**CHARLIE STROSS:** You know the difference between a pessimist and an optimist? The pessimist, the glass is half empty. The optimist, the glass is half full. The engineer, the glass is twice the size it needs to be. And the visionary, okay, we need to figure out how to fill this bigger glass.

**KEVIN SCOTT:** (Laughter) Indeed.

[MUSIC]

**KEVIN SCOTT:** Hi, everyone. Welcome to Behind the Tech. I'm your host, Kevin Scott, Chief Technology Officer for Microsoft.

In this podcast, we're going to get behind the tech. We'll talk with some of the people who have made our modern tech world possible and understand what motivated them to create what they did. So, join me to maybe learn a little bit about the history of computing and get a few behind-the-scenes insights into what's happening today. Stick around.

[MUSIC]

**CHRISTINA WARREN:** Hello, and welcome to Behind the Tech. I'm Christina Warren, senior cloud advocate at Microsoft.

**KEVIN SCOTT:** And I'm Kevin Scott.

**CHRISTINA WARREN:** And today our guest is Charlie Stross. And Charlie is a science fiction writer and a Hugo award winner. His novels include the “Laundry Files” series and “Merchant Princes.” His work has been translated into 12 languages for readers around the world. I'm curious, Kevin, when did you encounter Charlie's books?

**KEVIN SCOTT:** It's been a while now. I think I first discovered him with his first big commercial work, or at least the first one that was published in the United States. It was a book called “Singularity Sky” and it was, you know, sort of, funny enough, about the singularity. So, that moment when artificial intelligence becomes self-aware and is in control of its own development, and all of a sudden evolves beyond human understanding.

And then the rest of the storytelling in the book was what happens after that. And it was just so interesting. I read a bunch of the Singularity books that other science fiction authors have written. And, like, the interesting thing about Charlie is, like, he writes these books that have just deep technical, some of these, like, really great, hard sci-fi characteristics that I really love, but his characters are great.

And he — he has humor in them, you know, and you can tell from reading his books he has such a broad range of interests and, like, reads so many things and, like, draws elements from, you know, everything from theology to, his background in the early computer industry into the fiction that he writes, which just — I really, really love his books.

**CHRISTINA WARREN:** I love that. I love people who have such a broad background and broad interests. I, frankly, think they're the best storytellers. So, let's hear what Charlie's been up to.

[MUSIC]

**KEVIN SCOTT:** Our guest today is one of my favorite science fiction writers, Charlie Stross. Charlie's work spans genres, mixing spy thrillers, science fiction, and Lovecraftian horror. He's the author of six Hugo-nominated novels, and winner of three for best novella. I'm really excited he's with us today.

So, Charlie, I'm really very interested in your career path, which seems to have been an interesting one.

**CHARLIE STROSS:** It was actually a bit more of a drunkard's walk, semi-random. I've been through a variety of careers. I actually qualified and worked as a pharmacist for a while, then switched track, degree in computer science. Worked as a technical author, and then programmer in a startup or two.

But really, the initial impetus was famously bad careers advice when I was about 15, because in the English education system, you have to specialize and focus at, in my view, a very, very premature age on the subjects you'll study for your A-level exams, aged 18, which dictate what you can do by way of university degrees.

And I had to make the choice on what to specialize in in 1979 to 1980, when I was about 15, at a point where unemployment tripled overnight and the economy crashed 10% in the United Kingdom with the closure of the coal mines and the steel industries and an awful lot of stuff that had been kept on life support by successive governments.

So, the careers advice was-- I knew I wanted to be a writer at this point, but you can't really get a day job as a novelist, you can't really do a degree and get a job as a novelist. Get yourself a profession, something that will be safe and earn you a decent living. And, “Oh, look, pharmacy. There is zero unemployment among pharmacists. I wonder why you can't study pharmacy? You've got decent background in biology and chemistry and physics.”

So, I went into pharmacy for a bit, and that's seven years of my life I'm not going to get back.

**KEVIN SCOTT:** So, I'm super curious, like, how did you decide — I mean, it sounds like you had the inspiration or, like, something called you to writing early, like, or to science fiction or speculative fiction or whatever we want to call it. But, like, how did you get interested in computers that early? That was an unusual thing at the time, right?

**CHARLIE STROSS:** Actually, no. Around 1980, you had the big boom in 8-bit computing that hit the U.K. I think things happened a bit differently in the U.K. from the United States. We had this range of very, very cheap and cheerful, not games consoles the way the Japanese had them, and not serious useful computers like the Apple II or the K-PRO CPM stuff that was happening in the United States, but stuff like the Sinclair Spectrum and the BBC Model B, that was designed specifically for education.

And this stuff was everywhere around the time I was turning 15, 16. Unfortunately, my school only got a computer lab when I was 17, which was too late for me to take A levels in it and go straight into computer science. So really, I sort of got detoured away from what I would have been a natural for, simply because it wasn't an available career path because I was just a couple of years too early.

**KEVIN SCOTT:** Interesting. How did you first get interested in writing?

**CHARLIE STROSS:** Okay, now we have to rewind a bit. When I was about five, my mother was trying to write a novel, bashing it out on a manual typewriter on the kitchen table. And like most people who try to write a novel, she never got more than one chapter in. She kept rewriting that first chapter. But somehow, when you're a five-year-old at home in the summer holidays, it sort of normalizes this as an adult activity, rather than something strange and surreal.

And highlights — I did pretty well in English at school. In fact, I was sort of rated a severe loss to the English department when I headed for STEM instead. One particular exercise when I was about 12, we had a teacher who wanted everybody in the class to try and write a short story. When I say a short story, I mean fill an entire workbook, rather than just the odd page.

I learned to use a typewriter around the age of 12. That was about the time I was getting into Dungeons and Dragons, which was also a new thing back then. And it was just sort of a collision between interests and skills that ended up going sideways on me. I was trying to write from a very early age. I think I wrote my first novel-shaped object when I was about 15.

**KEVIN SCOTT:** Wow.

**CHARLIE STROSS:** Don't ask, if I find it, I will burn it. (Laughter.)

**KEVIN SCOTT:** I'm just always fascinated by this. Like, writing a novel at any age is a real serious undertaking in focus and commitment. And doing it well just requires I think some amalgamation of talents that most people may not have. Where do you think that came from at 15?

