



## 110. Space Exploration

Recorded on 9<sup>th</sup> March, 2020, in Byron Bay, Australia  
With guest co-host, futurist, Ross Hill.

*Future Sense is a podcast edited from the radio show of the same name, broadcast on BayFM in Byron Bay, Australia, at [www.bayfm.org](http://www.bayfm.org). Hosted by Nyck Jeanes and well-known international futurist, Steve McDonald, Future Sense provides a fresh, deep analysis of global trends and emerging technologies. How can we identify the layers of growth personally, socially and globally? What are the signs missed; the truths being denied? Political science, history, politics, psychology, ancient civilisations, alien contact, the new psychedelic revolution, cryptocurrency and other disruptive and distributed technologies, and much more.*

*This is Future Sense.*

**Nyck:** You are tuned to *Future Sense* here in Byron Bay, Australia. Thanks to all of you listeners out there in the world, and hopefully this is useful to you because the things we are doing locally here should and will apply many times to all of you out there as we move into this unknown and, for some, quite fearful future.

Sometimes, of course, people are quite fearful of technology. We've jumped from the Tesla to local economies with Helena Norberg-Hodge there, to do what we're going to talk about now: a bit of space exploration and some of those things that are happening out there right now.

There's an asteroid warning, for example. NASA is tracking a four kilometre wide asteroid approach to the Earth. It's listed at NASA's *Center for Near Earth Object Studies* (CNEOS) in California. The asteroid has been officially called 52768 and is estimated to measure between 2.5 and four kilometres across. An object this big could potentially kill millions of people if it ever hit the planet in the distant future. It pales the coronavirus and other things by various levels of orders of magnitude.

**Ross:** Which is why space is so interesting, particularly to me. It's nice to get out there a little bit and just compare some of these numbers because they are very, very large. Another listener, Andy Hedges, just sent me a link about a paper in the *Astrophysical Journal* that was just published (see <https://www.nytimes.com/2020/03/06/science/black-hole-cosmos-astrophysics.html>). They have recorded the largest explosion ever that they've seen in the world—in the Universe; the world's not big enough—and this is fascinating because from one point, this is the largest recorded observation. It doesn't mean it was the largest explosion ever, it means it was the largest one we got a photo of.

**Nyck:** Terribly anthropocentric if we said it was the largest one that ever happened.

**Ross:** But what happened was, this is another Galaxy cluster, Ophiuchus ...

**Nyck:** It's something to do with the serpent; it's the serpent trail or something.

**Ross:** Yes, it is. This is from the *New York Times* and they say it was doing just fine until this particular black hole "burped" on it. The black hole was several billion times as massive as our sun for a start. This is the largest recorded explosion and the crater that it left was so large that you could fit 15 Milky Way galaxies in a row inside the crater.

**Nyck:** 15 of our whole galaxies inside the crater of this exploding black hole!

**Ross:** That's it.

**Nyck:** Okay, that's beyond comprehension, really.

**Ross:** It's quite big.

**Nyck:** But isn't it fascinating that we think about these things now? You know, I think this is an interesting point. We were talking at breakfast about "the overview effect", which is what is termed the moment when we saw Earth from space for the first time, some time there in the 60s or whenever it was exactly, and I sort of remember—because I was alive then—how was tremendously changing that perspective was for so many people. And this kind of perspective now, that there are these bodies out there that we can now see and experience on such a gigantic scale, must do something to our consciousness—the way that we can or don't receive it, and we're placed it with that, yeah?

**Ross:** And there's a large spectrum of that. So this "largest explosion recorded" happened because NASA have got an x-ray observatory in orbit around the planet. We'll often hear about rocket launches, but we have no idea what they're launching. In this case, it was an observatory which has been looking out for these large explosions and black holes and other things, and now we know about it. So that's cool.

Interestingly, the paper described it as "discovery of a giant radio fossil in the Ophiuchus galaxy cluster." The actual explosion happened a few hundred million years ago ...

**Nyck:** Yes, well, that's right. Not very recent.

**Ross:** It's breaking news for us, because the paper just described the echoes of it, which we found for the first time. So we're getting a better idea of what's happening in space, and it can feel distant, even though most of what we call space in the satellite realm is between 400 kilometres to 30,000 kilometres high, which is fairly close when we're talking about galaxies, but every time you look at that flashing blue dot on the map on your phone, the origin of that is GPS satellites, and there are 50 or 60 of them flying around in orbit. So every time you look at that, this is where it originally came from.

