Jacob Mulder: ‘We Should Look at Nature and Go to Space as a Swarm!’

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New Minister of Manufacturing shares his way of starting small to have a large infrastructure in place

What is your dream? How is getting closely involved with Asgardia driving you closer to your dream?

I have 3 interconnected dreams. I’m interested in science, space, and going to the stars. This is my mindset and the reason why I joined Asgardia. My dream of mankind going to space and expanding there is what Asgardia is about.
The second dream is related to my career as an IT architect. It is not about building, but rather about integrating. This is exactly what a Minister of Manufacturing should do, and I want to start by laying a foundation for that.
And the third dream is to emigrate to space. I’m in an electric reclining wheelchair because gravity squeezes my spine. My back is likely to get worse in the coming 15 years. Even this wheelchair might not be enough for me.

Jacob Mulder, Ben Dell, and other participants of the I Asgardia Space Science and Investment Congress in Darmstadt, Germany (2019)
Image credit: Jacob Mulder’s archive

Ever since I was 15, I said I didn't want to end up being like Stephen Hawking, because he was in a wheelchair. I studied Astronomy. When I was graduating from my university, I gave a talk on Stephen Hawking. I did not agree with him on a few things regarding black holes, but I did feel connected with him.
I was at the Asgardian Congress in Germany giving a presentation on my idea of space colony architecture. At the end, I said: 'You're going to help me to emigrate to space in 15 years!' You never know, it might be a self-fulfilling prophecy!

What will be your first steps as a newly-elected Minister of Manufacturing in Asgardia?

While in Parliament, I was in 2 committees: Manufacturing and Safety & Security. I'm both an IT and a security architect. In Manufacturing, one of the key drivers is the Institute of Standards. If we want to build companies and also integrate a number of things, it is important that everybody uses the same standards.
For example, if you integrate different parts of a Mars lander, it shouldn't be that some of those use metres and kilogrammes, and the other ones - yards and pounds. Things will go horribly wrong! And that happened at least twice! One device crashed on Mars, and the other one completely missed the planet because of this problem.
Fernando Jimenez Motte, Chair of the Manufacturing Committee, initiated a law that establishes the Asgardian Institute of Standards (AIS). When I joined, the law was already there. I wrote a short document on a pre-AIS. Let's start small to have that nice large institute in the future.
Now, the first step for me will be to actually create the Institute of Standards. I have to learn: this is the first time I've ever become a minister! Minister of Trade & Commerce Ben Dell is currently working on getting startups in, so that they can really start a company, start making things. I thought: 'We are now in a hurry because those startups need standards!'
As a purely digital nation, Asgardia depends on IT. So, I also want to lay the foundation for secure collaboration and project management, whereby I believe that Asgardia should focus on *integration* of products and services that are delivered by organizations and companies both inside and external to Asgardia. Asgardia should facilitate a supporting marketplace for components and partial solutions, which I think will mostly be delivered 'as a service.'
We also need a standard IT core system, so that we can share documents and integrate things easily. We now have Google Drive to share documents, but Google is not that secure and moreover, we need to be in control of things ourselves. I'm very glad I became a minister. Together with other ministers we can start things like an Institute of Intellectual Property.
Working together is really important. Ben Dell has lots of ideas on trade and commerce; Michael Chirino is competent in security; Dennis Shoemaker knows about information and communication, and so on. And if you combine all that, you can create a robust and secure IT core.

Once you have it, you can not only build a document collaboration environment which is secure, but you can also create an e-Academy. A website for that has already been created by our colleague Andreas Chiou. It looks very nice, and our group is currently working on really making the e-Academy work.

In the recent XII Parliament Sitting, close collaboration between the Asgardian Parliament and Government was constantly emphasized. What is your current interaction with the Manufacturing Committee like? How can other Ministries and Committees benefit from your experience?