**CHARLIE STROSS:** I'm not really sure. I mean, actually, now you put it that way, it is kind of freaky. I was also trying to write short stories as well because the feedback loop for a short story is much, much tighter than for a novel. Indeed, my first professionally published stuff began showing up shortly after I turned 20. It was another decade before I was anywhere close to selling a novel, because you've really got to get a degree in the university of life before you've got enough to say about the human condition to write a book other people will want to read.

So — how to put it? Yeah, I focused on short fiction for a while in my early 20s, kept trying to figure out how to make a novel work. I didn't read books on how to write, I didn't take an MFA in creative writing, I just sort of taught myself. And I was a slow learner.

There were also a number of — again, I said my career was a drunkard's walk earlier. There are a number of side quests that led me down blind alleys and distracted me for a while. If there's one career that is in my view pretty incompatible with being a novelist, it's being a technical author. And I spent a few years as a technical author, working on the documentation team for SCO Unix back when SCO was an actual Unix OEM. And that sort of killed my productivity for a few years.

And then around 1993, the tech pubs team discovered the Worldwide Web and HTML pretty early on. It was beyond sort of our dream, which is one set of source code for all the publications. I mean, we've seen where that's gone since. And I ended up talking to a whole bunch of people outside the company and ended up with a job in a startup, which went the way of all startups, and then another, and then another.

And the startup death march is not really compatible with being a novelist either. What they were compatible with, again, a side quest, was writing articles for computer magazines. Now, you're familiar with the American magazine Computer Shopper. There's a British publisher, a guy who — a guy called Felix Dennis, who died a few years ago.

He set up Dennis Publishing, which is now a fairly major trade press publisher in London. And on a business trip to the United States in the mid '80s, he took a look at Computer Shopper and thought, “This is great.” And he ripped it off. He ripped off the title, the format, the structure, the whole lot. And he brought it back to the United Kingdom and set up a British magazine called Computer Shopper, which for many years was the second — number-two best-selling monthly computer newsstand magazine.

And he handed editorial over to a succession of impressively eccentric British computer journalists from the early 1980s microcomputer boom, and got them to commission editorial content on whatever the hell interested them, by people who were interested in the subject, not journalism graduates, but computer geeks. Which is why I ended up writing the Linux column there for five years.

**KEVIN SCOTT:** Were you a fan of Jerry Pournelle?

**CHARLIE STROSS:** He was a fun guy to have a pint of beer with. I will say, he was also a terrible troll on various internet discussion fora I knew him through, and I don't see eye to eye with him on — didn't see eye to with him on politics, not in the slightest. But, hey, that's — I read his column continuously in Byte for several years.

**KEVIN SCOTT:** Yeah, yeah, and that's the reason I ask, you know, it's —there do seem to be some interesting coincidences here, you know, you've got Ted Chang, who is, like, an excellent science fiction author who was a tech writer for a while. You've got, you know, Jerry Pournelle, who you know, despite his politics, wrote some very interesting science fiction books and had this column in Byte magazine that at least to kids like me, was influential.

**CHARLIE STROSS:** Byte was very influential.

**KEVIN SCOTT:** Yeah.

**CHARLIE STROSS:** Yeah, there was a lot of overlap. I think partly, it's small world syndrome. Back in 1993, the internet — at least consumer internet — was pretty much not a thing. And I had it through work, working for a multinational doing Unix stuff, but most people had never even heard of it.

And an early internet startup called Demon Internet, they were the first actual dial-in ISP startup in London. I was one of their first 2,000 customers. And about 12 months in, in early 1994, they organized a series of pub meet-ups. And a friend of mine turned around about 10 years ago and said, “Hey, Charlie, do you know anyone who was at that pub meet who didn't end up in the industry?”

And, you know, I thought for a bit and I said, “Hang on, my wife. Hang on, didn't she do some consulting for AOL? Yeah, busted.” (Laughter.) It was a small world.

**KEVIN SCOTT:** Well, it sort of felt at the time much smaller than it does right now. I mean, sometimes I think it's a little hard these days to get your bearings on not just the world of tech, but what is happening on the internet, because in some sense, it's sort of merged with life in this grand way, which it hadn't at the time. It was sort of this apparatus sitting on the side of things.

**CHARLIE STROSS:** Absolutely. One of the craziest things I've noticed is Moore's Law, the — well, we're nearing the end of Moore's Law as a phenomenon governing integrated circuit density. But for its duration, we saw something similar happening with the number of people who are connected, and also the number of people involved in computing.

I mean, nowadays, when Apple launches a new generation of iPhone, you can look at it and say, “Right, that's 50 million more sales within how many months?” Back in 1994, there weren't 50 million computers in the whole world, you know, probably less than five million. Each time we've seen a generational improvement in microprocessor performance, the number of people using them seems to have doubled.

**KEVIN SCOTT:** Yeah, I was watching an interview with Brian Kernighan, who I got the chance to work with very briefly when I was at Google in New York. He did an interview with this guy, Lex Fridman, who does these very interesting interviews with tech people.

Brian was talking about his early work with the PDP-8. And I just did a quick Web search and looked up the Wikipedia entry for this particular machine, and they sold 200 of them, which is just crazy when you think about what constitutes a good volume for computer sales or mobile phone sales or whatever these days.

**CHARLIE STROSS:** Absolutely. I mean, it was a tiny world.

**KEVIN SCOTT:** I wanted to shift a little bit into talking about how it is that you get inspiration for writing. Because, superficially, I would think that part of my job and part of your job are alike. We both, in a sense, have to be able to imagine what the future is going to look like, and then we have to be able to describe that future well enough to a group of people that they understand what we're saying.

In your case, I think you're trying to inform and entertain and provoke folks, although I would love to hear, you know, like, you know, whatever exactly it is your mission is, other than earning — earning a living from writing science fiction. Mine is, like, I have to sort of imagine the future and then persuade enough people to go do work to make part of what that description of the future is reality.

How do you start this process of trying to imagine what the future might be like so you can have a foundation for the stories that you're telling?

**CHARLIE STROSS:** Okay. I don't always start from a point — from the perspective of the world building itself. I usually start from the point of view of the characters, because fiction is essentially the study of the human condition under circumstances that don't currently apply. And, you know, if you're going to talk about the human condition, you have to start by talking about people.

