, etc. I don't think one needs a dedicated degree for that. I don't have one. I learned by doing, through my real-life business experiences.

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Making Space Achievable, One Orbit at a Time.