**Nyck:** And that's an interesting point, because many people—and I know lots of them, too—who are not exactly Luddites, but somewhat suspicious of technology, generally. And yet, of course, we do use it. It's just embedded in our lifestyle for most of us, most of the time, one way or the other. Maps or those other GPS apps are a simple example of exactly that. But that notion that we're embedded in this technology and yet somehow we're resistant to it—because the technology has done some bad shit.

**Ross:** Well, it's the people and the values behind the technology which I would say have done the objectively bad or good things.

Again, to talk about the trip to Uluru, I stopped over in Woomera on the way. Woomera is roughly known for two things: there was the immigration detention centre more recently, but what put Woomera on this map a long time ago was that it was established as a rocket test range and it's the longest rocket test range in the world because it stretches from Woomera to the coast near Broome [approximately 2,800km].

Back during the war, some of the countries—there was the UK, there was Australia, there were a few others—all these scientists said we need some big rockets because they're getting fired at us from the other side. So they went to Woomera and started building these rockets. Obviously they were trying to build military rockets and blow things up, but now if you go there, there's Japanese satellite researchers launching satellites as well, and most of those are actually for the weather. So you watch the news on your iPhone or on your TV or wherever you watch the weather, and a lot of that weather forecasting does come from photos from space. There are satellites in orbit at different heights and they take photos of different things—some of them are temperature, some of them are clouds—and it's these kind of giant selfies which actually do inform our weather. So, again, that's a very practical, everyday thing, but it can get lost if you forget that's the origin of it.

**Nyck:** We talk about space being 400 to, say, 30,000 kilometres up—and that obviously has expanded since our time of having science at the level that we now currently have science, so to speak—but *Voyager 2* is an interesting example, too, because it's gone outside of that parameter, hasn't it?

**Ross:** Outside of the interstellar boundary, yes.

**Nyck:** Which is interesting because it won't be able to actually answer—or we won't be able to answer it. We'll be able to get information back, right?, but we won't be able to answer it. That's new territory, isn't it? It's another kind of like, almost a psychic of expansion ourselves, of our capacity, in a way.

**Ross:** And it's fascinating because the *Voyager 1* and *2* were launched a long time ago. They're still going, which is very impressive, but they're running on the end of their fuel sources at the moment and they are a long way away, past the interstellar boundary. So that's very interesting because that's a new area of space that we don't know that much about.

We do know that the results the scientists got was different from their forecasts. And so that's interesting. We should learn more about it. At the same time, that data gets sent back and is received by the *Deep Space Network*, which is a series of satellite dishes around the world, one of which is in Canberra. Canberra is the one that actually transmits to *Voyager* and transmits new commands and tells it where to go and all those things.

**Nyck:** Oh, we have such power of Australia.

**Ross:** But it's also an old dish and so they're closing it down for 11 months for maintenance.

**Nyck:** I don't think you should call it an old dish. Poor old lady, the old dish.

**Ross:** It's getting an upgrade.

**Nyck:** You visited the one in Parkes, didn't you, on your journey back from Uluru over to here?

**Ross:** I did. It turned around for me. That was cool.

So there are these giant dishes and when you see them on the ground, they're just pointed into the sky, but there are some NASA websites where you can see: what are they connected to, and are they listening or are they talking or are they doing a bit of both? And they do move around as the sky moves around, obviously, throughout the day. But it's interesting that our furthest spacecraft, the *Voyager* ones, we're going to be out of touch with them for

a whole year. Hopefully they keep going and collect some good data and we can hear it all because that really is the frontier out there.

**Nyck:** Certainly one frontier, that's for sure. And of course, the person who's really pushing the frontiers in this area is Elon Musk. We were talking about his Teslas before, and that expansion; and Ross being an owner of one indeed knows full well from inside—and I've been in one; it's kind of fun driving out there near the Rock [Uluru]—but Elon Musk, just this week, is announcing that he wants to build one to two spaceships a week with the purpose, essentially, of colonising Mars or beginning to colonise Mars. Do we need all that? Do we need a space fleet? What's your take on all this?

**Ross:** Well, I've been watching a little bit of *Star Trek* recently.

**Nyck:** Oh, I love *Star Trek*.

**Ross:** Just freshly getting into it. It's pretty cute.

**Nyck:** Which version? From where? Back from when?

**Ross:** Who is the guy on the new streaming one that just came out? Picard, that's it. And so Picard's doing a lap of the galaxies and visiting all of his old mates—it's kind of a cute show—but they take the idea of a Starfleet for granted. And that's quite interesting because I think a lot of young people kind of grow up assuming that's what NASA does. Surely they're going to colonise different places. But they're not doing it!