Having said that, there are a couple of books I wrote in 2006 and 2009 which were very tightly focused on the world 10 years in the future. It was going to be a trilogy, but unfortunately the third book in the trilogy has been persistently derailed by political developments in the real world.

I mean, I just can't write it. I've had about two or three different plots for it both destroyed, the most recent one was killed by COVID-19, because I do not want to write a book about a viral pandemic at this point.

**KEVIN SCOTT:** Yeah.

**CHARLIE STROSS:** Those books were “Halting State” and “Rule 34.” And the idea of “Halting State,” I got — in 2005, when I was at a science fiction convention at a panel discussion discussing massively multiplayer online role-playing games like World of Warcraft, at that point.

And a member of the panel who were on the top table at that point came up with a couple of points. The first was MMOs were the first commercial successful virtual reality environment, one in which you have lots of people with avatars meeting each other. Forget the lack of headsets or tactile feedback or head position and so on, there's still a window into a virtual world.

The second thing he came up with was, there's economics involved. He gave, as an example, an anecdote of an incident that happened in London a couple of years earlier. And a guy walked into a police station to report a crime. Somebody he met on the internet had sold him a magic sword, and it wasn't magic. (Laughter.)

**KEVIN SCOTT:** That's great.

**CHARLIE STROSS:** It turned out to be fraud. You know, he bought a weapon inside a game via an eBay auction, and it wasn't as described. It did actually get written up as a fraud. And I suddenly realized at this point, hang on, I need to do some digging here.

And I did some digging and discovered some exotic studies, including one paper that confirmed if you take in-game currencies and convert them to real-world currencies using whatever players are running as an exchange rate, by about 1999, there was one game which had an economy with about the same value as the GDP of Austria. Well no, you can't really do a real-world conversion like that because it's just fatuous. You'd crash the in-game economy if you tried anyway.

But there was something going on here. And you know, economics is the study of how human beings allocate resources under conditions of scarcity. I began to ask myself, what's the world going to look like in ten years' time if we really do get artificial augmented reality goggles and self-driving cars and computer games everywhere and MMOs and live-action role play combined with high-bandwidth, always-on stuff.

So, I started designing what I thought the world of 2017 would look like. And I got this book written and had a bit of a hard time selling it in the U.K., although it sold well enough in the U.S. The problem is, a crime novel set in 2017 in an independent Scotland where it opens with a cop being summoned to the boardroom of a startup company she doesn't understand in a former converted nuclear bunker to be told there had been a bank robbery.

A gang of Orcs with a dragon for fire support had robbed a central bank inside an MMO. And she gradually — well, various consultants are called in, including forensic accountants and a computer guy, because you need a computer guy for this sort of stuff, and so on. And we gradually discover that somebody has come up with an exploit for compromising the private keys of a company whose basic specialty is arbitrage between the economics of competing MMOs, because one games company after another is trying to poach their competitors' customers. And there's now a capture of a flag game in progress between rival teams of Chinese hackers who are trying to hijack the economy of a small European state.

Now, to get to where this was going to go, I tried to do some rigorous extrapolation, and came up with a couple of rules of thumb. And the first is if you're looking 10 years in the future, 70% of that world is here today. About half the cars on the street, they're already there. You know, they're going to be there in 10 years' time, they're still going to be driving. They're going to be a bit more decrepit, but they're out there.

Buildings, the average house in the U.K. is 75 years old. I know American dwellings tend to be a lot younger. But you know, 10 years' time, there's not going to be much turnover. There will be a few new office buildings, a few new developments, but most of what we see is there.

The people, everybody's going to be 10 years older. The people at the top of the age range will — well, they won't be visible anymore. The kids, they're going to be teenagers, but it's the same stuff. 70% of it is there today.

You then get another 20% — no, actually, it's about 80% that's there today. You then get about another 15% that is pretty much predictable. It's on roadmaps.

We knew back in 2006, 2007, that by 2017, we'd be looking at — we'd have 3G cellular telephony as standard and something called 4G would almost certainly be out there, but not universal by then. You know, I have no idea what the 4G standards were, but 3G was pretty much visible. Everything back then was running on GSM.

The state of the phones we were using, again, it was fairly obvious that they would be connected devices and they'd be very smart, pocket computers. I missed the call on that by going for artificial reality goggles, shades of Google Glass, which as we know, kind of crashed in the market for social reasons rather than technological feasibility. It may eventually happen.

There's always, though an almost of a couple of percent which is, “Who ordered that?” You know, stuff that comes out of left field completely and is completely unpredicted. The CCD image sense that we have in all our cameras today was, I think developed in the 1980s, actually commercialized, and people realized that these things were literally cheap as chips.

What are we going to do with them? Where are we going to put them? The idea that everybody would be carrying a decent quality camera around with them at all times, though, a video camera that could upload to the internet, that was not something most people were prepared to grapple with.

And the idea that there'd be a crazy for “happy slapping,” whereby teenagers would find a random stranger and video one of their mates going up to them and beating the crap out of them and then put it on YouTube. Yeah, luckily, that was a short-lived craze. Most of the people who did it didn't realize they were basically preparing evidence for prosecution. (Laughter.)

But it's a second-order consequence. As Frederik Pohl once said, “Anyone can predict the automobile, the difficult bit is predicting the traffic jam.”

**KEVIN SCOTT:** In some sense, the scenario that you just described, if I were to give this book to my 12-year-old daughter, who has never known a world without tablets, without Minecraft, without you know, massive multiplayer online environments, virtual worlds, she would sort of look at that and say, like, this is plausibly nonfiction. Like, she could believe everything about it. It doesn't require a leap of faith on her part which is, you know, like, huge amount of credibility to your ability to imagine near future, which is hard.

**CHARLIE STROSS:** Yeah, but there's other stuff I got wrong in it. One of the plot points relies on not self-driving cars, but it occurred to me that if — you know, everybody would want self-driving cars, but the AI issues looked pretty difficult, especially in 2005, 2006. So, instead, high quality of service 4G networks and call centers with drivers in them — driving the cars remotely — I believe this is actually a startup business model that's been attempted.

**KEVIN SCOTT:** Yep.

**CHARLIE STROSS:** And you'd have, well, remote drive taxis, which of course leads to the entertaining scenario of somebody's taxi is hijacked and driven at a bridge abutment.

