Episode 146 – Digitalization, Leveraging the Cloud and the Building Your Own Ground Segment

Speaker: Guillaume Tanier, CEO and Co-Founder, Leanspace – 22 minutes

John Gilroy:	Welcome to Constellations, the podcast from Kratos. My name is John Gilroy and I'll be your moderator. Most enterprises embrace digital transformation to advance their business operations and benefit from the replacement or augmentation of physical devices with virtual functions. However, due to the nature of working in space, the satellite industry has been one of the last to fully adopt today's most widely spoken language. No, it's not French, it's zeros and ones. During today's podcast, we will discuss digital transformation and ground segment development.
	Today we welcome Guillaume Tanier, Co-founder and CEO of Leanspace, a French startup founded by an international team of space and cloud veterans with the goal to build the digital infrastructure of the space industry. Guillaume, we look forward to hearing your knowledge of some of the technology behind the evolution of space networks. Let's jump right in here. So to get the lay of the land, let's first talk about how satellite networks traditionally operate. What are the components involved in making it all happen?
Guillaume Tanier:	Hi, John. Thanks. Indeed, there are lots of components involved and actually many people don't know much about it. When we think satellites, we think a lot about the space segment, like the actual satellites flying, but there is a lot of stuff on the ground to make this work. You have different point of views from the U.S. or Europe, how you should call this, many different opinions. I typically split this in different segments. So, you have the control segments in which you will manage the satellite, you will plan the operations of the satellite, the maneuvers and the onboard executions of stuff. You will send the commands, you will receive the telemetry, make sure the satellite is healthy and all this stuff. On the control segment, a big challenge now is how you scale operations when you have many, many satellites or when you keep changing them very often.
	So the control segment is becoming more and more important. And then you have another segment which is closer to the end users, the end customers. I call this the user segment. Typically, if you think earth observation or science missions, it's about processing data, images or I don't know, observations or deep space or whatever. And when you do telecommunications, it's about managing the network operations, the flow of data between a consumer and a

device on the ground or whatnot. So these are a bit very high level overview, but the key thing here is there is a lot of software in that. Tons of software, and many people don't realize how important software is here because that's how you run the business. That's how you provide value to the end customers. In the space industry, we tend to put a lot of focus on the hardware, on the satellites and the launch shares and the engines and all that stuff but software has become such a big thing that now we have this topic today, talking with you about digitalization and how we make this better.

John Gilroy: Wait. Now when you think of a satellite or you think of this spaceship going up and the rocket going up, very visual, very easy. Zeros and ones are hard to visualize, but us humans we have to learn how to figure it out. So from your perspective, what are the big drivers towards this digital transformation into space networks?

Guillaume Tanier: So the space industry, many people outside of it still sees it as we send rovers to Mars and we have a big space station going to the moon or whatever. But the truth is that it's heavily commercial nowadays. It's about bringing value to earth to society, bringing images, tracking goods and ships and whatnot. So, the space industry has changed a lot in the last 10 years. You know all about this, the so-called new space movement, the commercialization of this industry have brought many new requirements. You still need to have trust in the systems, you still need reliability but on top of that now, you need lower cost and you need to be much more agile.

Guillaume Tanier: You can see it in the market, everyone is trying to find ways to cut cost to be much lower cost on how they build and operate their space missions, their satellites, but also to increase drastically agility, to be able to build much faster, to evolve faster, to answer much faster to the needs of the market to their customers. That is a very big difference than even 10 years ago when 10 years ago you had, I don't know, three years to conceptualize, then three years to get an approval. Then you build a thing for eight years, then you launch and then it flies for 10 years. Nowadays, all of this done in two, three years, maybe less sometimes. Things have to be much cheaper and much faster and that's what we see all across the whole industry.

John Gilroy: Well, I think everyone wants cheaper and faster. That's true in many different industries, but space is unusual and has particular challenges. So, what are the challenges that you see are unique to your field?

Guillaume Tanier: I'm in the field of space software and ground segment, and it's a lot about the developers and data. I think one of the key issues we have is the development cycles are still way too long. Every space mission, space organization, they rebuild from scratch each time. They put in and place infrastructure to manage their satellite operations, to even build or test their satellites. They put it from scratch, they will reinvent the wheel, they can reuse sometimes some existing

technologies, but it'll often be old school technologies that were made before all this digitalization thing. And I think the reason why they do this is because space is hard. There is a lot of investment and very long still. So, space organizations, they need to keep trust and ownership in the software infrastructures. It's like the developers, I only trust my own stuff, my software, or if I don't, I'm not going to do it. Then I'm going to trust a very reputable incumbent who can commit it's going to work.