**Nyck:** And of course, the reason is they don't have the money, but private enterprise such as Elon Musk does have that sort of money.

**Ross:** He does seem to have some money and he's spending a lot of it on just making these Starships, as he calls them.

What's kind of revolutionary about this is, until now you've had to be a country to make rockets because you needed that sort of money, and now companies can do it. *SpaceX* is one of them—there's a number of others as well—but *SpaceX* were the first to launch an orbital rocket and re-land it. As we're talking about sustainability, it's fascinating to see the shift because *SpaceX* do have reusable rockets.

**Nyck:** Yeah, well, that's a goal, isn't it? And therefore, much, much, much less expensive overall per trip.

**Ross:** Much less expensive.

**Nyck:** What are the figures that are currently being put out there?

**Ross:** Generally when you buy a rocket launch, it comes as a package.

**Nyck:** I'm saving.

**Ross:** And until recently, you might have spent \$300 - 500 million dollars on it. Partially, that's because they throw the rocket out every time, until now.

**Nyck:** Absolutely.

**Ross:** Imagine if you flew from Byron to Bali and you threw out the jet at the end, it'd be very, very, very expensive. Obviously, we know that all they do is give it a quick clean and put some more fuel in and off you go. That's really what *SpaceX* have been working on as a fundamental thing, is being able to launch and then re-land and reuse. Just last week, they had the 50th landing of a *SpaceX* rocket. They had plenty of crashes and spectacular crashes along the way.

**Nyck:** Yes, you do have to remember that.

**Ross:** Which all rockets do. When I was in Woomera, they have a museum just of rocket pieces. That's just part of rocketry, but once you've got a good one and you can re-land it and relaunch it, then the price can come down to closer to 5 or 10 million for refurbishment and refuel. *SpaceX*, I believe, sell a retail rocket for \$50 million for launch, so that's already 10x cheaper than the previous average, and they're trying to go again for another 10x cheaper.

**Nyck:** And he's just doubled his workforce there at *SpaceX* in the last week or so, too. But I noticed with one of those crashes—and there's a video clip that you sent me on <https://arstechnica.com>—is one of the exploding rockets which took off, and it's interesting how he responded to that. He basically said, 'look, you guys—my engineers—you didn't actually tell me that it wasn't really up to scratch, and I need to know. I want to take

responsibility for that myself because you're under my auspice. Ultimately, of course, it is my responsibility', but he's pushing the limit, isn't he, because he really wants to go faster and faster and faster with this?

**Ross:** He really is, and he thinks very big. He says to get to a settlement on Mars, we probably need on the order of 1,000 ships. If you just work back from that goal, instead of saying, 'let's build a ship and send it out; let's build another ship', you say, 'how many ships do we need to have a settlement on Mars? It's about a thousand'. That's the hardest part, is getting the ships to Mars, and that's what he's working on. But it's interesting because he's working back and saying that we need to build one to two per week. It's very different when you build a production line of a product rather than just one product.

He also made a comment about the hiring. It was specifically for the factory building the Starships, which is the Mars rocket. He said 'we can't have MIT graduates building these rocket parts by hand because MIT, you don't graduate enough rocket scientists', so there's literally just not enough people, 'so what we need is a production line. We can have different specialities of people and doing it in a repeatable fashion', similar to the satellite network they're building for space Internet. They're building a production line and they launch 60 per launch. They've actually started de-orbiting—burning up in the atmosphere—some of the first batch already.

**Nyck:** Deorbiting. That's a good word, I like that. It's clear what it means but I hadn't heard it before.

**Ross:** Yes, so you could say that's one form of clearing out the space junk.

**Nyck:** Yes, I am sitting in a tin can.

**Ross:** It's a very different mindset that you need when you're building a factory versus a one-off item. I think that's what this piece, which will post on social media, is really digging into, is that mindset of if you are building Starfleet, you need something different to just a one-off large rocket.

**Nyck:** What do you think about going to Mars? I know many people in this region—some people, younger people like yourself—are probably very excited by it. On the other hand, even though people like myself have grown up with *Star Trek* and similar quite often predictive fictional media—it's all out there—we have some suspicion given the state of the planet now. With all the problems we have, why would we want to spend all that time and energy to get to Mars, even if it's private money? What do you think? I don't know where I sit with this. I find it exciting on one level because I love space—I love the idea of 'out

there'—and yet, on the other hand, I do live on this planet. My feet are on the ground, I think.