**KEVIN SCOTT:** Yes.

**CHARLIE STROSS:** But, you know, we did not get to self-driving cars by that point. Again, the Google Glass type stuff, I imagined something called Cop Space that the police would be using, which would basically combine a geographical information system with the contents of all the police intelligence databases so that an officer walking around the streets could actually look at a building and see what crimes or acts of vandalism or incidents had been reported in conjunction with it.

That's something that — well, we haven't got that, instead, we've got armored personnel carriers and machine guns being handed out to cops. Personally, I think I'd rather they had the AR goggles.

**KEVIN SCOTT:** Yeah, seriously. So, I mean, you mentioned a minute ago about thinking sort of seriously about scarcity in these digital environments. Do you — do you think if we could abolish scarcity that we get to a Star Trek like world? Or is scarcity a useful constraint for organizing human behavior?

**CHARLIE STROSS:** Okay, firstly, I don't think we can ever abolish scarcity because humans are very ingenious at creating scarcity because they're obsessed with status. We are basically primates and far too many of us want to know that we are valuable or important and attention is the ultimate thing that's in short supply. We have a limited number of hours in a week in which to worship our superiors. (Laughter.)

**CHARLIE STROSS:** Now, material scarcity, we're already at the point — we passed a point decades ago, as Keynes pointed out, where we don't need to have everybody working in the fields doing backbreaking labor for food. We don't need them in the factories doing similar for material goods. Much of what we do today, as per the sociologist David Graeber's work is actually “bullshit jobs,” administrative stuff, stuff that should be automated, but we've got ourselves into this social hierarchy whereby you can't eat if you don't earn money with which to pay for stuff.

We have a rationing system that's contingent on us doing work, even if the work is pointless for any reason other than shoring up the status of somebody higher up the pole. I don't have a prescription for how to get out of here. In fact, the past five or six years have sent me screaming in the direction of writing fantasy. I don't know if you're familiar with my “Laundry Files” stories, but —

**KEVIN SCOTT:** I am.

**CHARLIE STROSS:** Okay. I'm currently nearly finishing what is going to be sold as book 11 in the series. It's not really, it's actually book two of a new series, because I can't finish a series about a political singularity, ruled by elder gods, in the current political climate. So, I'm taking a side quest into what the cops and robbers are doing in the world of the new management, with “Dead Lies Dreaming,” that comes out this October, and the sequel.

**KEVIN SCOTT:** And the title of this book is “Dead Lies Dreaming”?

**CHARLIE STROSS:** Correct. Comes out on October the 27th.

**KEVIN SCOTT:** Awesome.

**CHARLIE STROSS:** And it's basically what civilians are doing under the world of new management, the mantra of which is “strong and stable government,” and it doesn't get much stronger or more stable than the Nyarlathotep, the black pharaoh. This was meant to be a horrible, monstrous nightmare scenario when I began writing it around 2016, this sequence, only it's now kind of utopian, competent government. (Laughter.)

**CHARLIE STROSS:** It may be evil, but it knows what it's doing.

**KEVIN SCOTT:** I have wondered, reading your blog posts about this process, how it is that you maintain your sanity. Because it's like the — you're a human being living through all of this political turmoil and disruption, which sort of has its normal set of impacts, and it's tampering with your professional life. (Laughter.)

**CHARLIE STROSS:** Yeah, I'm just trying to front-run the insanity in my fiction, and I'm having great difficulty making elder gods more horrifying than what's happening around the world today.

I will add, there was a novel I began work on in 2016 and shelved in 2017 that I want to get back to probably next year. I shelved it when my father was terminally ill, and I just couldn't continue to focus on it. But it's a space opera. And I self-consciously began it in the wake of the Brexit business and Mr. Trump's election on the grounds that there was absolutely no way anything currently happening could mess up a book set two-thirds of a million years in the future.

You know, that's another strategy for getting away from it. And what I wanted to do with that was to examine an interstellar polity where humanity has radiated and speciated. Our kind are extinct. We are remembered as the last common hominid ancestor species, much the same way we look back on australopithecines or Neanderthals. Also, science is a completed enterprise.

**KEVIN SCOTT:** Oh, interesting.

**CHARLIE STROSS:** Yeah, two-thirds of a million years of research, information retention from all that time, pretty much anything that can be discovered in mathematics will have been discovered by then, if it can be discovered by human-grade intelligences.

This assumes no access to truly superhuman intelligences — at least none that we can create. Physics, chemistry, biology are pretty much mined out. What we're left with is stamp collecting and librarianship. If you want to know something about the way the universe works, you look for librarian.

**KEVIN SCOTT:** Interesting.

**CHARLIE STROSS:** That remove in time, a device like a dragon capsule is of similar antiquity to a flint hand axe from the Neolithic.

**KEVIN SCOTT:** That's such a cool idea. So, these are, like, super different things to write about, near future versus far. Like, is there anything structurally different about how you go about your writing process?

I mean, like it — so, it sounds like it always starts with character. Is it easier to think about the far future when you're sort of unconstrained by, like, having to have leaps or paths that are more plausible to the future that you're describing than near future?

**CHARLIE STROSS:** I've discovered over the years that every book, I basically have to reinvent how to write a book. And for writing far future material or fantasy, you can't write without constraints. You've got to have a framework within which to write. So, if anything, you've got to do more work. Writing something set in a parallel version of our current world or in a version of our current world with magic or in the very near future is actually easier in some ways, because as I said earlier, you know what's out there. You know what it's going to be like. Most of it is already there. The far future, in contrast, you've got to invent just about everything.

**KEVIN SCOTT:** Yeah, it's — so, the first of your books that I read was “Singularity Sky,” and you wrote a whole series of books around that time, so “Singularity Sky,” there was “Halting State,” there was “Accelerando,” which was a collection of short stories if I'm remembering correctly.

**CHARLIE STROSS:** Yeah.

**KEVIN SCOTT:** I mean, these were — I mean, at a certain point, like, I — it was you and Peter Hamilton and Alastair Reynolds and Ian Banks and I thought, like, it was all I read, and I thought all science fiction authors must come from the United Kingdom. And, but they were super influential.