So, when you are a government funded mission, that works well, it does work well. But when you are a new commercial player, then you'll rebuild from scratch, they rebuild from scratch. It means that digitalization is very hard because you spend a fortune rebuilding the basics, rebuilding the infrastructure, the piping and the underlying stuff that is not really adding value and not spending time on the innovation to think how do you connect your data. I think the second thing is beside the development life cycles, it's the fact that data is very hard today still to move, to standardize. You have so many silos, different tools, data formats, different teams. You have data in different geographies, so you still have a lot of manual actions to move data, you'd have to modify your interfaces. It takes an enormous software cost just to keep the thing running and to adapt. So we need new ways to develop much faster, to be much more agile and to connect all the systems in a way that you can integrate. Then finally you can achieve agility and reduce cost.

John Gilroy: Here in the tech community in the last few years, new words have evolved to describe this managing data. They're called data lakes, data warehouses, data lake houses. They're just trying to create a base to manage this data from one silo to another, and it's just really difficult. What technologies do you see may eliminate some of these barriers?

Guillaume Tanier: So here, of course, I have to talk a little bit about what we do because that's one of the reasons I created Leanspace, to solve these problems. And we're not the only one looking at this problem, but we need a new way, as I said, to develop software in space and software platforms. What Leanspace is building is really what changed the game because we provide you everything you need to build your ground segment software in weeks, not years. We provide all the core functionalities, the generic lower-level systems. You need all the thing to decode telemetry and send commands and manage your data. We provide this generic for APIs and developers can take this and build a solution in weeks so they don't have to reinvent the wheel. They don't have to figure out a whole ground segment architecture.

Guillaume Tanier: They can just come to Leanspace, pick the APIs they want, get some reference architectures, some templates, and off you go. You can build in weeks what in the past you needed years and for me, that's a game changer. It's not new, but software is something that works in many industries. You have it in banking, in energy, in transportation, in life sciences, you have these kinds of platforms that

help companies build very quickly and integrate very quickly. We are the first ones doing it for space, but I'm sure there will be more. So that's one technology, leveraging the cloud. Now, of course, it's making use of this modern, let's say IT paradigms, making the cloud available to the end users. I think another one is making the data flows easier. We talked about the program to move data and we need ways if you want to digitalize to make the data flow much easier across the teams.

Teams need to be able to share data to work on the same data sets to across geographies. They need to connect all your tools, so the tools can connect to each other, they can work with each other. When you have a provider, the big question is how do we manage the interface through this provider of data? So all this data management problems and interfaces today is really a killer in the space businesses. So Leanspace, again takes care of these interfaces. We provide all this in the platform so you can just build on top of this infrastructure, this healthy, reliable infrastructure that takes care of all this heavy lifting for you. I think maybe another thing quickly is connecting across lifecycle phases between design and manufacturing and test and operations. We call this digital continuity, it's about streamlining your data flows across the different phases of the mission.

John Gilroy: Again, there's an American author named Simon Sinek and he wrote a popular book called Start with Why. You probably heard about it. It's very popular with software developers. So why, I got to start with why, so why is it important to adopt this approach, this platform approach, and what kind of players in the industry are already doing so?

Guillaume Tanier: In the time of new space, honestly it makes absolutely no sense to rebuild from scratch over and over the same thing. It makes no sense that companies waste time and resources on something which is a commodity nowadays, and companies want to innovate more. So it's about enabling them to innovate more, to create the software that they exactly need, the custom thing they need for their specific use case so they can deliver on their secret source. Every customer is asking the same thing. I want to do this exactly thing, how I do?

With Leanspace, you can because you build yourself and that for me is a big differentiator. It's a big answer. In the space industry, it is still so specific. Each mission is so specific. The only way you reduce cost and accelerate the industry as a whole is to enable and empower people to build their own systems. I think once you do that, you will see much more innovation. You will see people being able to do much more fancy things on the operational concept, on the type of ways to manage the operations that it has been in the last 60 years.

John Gilroy: When I was in college, I studied political science and there's always books on political science that use a phrase, continuity and change. So it'd say continuity and change in France, continuity and change here. I think the technology people

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have liberated this phrase and they talk about digital continuity in the space world. So what is this continuity and what does it really enable?

Guillaume Tanier: For me, it's an amazing concept. It's something that we are working towards, although it's very hard to achieve. It's basically, as I mentioned earlier, connecting your different lifecycle phases and that's something many industries start to do, automotive in particular where you can leverage insights and data from, for example, operations to better design the next generation of satellites. It's to have in the same place your models of your assets, the structure of your mission, all the operational data like the telemetry, the operations plans, the test data, everything available in the stowaway so that they can be used across phases to better integrate. I think if you look at the rocket companies, all these companies who are trying to launch every week or reuse their space systems. It's going to be very hard to do if you don't have a quick way to learn from operations and to integrate very quickly and adapt.