The Ministry and the Manufacturing Committee collaborate tightly on laws and the Institute of Standards. But they have different roles. We have the legislative part, which is the Parliament who defines the laws and how things should be, and votes on those. And we've got the executive part, the Ministry, who is able to say: 'OK, let there be this institute!' - and to make it so!
The minister can decide that there will be an institute. And the Parliament can say: 'We want this institute with these kinds of parameters!' We also have the third power - the Court. If there is an issue somewhere, the judiciary can rule. Together that is the *Trias Politica*.

Jacob Mulder at the I Asgardia Space Science and Investment Congress, Darmstadt (2019)
Image credit: Asgardia

In the ministries, there should be someone to say: 'I will create an Institute for Intellectual Property. And I will collaborate with some external company that can do the actual work for me.' Effectively, the main thing we'll need to do is integration work. We can create a frontend for this external company, with which we can make it very easy for our own residents and companies in Asgardia to get their trademarks, copyrights, patents, and so

on secured. Thus we are protecting our intellectual property and both they and Asgardia can thrive and grow.
Typically, you need to interact between the ministry and the parliamentary committee, and that has to be done in all 12 areas. When you want to create a space station, you need manufacturing, but you also need standards and finance. And you have to combine all kinds of equity that you have. Also, you need trade and commerce because you want to collaborate with launching companies and organizations. And maybe, for example, also CGI, the IT multinational where I work. You need culture and citizenship as well when you want to create a spaceship or a space colony. When you build a habitat, things like art and music should be present to create a pleasurable environment. Effectively, all the ministries have to work together.

As a dedicated member of some healthcare companies, especially Platform Toegankelijk Westerkwartier focused on providing special accommodations, what advantages do you think people with special needs would have living in space?

Here on Earth, a special solution for my challenge with gravity would be to become like Jacques Cousteau. However, in my normal daily work, my laptop will not work that well in water. But in space, it would be more suitable for me. I've studied Astronomy, IT is very important in the space industry, and I'm already in Asgardia. Everything comes together in my career!
As for PTW, it's a local volunteer group that works together with the government, organizations, and companies to help them make everything accessible to people in wheelchairs, those who are blind, deaf or whatever.
Typically, if you are blind, your hearing improves. If you need people who can hear very well, you should pick a blind person. And if you want someone who is really good at IT and at focusing on miniscule details, you should have an autistic person do that. At CGI, the company I work for, autism is quite common.
My wife is a self-employed healthcare professional. Her main profession is to help children and their families who have really special needs. Typically, this is a combination of a few things, like a child with autism and ADHD, a mother with a drug addiction, a long-term unemployed father, and money problems in the family.
When she first started this around 10 years ago, she said: 'We need more people around me! I need an extra person who knows about drugs, another extra person who knows how to get this guy a job, and we need a third person who can solve their money problems!'
A painter has a palette. I said: 'We need a healthcare palette! We need different people working together, and each one of them has their own specialty.' They should all be small, 1-5-person companies, because these are typically very motivated people who will also go there at 11 p.m. on the weekend. So, I started a volunteer network: **Paletzorg**. By now, we have some 70 organizations, and about a half of them are one-person companies.
What I learned from this experience and which can be applied in space, is that inclusion should be natural and unambivalent and diversity should be embraced. Evolution has proven that exceptions often make the difference and devise a solution upon challenges.

When I ended up in a wheelchair due to serious issues with my back, I was able to go to a trade fair for handicapped people. They were selling wheelchairs and all kinds of things you need when you are disabled. A gorgeous red Ferrari was parked there. It was there not for fun: it was adapted for its disabled owner. You could do everything with a joystick - including driving up to 300 km/h with it! When you see something like this, you realize: if this is possible, everything is possible!

Jacob Mulder boarding his special Star Trek style minivan
Image credit: Jacob Mulder’s archive

I can’t afford a Ferrari, but I do have a great Mercedes Vito. It is a Star Trek style car, it can do lots of things. I’m almost lying flat while driving up to 40,000 km a year with it. My wheelchair can also do a lot, it has all kinds of extras in it. I invented most of the extras myself. I can go shopping and do my regular work. Both the wheelchair and the car are made in such a way that I don’t need any assistance.