And you know, sort of centered around this notion of a singularity and artificial intelligence and have you ever thought about revisiting those things or do you think, you know, you've said everything that is interesting to be said about those topics or worlds?

**CHARLIE STROSS:** I will sort of be revisiting it in the space opera I mentioned, “Ghost Engine,” when I get around to rewriting it. I mean, don't look for it in print before 2023 at the earliest. I've got a huge backlog of stuff.

However, I've been revisiting it from a somewhat skeptical point of view. The last decade in deep learning and artificial intelligence has taught us that artificial intelligence is not what anybody back then really expected to find, and that there are some interesting constraints on it. The singularity as an idea, it has an interesting ancestry. And the person who's done the most to give me a guideline to it is Ken MacLeod Scottish SF writer who you may have heard of — another of the same category.

And Ken makes some interesting points about the singularity. Ken's background is he's the son of a lay preacher from the “highlands and islands,” so had a sort of odd Christian fundamentalist upbringing, got over it, went to university, and contracted Trotskyism. So, since then he's been healthily skeptical of every ideology that promises jam tomorrow.

And the point he made was the singularity, itself, never mind when is it going to happen or is it possible or how do we build an AI, has some very disturbing features in common with Christianity. And he traced the origins of singularitarian thinking back to a Russian orthodox theologian in the 19th century Nikolai Fyodorovich Fyodorov, who among other things, taught the young Konstantin Tsiolkovsky, who invented the rocket equation — generally known as the father of rocketry.

Fyodorov — his theology was a bit weird, even by Russian orthodox standards. His view was — sorry, he took a teleological view of human existence. His view was humans are meant to converge with God and bring about the kingdom of God. And to this end, this means human nature must be perfectible. So, what does it take to perfect human nature? Well, we have to become immortal, for starters. We have to leave the earth and colonize the entire universe, so photosynthesis is part of a package, along with interstellar flight.

But it's an insult to everybody alive who reaches this state of perfect grace if their ancestors remain moldering in the grave, so we must also seek to bring about the resurrection through technological means. And it's obvious that this is God's plan. Is this sounding like the singularity to you? It should be, because — well, Tsiolkovsky and other Russians took Fyodorov's Russian orthodox — not exactly a heresy, but variant theology, and turned it into an ideology called Cosmism in the 1920s and 1930s before — along with virtually everything else interesting happening in the early Soviet Union, it was flattened by Stalin.

And a bunch of his stuff ended up in California, both via people like the Jet Propulsion Lab. Jack Parsons was one particular nexus, and let's not get into the connection with the scientologists and L. Ron Hubbard here, but rocketry, transhumanism, it cross-fertilized with the libertarians as well, and Ayn Rand is possibly a vector for that.

You get this into the early computer pioneers, and then you come up with the singularity being expressed in fiction by Vernor Vinge, who it's no coincidence is a retired computer science professor.

Now, the problem here is when you start talking about simulation hypothesis and mind uploading and the rest of it, you're getting very, very close to talking about Christian eschatology. And this reached its peak about a decade ago with speculation about Roko's basilisk, a hypothesized descendant AI vastly far in the future who will resurrect us all and torture us for eternity for the sin of not having contributed to its existence.

I mean, this is Satan. This is self-professed, atheist singulatarians reinvent original sin and Satan. I'm sorry, I don't buy it because, you know, I am not a believer, but I am of Jewish upbringing. And I don't buy Christian eschatology at all, I'm sorry.

**KEVIN SCOTT:** It's sort of interesting what must go on inside of a biological brain to produce these patterns over and over again? Because it — I — as you describe it, it does seem absolutely plausible than the singularity, like, has these theological overtones.

And I'm not entirely sure, I mean, like, I know a whole bunch of people who think about the singularity, like, I don't think they think of it in those terms, like, they probably haven't seen the connection.

**CHARLIE STROSS:** I think of it as being a bit like design patterns in programming. Christianity is a very, very successful syncretistic design pattern for religion. It has taproots in a bunch of religions that were circulating around that part of the Middle East around the beginning of the common era, not just Jewish Essene cults and Pharisaic thought, but also there's a chunk of the Isis cult, the whole resurrection of Osiris, the Egyptian god.

There are chunks of Manichaean dualism, Zoroastrianism in the sense of an evil God, because Satan in Christianity has massively ramped-up powers compared to the fairly feeble prosecution adversary in traditional Jewish thought.

It then acquired a whole bunch of Mithraism from the Romans. It basically did an embrace and extend on the entire Roman pantheon for so many Roman and pagan gods who got turned into saints, that it's — makes your head spin.

So, it's a design pattern. And it shouldn't be that surprising that people who were raised in Christian families or who had Christian parents and lived in a broadly Christian culture — the United States and Europe for that matter — even if they rejected the belief system explicitly, would be vulnerable to another syncretistic tech-based explanatory hypothesis that followed the same pattern.

Anyway — the MacGuffin I'm using in “Ghost Engine” is that, no, we can't actually build a vastly transcendent AI, although we get stuff that's almost good enough for government purposes.

But everyone and their dog goes in for settling planets and genetic engineering. And one of the common patterns is nasty people set themselves up as a master race with servants. The master race tend to go extinct before the servants, who are doing all the hard work, keeping them going. And the best way to keep the servants down is to program them for religiosity. Upshot, you get an awful lot of holy wars breaking out over who gets to run the upload afterlife that nobody's yet built.

**KEVIN SCOTT:** Oh, interesting. I forget which of Ian Banks' novels — maybe it was “Hydrogen Sonata,” where there was — were these particular species that had hell as part of their religious belief system. And, like, they had gotten to the technological sophistication where they could create a — like a technological virtual afterlife so that they could send people to hell and, like, it had gotten to the crass point that they had outsourced operations of their virtual hells to other people.

**CHARLIE STROSS:** Oh, yeah, so we end up with a situation where there's an entrepreneur who's been buying up hells from various civilizations to keep them running at a profit.

**KEVIN SCOTT:** Yeah, it's —

**CHARLIE STROSS:** That's just very twisted.

**KEVIN SCOTT:** Yeah, it's very twisted. So, I know from reading some of the stuff that you've been writing on your blog that you may not be in the most optimistic mood about the future of the human race right now, but like is there anything interesting technologically that you sort of see on the horizon — or not even technologically, just sort of any good that you think that can come out of the current moment that we're in?