**Ross:** It's a nice planet.

**Nyck:** Yes, it is. It's a beautiful planet, and we should be more positive about just that.

**Ross:** As you mentioned though, from the overview, looking back is one of the best ways to think: 'Well, that actually really is a nice planet.' It's the same whenever you travel somewhere, even if it's the next town along the road, you'll see different ways of living and you'll think, 'well, I like some of them and I don't like some of the others', and you can take your pick, but it does expand your awareness to go somewhere and look back. I think that for me is ultimately what the Mars mission is really about. I'm not personally interested in going to Mars in the first few hundred people because it'll be rough, just like the first people to go to Antarctica or any extreme environment—and it is extreme—but I wouldn't mind going into orbit, you know, for a weekend. That'd be fun.

**Nyck:** I've seen you in orbit.

**Ross:** If I flap my wings hard enough. But you can see how going to orbit is going to be a lot more accessible than going across the galaxy, at least in the next hundred years.

**Nyck:** Obviously. Well, we need a completely different order of technology to go across the galaxy than the current technology that even Elon Musk is bringing forth at the moment.

**Ross:** Well, it's funny because the person in charge at *SpaceX* is Gwynne Shotwell. She runs the programme and does the operations, and she actually says that her goal is to go far beyond Mars and to go to the rest of the solar system and beyond the solar system. So her vision in some ways is larger than Elon's, which I love.

**Nyck:** Well, I still think to do that, we're clearly going to have to give up burning stuff to get from here to there in space and find other kinds of technologies, and we talk sometimes about those sort of new revolutionary things that are not yet online that are likely to be out there. We're trying to find them. It's hard, but that addiction that we have to the past as human beings, rather than to the future, so to speak—to put it very bluntly, because we're almost running out of time—but we don't see enough, I don't think, that from the perspective that we are now, we look back 50 years, 100 years or even 10 years, and the changes, the technological changes that have come are just extraordinary. In my lifetime, it's



off the Richter, and it is an exponential change. Yet it's hard for people to see from where we are now into the future and see that these changes are going to be even more accelerated; that the possibilities, depending on whose programming it, who's making it and for what reason—what the value system is—but to give that some kind of trust, if you will, to my mind, is probably a good thing. And not blind trust—we need to be discerning about these things and how we're going to apply them and what's valuable, what's truly useful and not just some sort of junk idea, which we've got tonnes of on the planet already.

**Ross:** The paradox is that if you look at the early-stage investing in start-ups and new companies, venture capitalists go into an investment believing that one in ten choices will actually work out. At the time, they believe that every single investment has the capacity to go that big, but they know that 90% of them are going to lose money.

**Nyck:** How do they balance that incongruity within their actual vision?

**Ross:** It's part of the business. Venture capital investment and start-up investment is such a small amount of the pie, and it's the same with space travel. The amount that we spend as a planet on space travel is so small, so if Elon fires a few rockets, it's like the cars. He makes as many cars as he can—it's 0.7% of the world's cars—and so early stage investments and things are always going to be much smaller and they're going to be riskier, but we have to do them. That's the nature of it. You try a bunch of stuff, you learn a lot of stuff, a lot of rockets blow up on the way, a lot of start-ups blow up on the way, and the super-useful ones that actually do satisfy the needs that we have in reality, they succeed, they spread, and then they become your everyday thing that you stop thinking about, like the blue dot on the map on your phone.

**Nyck:** I have a beautiful piece about matter, itself. Maybe I shouldn't jump to this, it's a bit too big a topic, but the notion that the matter itself is like an empty canvas that we as beings paint upon, so to speak. And that's what we're doing really, as creative beings in a sense, so that when you start something, a new idea, you have to go through that period of making mistakes—of failures, of going down the wrong track and finding something to call us back and so forth—but it actually is our very nature to do just that as human beings.

**Ross:** Yes. Going inside, having that inner vision and then trying to actually make it in the real world. That's the big challenge we're talking about on all these topics: how does it materialise?

**Nyck:** We have to leave it there. Thanks so much for joining us here on *Future Sense*. Thank you all out there who are listening via podcast. As we are saying, the podcast version of this programme will be up within about 24 hours or so. [www.future sense.it](http://www.future sense.it) is the doorway to

that, if not your platform that you already have it saved on. Thanks for joining us. Thanks very much to Ross Hill, who will be, I think, back next week sitting in the chair with me as my stand-in co-host, and hello to Steve McDonald out there who may be listening in Austin, Texas.

We will be with you next week. Thanks for joining us. Thanks, Ross.

**Ross:** Thanks.

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