Guillaume Tanier: So digital continuity is part of this, it's to connect all these things together. I have the data available so that all engineers can use it. There is another aspect which I like a lot as well, and that's something we have demonstrated in the Smallsat Conference in Utah last August. It's also how your ecosystem evolves almost automatically when you change something. For example, we had this demonstration where we had a satellite control application built on Leanspace. It was using the APIs of Leanspace, and we imported a new satellite design from a design tool. We imported this into Leanspace. We could very quickly reconfigure the Leanspace environment directly in the console or with some scripts and then the app, which was built on top leveraging the APIs of Leanspace, could automatically be updated, which means that now the satellite you had imported was available in the satellite operation software. You could see the dashboard; you could see the data coming in just in a matter of minutes. So of course, in real life you will have to do proper validation and all that stuff, but it shows how quickly your systems can evolve once you make use of the proper and modern software infrastructures.

John Gilroy: Again, we touched on this topic earlier, the whole idea of data management, and it's obviously your platform allows for much more data to come in and be transferred. So, if we're in the process of moving more data faster, so where does all this data go, and how's it managed?

Guillaume Tanier: It's a big question. The cloud is one of the obvious answers. It all goes to the cloud. Some people don't like it so much, and that's because you have security issues. I think the cloud brings so much value, so many benefits to access the data to actually make it safer, more secure. We just need the right tools to do that. And actually lots of companies are struggling and that's why they don't trust it, because they don't have the right tools or they don't have the right budget to just adopt it. What we do with Leanspace to try to solve that is again, to have this infrastructure that provides you the tools to configure security

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policies, data access policies, to give to your customers the right to access this dataset or be able to use that function.

So by centralizing in one place, your security rules and your policies for data management, you save a lot of effort and that's how hopefully, you can more easily trust the cloud. I think there is another aspect as well is you have a lot of countries with different legislations, and that's a big question as data has become so important and so strategic that many companies don't even know how to navigate these regulations.

It's not even clear if you give access to the data to your customer in another country, if it's an export or not. Many people don't know, and all these questions are very important. So the more and more data, I completely see that. I have a customer, for example, who is very keen to use Leanspace to centralize the data in one place because they're running tests in a distant location and they want engineers in the headquarters to be able to see the data and help them remotely. But this opens so many questions on ingesting the data, storing it, and making sure you don't duplicate. That's why platforms Leanspace really solved a big problem.

John Gilroy: Guillaume, we started this conversation by using the phrase digital transformation. It's taking place in agriculture, taking place in many different industries, and normally there's use cases that improve performance by adopting this type of new technology. So let's just take space networks. Can you describe an ideal system layout of a future proof satellite control system? Is that even possible?

Guillaume Tanier: Yes, it is. First, what is future proof? Future proof at least, my understanding is that you build something once and whatever is thrown at you in the future, you will be able to easily handle it. Which means if you put more satellites, it'll be easy to handle. If you have new business requirements, it'll be easy to handle. If you have a change of technology, you can handle it. So for me, future proof is about starting small on something that will be able to last for very long. And it is true in the space industry. It has not been like this for often. It has been you pick something and then you are stuck with it, you cannot change. And so for me, the way you get to it is by having a solid and trusted software foundation, but not too high in the use case, just the basics so that you can yourself adopt your own choice of technologies and of business needs.

You can just build whatever you want. And again, that's really what we're trying to do here at Leanspace is to empower developers to build what they want the way they want, innovate the way they want or the languages they want, the process they want, and develop whatever software they need, but without the need to invent the whole thing and build from scratch. And you are asking about a good example, I think the key takeaway is that the time for custom build satellite ground segments, I see that it's over. I don't see anyone really who can

justify in the coming years that, we are going to rebuild the whole thing again because we are so different, not anymore.

John Gilroy: Speaking of the future, we just talked about the future. What do you think is next in IT for space? Can you describe what the landscape might look like in the next 10 years, if it's even possible to think about, 10 years from now? Who knows?

Guillaume Tanier: Good question. Who knows? Yes, there are lots of discussions on computing in space and stuff like that and it's all great. I think maybe we'll come to this. We talk about onboard autonomy and all these things, but if you ask me what I think is the biggest impact, it's just solving the basic infrastructure problems we have. I see so many people spending fortunes developing AI powered models and super fancy smart things, automation layers and all kind of stuff, which are orchestrating really badly designed architectures which don't scale, or at the time were they designed, it was great, but today it's not fit anymore. And I think there is a very easy quick way to solve 80% of generic stuff, make it much better, and then you will see so much more innovation in the space industry.

It will make it much easier for new players, new entrants to come in, whether they are new startups or even big enterprise going to space, it'll be much easier to democratize the suspect. We talk a lot about democratization, but it's true. People are simplifying the space segments with standardized satellites and low-cost launchers and all that stuff. But having a way to easily put in place all the tools you need, the process you need to integrate over the years. For me, it's a big game changer that the industry needs. If we want the space industry to become much more accessible, we need something like this.

John Gilroy: Oh, Guillaume, I think you've given our listeners a real good perspective on digital transformation for the satellite and space world. I'd like to thank our guest, Guillaume Tanier, Co-founder and CEO of Leanspace.

Guillaume Tanier: Thank you.