**CHARLIE STROSS:** One thing that's very clearly happening is we're seeing the end of the carbon bubble that's dominated western economies for about 120 years. It's happening far faster and far harder than anyone imagined. And part of it is the price of photovoltaic cells crashing ridiculously. Nobody was really expecting this, and I think it's going to have huge political impacts on the Middle East and elsewhere in their future.

But in the long term, it's necessary because the biggest problem facing us is an unmanageable climate. In particular, we're only a couple of degrees of warming away from agriculture being destabilized. And without agriculture, we're not eating. That's pretty terrible. That's worse than any of the other effects.

But we seem to be pivoting away from fossil fuels with remarkable speed. I hesitate to mention the name Elon Musk, he reputedly turned around in 2000 and came to the conclusion we needed to get off fossil fuels. We needed electric cars, because cars are out there, and he had the right idea, which is build a supercar and give it some kind of charisma, because all previous electric car projects were just dismal.

And we're now at the point where everybody is pivoting toward electric vehicles. And, credit for doing that pivot, even if Tesla goes bust tomorrow, I don't think they will at this point, his engineered a transition.

The second thing and, you know, again, this is a name that keeps coming up, SpaceX is I don't think much of a prospect of actually colonizing Mars, I think it's a really idiotic thing to do. I mean, the Gobi Desert is a whole lot closer, a whole lot more hospitable than Mars will be even after 1,000 years of terraforming. And if it goes wrong, you can get home from there. Excuse me. A one-way trip to Mars, which means you're going to be living in something the size of an RV for the rest of your life, doesn't sound that appealing or practical.

But he's building out infrastructure. It's like railroad time in the 1840s in England when the railways got built. An awful lot of people went bust. An awful lot of railway projects didn't get used for the purpose for which they were planned, but they left the U.K. with the infrastructure it needed for the industrial revolution to continue.

I don't know quite what's going to come out of SpaceX, but it is going to disrupt a whole lot of fields. I think Starlink is the most likely thing in the short term. I would be very unsurprised to see him beating NASA to the moon with a manned mission in the next few years at this rate.

I'm a bit less happy about the fact that there are far too many assholes out there who are not building things, but who are just trying to grab as much money as they can rather than doing something that generates money as a side effect. And that seems to be the besetting problem with the era we've moved into. It's too much of a focus on getting rich and not enough of a focus on why we should be doing this.

**KEVIN SCOTT:** Yeah, I very strongly agree that, like, we need to figure out some way or another how to align people's incentives around, you know, accumulation of status or wealth or whatever it is that motivates people and doing more good for the world.

And, like, I don't say that in this Pollyanna, Silicon Valley way, like I know there are a lot of people who have deceived themselves into thinking that they're doing good and aren't. But we do need, I think, to get the incentives genuinely aligned better than they are right now.

**CHARLIE STROSS:** Yeah, we currently have an incentive system that rewards sociopaths with status, and that's toxic in the long run.

**KEVIN SCOTT:** I've just written a book recently, not fiction, nonfiction, about AI and the future of work. And, you know, one of the provocations that I had in my book is to challenge people to think about the ways in which technology can turn zero-sum games into non-zero-sum ones.

I mean, it more or less for, like, the big challenging problems that we have, technology is the only thing that can perform that magic trick. It's the thing that allows us to relax constraints and create abundance from scarcity. And thinking very carefully about where it is, we can apply that trick to, you know, maximum global benefit I think is interesting.

Like, you mentioned one that I care a lot about, which is climate and sustainability. But there are a bunch of others as well, like feeding, you know, a word that's headed toward peak population, you know, figuring out how to deal with water scarcity, you know, figuring out, like, simple things like healthcare, like I say, they're simple, but they're not.

But, you know, that's one of those silly zero-sum games that we're in right now where you're — you have a population of human beings who want to be in excellent health, rightly so, and at least in the United States, which I've — this is an interesting discussion to have with a British person, like our cost of delivering high-quality healthcare in the United States is growing faster than our gross domestic product. And, you know, one of the ways that you potentially tackle a problem like that is like have a technological intervention that says, here's a way to bend the shape of that cost curve down, where instead of under-escalating costs, you're figuring out, like, who gets access to the healthcare and how much, which is a very contentious conversation.

If you can change the cost dynamics of the thing through technology, maybe the conversation is less contentious, and you can figure out how to give everybody access to the thing.

**CHARLIE STROSS:** Yes, but I'm afraid the real underlying problem in healthcare in the United States especially, but also in the U.K. and elsewhere is a regulatory framework one.

We have a problem with regulatory capture. We have a problem with drug development. We have a problem with commercialization of new medicines. Our development of new antibiotics has crashed to almost nil just as antibiotic resistance has become almost universal.

And this is killing tens of thousands of people a year in the U.K. alone. It's catastrophic. We went through a period from about 1940 — about 1939 to 1970, 1975, in medicine when we were innovating and developing new categories of pharmaceuticals and new treatments, and also understanding a lot of the underlying phenomena of human biology at a ridiculous rate. And then it sort of hit a brick wall.

We've seen similar brick walls before in other areas. For example, aerospace technology had its own version of Moore's Law with transportation speed doubling, which again, hit a brick wall in 1970 due to energy issues.

I think in biology, the real problem is complexity. And we're going to be seeing great gains from AI and deep learning in the next decade or two, but we have a regulatory environment that makes it difficult to bring new treatments to the public at an affordable price for whatever reason. And I'm not sure we can solve that just through technology, it's going to actually need political will to do it and a redesign of the patent system, for one thing.

**KEVIN SCOTT:** Yeah, I do not disagree with that at all. The thing that I've been trying to do is-- I talk with some of the people who are making some of this policy-- is that maybe their job as policymakers gets a little bit easier if they can figure out how to reframe this thing as, like, dividing up a fixed-size pie versus, you know, making some investments in things that can create — increase the size of the pie for everyone.

Because I think part of the issue that we have with our politics in general, I think this is sort of a global problem, is that issue of contention, where like most of the dialogue is about I have the thing that I care about and I want to get the resources directed toward that, and you have the thing that you care about and you want the resources directed to that, and those things under zero-sum constraints are in conflict with one another.