You are a grandfather of 5: how do you see their future in Asgardia? Do they inspire or help you with your current Space Nation projects?

Children are our future. If you talk to them, they typically have a broad view of things. As adults, we know that some things might be impossible - until we see a Ferrari with a joystick. Children always see ‘Ferraris’! They say: ‘Of course, it is possible! Of course, I can fly! Of course, I can go to the Moon!’ So, we need to collaborate with children as well. And also with people who are said to be mad or lunatics. Maybe they are really smart and have great ideas! This is what I know from my wife’s experience dealing with children with special needs.
I want to emigrate to space 15 years from now. My wife says: ‘Good luck! I will not join you: our children are here.’ This sounds logical. On the other hand, if you’re talking about a space colony not with just 100 people in one place, but rather with multiple locations each with 15,000 people, then it would be normal to buy a house over there and live there for 7

years, and then move to another location, like to the Moon or to Mars. And once our children have seen this picture of such a colony, they will think it will become normal to buy a house over there.

Ever since our children were born, there has always been the Internet. They take that for granted. When there were no cars yet, there were carriages with horses. At that time, people were saying: 'I want to go faster from this city to that city!' and everybody said: 'We should have faster horses and better wheels!' And there was also somebody who thought we could do it in a completely different way by making a machine instead of using a horse. That's really thinking out of the box.

When Einstein was young, he was working at a patent agency as a clerk. He was seeing new ideas all the time - that was his work! His mind was open. He saw lots of inventions and was inspired by those. But then he heard one of his friends saying that one should not study Physics or Astronomy because everything was already discovered, that there was Newton with his Gravity Law and only 2 or 3 minor problems yet unsolved.

One of them was the somewhat anomalous orbit of the planet Mercury around the Sun. And Einstein said: 'OK, let's do things very differently. Let's not think about gravity... Let's define that the speed of light is the same for everybody else.'

This was strange. Say, there is a train moving at 100 km/h. If I throw an apple as I stand still, it moves at 20 km/h. But if I'm on the train, the apple goes at 120 km/h: the speeds add up. And that is logical, this is how we see the world. Einstein said: 'Maybe light is different. Maybe light always has the same speed.'

He used calculations of the Dutch physicist Hendrik Lorentz and eventually came up with a completely new set of laws for gravity and for the orbits of planets around the star. He calculated Mercury's orbit around the Sun - and it turned out to be right! And Newton's formula was not right! Everybody said: 'You're crazy! Go back to your patent office!' He was actually right and was able to think outside the box!

I did a large international research project once, where I was in charge of the IT part. We met every 2-3 months somewhere in Europe. And I would start every meeting with the words: 'We plan to fail!' That's how research works! We have to fail, we have to make mistakes, because that way we learn.

If you want to accomplish something, you should first think of five ways of doing that. Two of them will turn out to be really silly, the other three might all work. You just do all three of them. Two, maybe three will fail. But there is a chance that one or two will work. You can always try, why not? I tried out a number of prototypes to beat gravity for my back problem and here I am, with my exotic wheelchair and my special car, completely autonomous.

At the First Asgardia Space Science and Investment Congress in Darmstadt, you made an intriguing presentation on 'swarm' architecture in space. Is it related to the bees' lifestyle? What can we learn from them to establish ourselves beyond planet Earth?

Jacob Mulder making his presentation 'Sustainable Space Colony Swarm Architecture.' First Asgardia Space Science and Investment Congress in Darmstadt, Germany (2019) Image credit: Asgardia

We should always look at nature: nature was here long before us humans. So, it has much more wisdom. When you look at bees or birds in the sky, they fly in a flock or a swarm. And they rarely bump into each other.

This is not because there's somebody up there saying: 'OK, you move to the left and you move to the right!' That doesn't happen! Every bird just looks at its neighbours, and when one of them moves a bit closer, moves a bit itself as well. They all move relative to each other.