**CHARLIE STROSS:** You nailed it with zero-sum constraints. Part of the problem is fundamentally an education issue in that too many people are being — are growing up ignorant of how iterated game theory scenarios work and the fact that it's even possible to have an interaction with a rival where you both benefit. And this is part of the reason I'm so pessimistic. I mean, we're both in our 50s, we're old enough to have seen this stuff before.

**KEVIN SCOTT:** Yeah, although I — you know, I've been saying to people for the past few years that I am short-term pessimistic, long-term optimistic. And I think part of that is why I became an engineer, like, ever since I was a little kid, I look at the world and see everything that's broken. I think that's a necessary trait for an engineer. But, like, you do have to have a little bit of long-term optimism, like faith that you can go fix things, otherwise, you can get yourself into a very deep state of deadlock.

**CHARLIE STROSS:** Yeah, you know the difference between a pessimist and an optimist? The pessimist, the glass is half empty. The optimist, the glass is half full. The engineer, the glass is twice the size it needs to be. And the visionary, okay, we need to figure out how to fill this bigger glass.

**KEVIN SCOTT:** (Laughter) Indeed. That's awesome. So, before we go, I wanted to — I always ask everyone what it is that they do for fun outside of their professional life. So, what you do sounds incredibly fun and romantic, this whole idea being a science fiction writer. So, I imagine your job is lots of fun. (Laughter.)

**CHARLIE STROSS:** My job is frustrating. It's lots of fun when it's going well and I'm actually making progress. It does tend to require a background that's relatively stable, and the past few years have been a complete flaming dumpster fire. COVID-19 is the icing on the cake. I mean, on my to-do list are the final editing tweaks on a book, “Invisible Sun,” which originally was due out in 2016. It got delayed because my editor died when a bookcase fell on him.

Then, I was working on it again and my dad died. Then I was working on it again, and my mother died. And I just handed in the final draft, and COVID-19 happened. I — it's cursed.

**KEVIN SCOTT:** Yeah — that really does sound stranger than fiction, what you just described. (Laughter.)

**CHARLIE STROSS:** Yeah, I'm just keeping my eyes open for a dinosaur-killing asteroid now. (Laughter.)

**KEVIN SCOTT:** So, I am curious, do you have things that you do outside of your writing routine for fun?

**CHARLIE STROSS:** Right now, my social life and my leisure activities have been stomped on by, basically isolation. I have metabolic syndrome, hypertension, and type-2 diabetes. And as a result, if I get COVID-19, I'm at much higher risk than a random other person my age. So, I'm reducing my exposure, and even though the pubs have reopened, you're not going to catch me going there.

And, you know, it's really kind of upsetting. I don't think I've seen any friends in person for about three months now face to face. You know, Zoom chats are one thing, but a Zoom chat is not the same thing, frankly.

**KEVIN SCOTT:** Yeah, it is not. And you used to — I mean, part of your job, I don't know how much of it you enjoy, was going to science fiction conventions and these big events where there were huge numbers of people and unclear when any of those will be coming back. Did you enjoy those things?

**CHARLIE STROSS:** Oh, hell yes. Unfortunately, while a lot of them are taking place online for the panels in a symposia, after 30 years of going, I'm more there for the people than the panels. You know, I was kind of burnt out on sitting on a panel discussion. So, you know, it's knocked a much bigger hole in my social life than I actually realized.

**KEVIN SCOTT:** Interesting. Well, I am hopeful. I'm spending an enormous amount of my time trying to help companies that are developing therapeutics and vaccines for COVID-19. And I have had on-again, off-again involvement in the biosciences for the past 25 years. And I can say I've never seen things move quite this fast. So, I have some degree of optimism that we're going to have a set of remedies coming out for COVID-19 that will make it less a miserable thing, and that some of these things that you and a great many other people enjoy can resume in the not-too-distant future.

**CHARLIE STROSS:** Yeah, I hope you're right about that. You know, I think if we get through the next century — well, I don't mean us personally, because we're not going to be around, but if humanity survives the next century, we're going to be in pretty good shape because there is going to be huge climate change, but we will have survived the first onset of it, and the worst of it.

As you mentioned, we're hitting peak population probably around 2060, 2070, and then declining, which is part of what's stressing the climate. We will have gotten off oil and petrochemicals by then. We will hopefully have fixed our current wave of social crises that are hitting globally at the same time.

You know, I did not want to spend my 50s rerunning the 1930s experience. But the 1930s were eventually followed with the 1950s and 1960s.

**KEVIN SCOTT:** Yeah, I think there — not to take anything away from the gravity of the moment that we're in, I think there are a bunch of reasons to be hopeful about the future. I mean, another thing that I don't know whether you're tracking is I've seen just an enormous amount of progress on not just cancer detection, but like very targeted cancer therapies. And there are a bunch of not insane people who think that cancer may be not defeated, but you know, just sort of a treatable illness, where they're already, like, imagining what the research funding framework needs to look like when cancer is no longer the thing that you need to dump the most money into, where it's probably going to be become neurological disorders after that.

**CHARLIE STROSS:** Oh, yeah, we'll find something else that kills us. I mean, the one iron rule is we all die sooner or later, it's just we die of different things. And as we get better at treating existing illnesses, new illnesses come to the fore with an associated mortality rate. Yeah, I mean, I think one thing we really do have to focus on is bacterial diseases, not just viral. Well, we're getting a crash course in virology and vaccine development right now and why it's important, and why public health education is vital.

The whole bacterial resistance thing has crept up on us, and I wish I was in a position to suggest to somebody that maybe it's time to revisit the old Soviet phage therapies, basically, viruses that are lethal to pathogens. In conjunction with fast, cheap PCR sequences to sequence the bacterial genome of the infections.

It used to be that if somebody wanted — needed phage treatment for a fulminating bacterial illness, they had to culture it on agar if they could get it to grow at all to identify it.

**KEVIN SCOTT:** Yep.

**CHARLIE STROSS:** Now, we're not that constrained. If you add gene synthesizers to the mix, it's conceivable we could have a one-stop shop whereby you go in, get a swab taken of the infection, sequence it to identify the pathogen, and have a phage synthesized on the spot to deal with it. That's a bit of a reach with current technology, but it's sort of not obviously impossible.

**KEVIN SCOTT:** Yeah, I agree. It is not obviously impossible. Well, awesome, I really am so grateful that you took the time today to chat with us. And I am grateful for what you do in general. You have brought me at least countless hours of enjoyment and I am very much looking forward to all of the books that you are going to write in both in the near and the far future. So, thank you very much for what you do.

**CHARLIE STROSS:** Thanks for reading. I mean, a personal rule of thumb is: If you're in a job where people will thank you for what you're doing and you're enjoying it, you've hit the jackpot. (Laughter.)

**KEVIN SCOTT:** Well, indeed. I think you really have hit the jackpot. So, thank — thank you for being here today.

**CHARLIE STROSS:** Thanks.

[MUSIC]

**CHRISTINA WARREN:** So, that was Kevin's conversation with Charlie Stross. Wow, what an amazing conversation. What — what was your kind of big take-away from that, Kevin?

**KEVIN SCOTT:** My big take-away is Charlie is super interesting.

**CHRISTINA WARREN:** Yeah.

**KEVIN SCOTT:** He thinks very broadly about the world and it's really interesting, you know, he — like even at the end of the conversation, like, he had this very pointed idea about what he thinks might be an interesting direction for research in the biosciences.

And, you know, earlier in the conversation, he was talking about Trotskyism and eschatology and I mean it's like just awesome to talk to someone who has such a broad ranging set of interests and tries to integrate those into a you know sort of a coherent theory of humanity and the world.

**CHRISTINA WARREN:** Yeah, no, I agree. From your perspective as an engineer, does his technical prowess, do you think that's really kind of aided with both the stories that he tells and also the — I don't want to say predictions, but yeah, we'll say kind of predictions and, I guess, commentary that he's making about our culture and about the role that technology plays in that?

**KEVIN SCOTT:** Yeah, I think it's hard to imagine that it didn't influence him in some ways, like we talked about a couple of other folks who had similar sorts of involvements in the computer industry. There's Jerry Pournelle, there's — you know, there's Ted Chang that, you know, a bunch of people.

**CHRISTINA WARREN:** (Inaudible) and Charlie Day, yeah.

**KEVIN SCOTT:** Yeah, and, like, you know, and there's also this collection of folks, you know, Vernor Vinge he mentioned was a computer scientist you know there are folks like Alastair Reynolds who's, like, another one of my favorite science fiction authors who was a physicist.

So, like, there's just something going on there. And, like, the thing that I don't know, and this would have been a good question to ask Charlie, is you know, what is the chicken and what is the egg. Part of the thing that inspired me to become an engineer was reading these science fiction stories.

And I just sort of wonder, like, how much of what they are doing and like the things that they have done in their career have been informed by which. Was it the science fiction that turned him into an engineer or is it the engineer that turned him into a good science fiction writer? And I think, you know, the answer to that question is: It's complicated.

**CHRISTINA WARREN:** Yeah, no, I think about that question a lot, actually. I was having this conversation with some friends recently where we were talking about the same thing, and these were also engineers.

And it is interesting, I think, to kind of look at the way that the two have influenced one another, because certainly there have been technological advancements that you could argue have been driven based on like science fiction and things that have been written, but at the same time, a lot of what's written is also driven by the actual science and the engineering research that's happening, which has been the case with Charlie's work.

**KEVIN SCOTT:** I think what Charlie does and what science fiction writers do in general is an extremely important thing for society, above and beyond the entertainment that their work provides for people. I really, really believe this. I believe that we all are effectively the stories that we tell. Like, our ability to function as a society is us believing in a vision for the future that is you know sort of appealing and inspiring.

And science fiction authors are some of the people that are telling part of that story about, like, painting a picture, like, establishing a framework for what the future could look like. And whether they know it or not or whether it's their intention, they are inspiring people who are then going to go out andpush the future into that direction. And, like, that's so critical.

**CHRISTINA WARREN:** Yeah, no, I totally agree. I did a profile a number of years ago around some of the people who were involved in making the film Minority Report and it's actually interesting because there was a lot of technical research that went alongside the visual effects and, you know, the storytelling aspect of that.

And what happened actually because of some of the things that they were doing with Minority Report, wound up becoming the multi-touch gestures that we all use today on devices. You know, and that's just kind of a small example. Obviously, there are much broader and bigger things, too. And I think that's what's interesting about the stuff that Charlie writes is that we can inspire people to do those things and also think about the implications about what these stories mean.

**KEVIN SCOTT:** Yeah, and I — look, speaking of Minority Report, I think Philip K. Dick is like one of the —

**CHRISTINA WARREN:** Yeah.

**KEVIN SCOTT:** He may be the world champion of like writing so much stuff that has become so influential on people that they have created what he was imagining all those many years ago.

**CHRISTINA WARREN:** Yes. No, I mean, yeah, it's so true. I mean, Bladerunner, obviously, it's different, but you know, it's funny that we passed the point of when that was supposed to take place. And the influence that that had on the proceeding 30-odd years is really interesting.

**KEVIN SCOTT:** I also thought that Charlie's — this framework that he has for imagining the future where it's, like, okay, 70 or 80 percent of the stuff is — in the future is already here. And then you've got you know 10 or 15 percent of stuff that is going to happen that is pretty, you know, straightforward to extrapolate. And then there's the weird stuff that will change everything and, like, the weird stuff is very, very hard to predict.

You know, so when you find someone who can call that 5 percent more accurately than others, you really do wonder, like, what was going on with them. (Laughter.)

**CHRISTINA WARREN:** Yeah. No, and I think it just shows the power of creativity, whether it's in writing or engineering or anything else.

**KEVIN SCOTT:** Yeah, super awesome.

**CHRISTINA WARREN:** Fantastic. Fantastic conversation. All right, well, that's it for our show today and we appreciate that Charlie took some time away from his writing to chat with us and we hope that you take a moment to write to us.

So, tell us who you'd like to have as a guest on the show, your favorite author, your most influential mentor, your most admired tech hero. We hope to hear from you at BehindTheTech@microsoft.com. Take care out there.

**KEVIN SCOTT:** Yeah, and everyone should go out and buy Charlie's book when it's published in October, and we'll see you next time —

**CHRISTINA WARREN:** Yes, buy his book. Pre-order it, yes. (Laughter.)

**KEVIN SCOTT:** See you next time.