They don't even have to be very smart to do that. The only thing they have to do is to keep their own distance from the neighbours - and that's enough. If you push the outer few birds a bit to the inside, then everybody will move, and the whole flock seems to move a bit. It's not that the flock is moving, it's the outside rim that is moving a bit, and the rest follows 'automatically.'

You need this swarm concept when you have, for example, three of those large cylinders in space with 15,000 people in them. On their surfaces, you will have solar panels. In space, there are meteorites, solar wind, and other dangers. You don't want those to hit your habitat.

It should not have an impact on your cylinder, because it will damage your solar panels, or worse. So, we should have something in space near those cylinders - a swarm of small robot-like rockets that watch those meteorites, capture them, move them aside, vaporize them or do something else to mitigate the risk.

Those have to be small robots, because they might get hit or break down because of other reasons, and we'd need lots of them, like a hundred or so. They'll have to be small, easily replaceable, easy and cheap to make, and autonomous: they should be able to recognize such a meteorite themselves and take care of it. So, you need a swarm. David Attenborough and Jacques Cousteau taught us: this is how nature works. It's all about collaborative networks.

Once a wise man said: 'If you are alone, you can run faster, but if you go together, you can come further.' And we want to come further as Asgardia. We don't want to run very fast because other people in the space sector are doing that. No problem, let them do that! We want to create a nation, a basis for humanity - not just for a few astronauts - to expand to space. We have to go there as a flock, as a group, as a swarm!

With current technology, it will take you around a year to go to Mars. Without gravity for a year, you would lose a lot of muscles. When people come back to Earth, they can barely walk and have to be lifted out of a spacecraft. However, when you go to Mars, there will be nobody there to get you out. And after 2 years, you will have developed cancer because of the radiation. So, you should do things differently.

You need a very thick wall on the outside. And the only way you can get that much material into space is by getting it from the Moon. That's much easier than launching it from Earth. I think a base on the Moon should be the first step towards being able to build a large spaceship and a large habitat.

We need to go to the Moon, but preferably not with many people, because there will be the same radiation problem over there. So, we have to send lots of robots. They could be autonomous, but they could also be (partially) controlled in real-time from the Earth - on Mars they really would need to be autonomous, because of the time delay due to the distance.

We should make those robots not too intelligent, though. A few years ago I did some research at the university on a swarm of intelligent robots, which I programmed to collaborate with each other. And I assigned them different characters, some of them being very hot-headed robots, some of them being lazy.

I gave them some contradictory goals: they had to run fast and, at the same time, inspect the road carefully. So, they had to learn what was best and adapt. Once in a while the environment changed: they had to slow down because the landscape was tough, and then it was flat again, and they could run faster.

During one of my experiments, all of a sudden, the whole group ran off! I lost them, they went off the screen and went away at a very high speed. I had to stop them manually. Then I looked at what the problem was and realized that one of the hot-headed robots discovered how to cheat on me.

Jacob Mulder giving a talk at CGI
Image credit: Jacob Mulder’s archive

He discovered that if he cheated, he could get extra points by running very fast. He immediately told his fellow robots about this, and they followed him: the whole group ran off in a second!
After that, I joined a scientific research institute and started my PhD on this subject. If you have such a collaborative swarm of intelligent things in a healthcare environment, for example, assisting elderly people - how do you stop those robots from doing harm to people? This is what my PhD was about.

What can any Asgardian do today to help us go to space?

First of all, join Asgardia as a resident! I will need help in my Institute of Standards and other entities that I’m going to set up. And others need people too - we need people to work with us, because we need a large swarm, a large collaborative network. We need more people to share this dream of ours!
Collaboration is key. Within Asgardia, we already have a great and large group of enthusiastic and smart people, but we also have great and large dreams. Building on our dreams together is great fun, working in parallel on lots of different things is really motivating. The sky is no limit! Everybody has their own talents and together we can and will achieve great things and 'boldly go where no one has gone before', as they say in Star Trek. And during that great voyage, we should never forget what Einstein said: ‘Imagination is more important than knowledge.’