

[Transcript] FYI - For Your Innovation / Best of 2022 - FYI Podcast Compilation

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Hey everyone, welcome back to FYI, the four-year innovation podcast. I'm Michael Cromer, a product marketing manager here at Arc. Today I'm joined by my colleague, associate portfolio manager, Dan White. Hey Dan, welcome to FYI.

Hey Michael, thank you for having me on the podcast today.

This year was certainly one of strife in the markets and especially for innovation strategies. Yes, it was quite the tumultuous year for many different asset classes.

Not only innovation, but also broad equities, bonds, commodities, currencies, cryptocurrencies, and crypto assets. Investors had a lot to digest this year. Generally, it seems the focus this year was inflation and its relation to interest rates, recessionary fears, and multiple crypto meltdowns with the Terra Luna ecosystem collapsing first followed later by FTX.

Arc's investment team does its best to publish a lot of content around many of these topics but I know this podcast is focused specifically on innovation.

And despite all the market headwinds I just mentioned, the five major innovation platforms continued to march on. They certainly have. And this year we tried our best to bring listeners even more innovation-focused content. We published 51 episodes of the podcast and earned more than 3 million lessons from six continents. Our research team covered topics from the ever-changing cryptocurrency ecosystem to cancer detection, from the potential of the metaverse to space exploration, and so much more. It's been exciting to watch the Ford Innovation podcast expand its reach year after year. On today's installment, as we have done each of the last two years, we will be replaying excerpts from some of our favorite episodes throughout the year, giving listeners just a taste of the knowledgeable guests we hosted in 2022. First, you'll hear our chief futurist, Brett Whitten, and our autonomous and robotics director of research, Sam Chorus, interview shift four payments CEO and chairman, Jared Isaacman. Brett, Sam, and Jared discussed the Polaris Dawn mission, Jared's passion for space flight to further human space exploration, and some of the tangible philosophies that he took from SpaceX. After that, next-generation internet director of research, Frank Downing, an associate portfolio manager, Nick Goose, sit down with Polygon Studio's CEO, Ryan Wyatt, to unpack the future of Web3 Games

and digital ownership. Ryan also comments more generally on the buy-in to decentralization, interoperability concerns, and his perspective on the realities of the metaverse.

Then, analysts Mac Friedrich and William Summerlin talked to Titan co-founders and co-CEO's Joe Percoco and Clay Gardner about their mission to personalize private wealth. In that episode, you'll hear how Joe and Clay met and founded their online investment platform, their mission and vision,

how they remove the middleman in hedge fund-like investing, and more.

Next, analysts Ali Erman and ARC advisor Dr. Charlie Roberts are joined by MIT professor, chemical engineer, scientist, inventor, and investor, Dr. Bob Langer. Dr. Langer has over 1,400 granted or pending patents, has been cited 375,000 times in counting, and was a co-founder of Moderna. In the episode, Ali, Dr. Roberts, and Dr. Langer discuss emerging biotechnologies, the potential of artificial intelligence and healthcare, and time to market accelerators for new therapies and vaccines. And finally, we want to highlight last week's episode with Steve Case.

Steve is one of America's most renowned entrepreneurs as a co-founder of AOL. Currently, Steve serves as chairman and CEO of Revolution LLC, which focuses on investing in the next generation

of founders, especially in the 47 states outside of California, New York, and Massachusetts.

In the episode, Steve and ARC CEO Kathy Wood discuss why he thinks entrepreneurs are vital, the value of research toward innovation, and why Steve is optimistic for the future of America.

While we are highlighting just five of our guests in this final episode of 2022,

we wanted to thank all of the fantastic innovators that shared their stories

and provided their expert insight into each of their fields on the four-year innovation podcast

this past year. Thank you all for listening to today's episode and for listening to FYI All Year.

We hope you and your loved ones are having a very happy holiday season, and we wish you a happy new year. We'll see you in 2023. Space, business, and the business of space with Jared Isaacman from

Shift 4 Payments, episode 127. And you mentioned like, you know, these basically private enterprises

required to capitalize these types of initiatives, which I agree with. And it's hard, you know, Sam's job and my job partly is to like think of all the crazy things that can happen out of the fact that we have reusable rockets, and with reusable rockets in particular. It's kind of like, yes, it would be good for the world for life to be multi-planetary, but it's not as clear how you could privately capitalize such a venture unless, you know, SpaceX can make so much money off Star Link that they can inject that capital successfully into sending, you know, missions out there.

If you had to guess what business models arise from reusable rockets, are there additional business models you can think of? Or is it kind of like you just need to make the leap and start a colony? Your question is the right one, right? You better have a Star Link and a lot of resources to pay for a trip to Mars, because not quite sure exactly when we get there what the economy is to justify the extraordinary Manhattan project level investment to do so, other than it's probably a good thing for humankind in this super grand scheme of things, right? But every single thing that SpaceX builds along the way can be monetized and opens up new opportunities. Like right now, the KPI is just, you know, your cost per kilogram accelerating into orbit. It's dropped a lot thanks to SpaceX. Like it can drop materially. And once you do that, you really don't know what is in the realm of possible, right? I don't think you're going to have like these massive tourist flights of people on Starships taking pictures, you know, going from point A to B in, you know, 45 minutes. I don't think that's what the economy is. I do think people will be working in low Earth orbit. I do think you can have a manufacturing capability in low Earth orbit. I think you can expand science. I mean, geez, the list is like, is probably 10 miles long for getting experiments on the International Space Station. They have to be super selective of what goes up. There's only

so many people that can even manage the experiments up there. When you can bring down costs like materially to the point where let's just say, you know, biotechs and pharmaceutical companies can afford it, you don't know what's potentially possible, right? I mean, we've come a very long way, you know, from the infrastructure investments to allow rich Wall Street types to have a car phone in the 1980s, what like mobile technology has to offer to the world today, where it's not uncommon for like your average 12 year old to have a smartphone and buy a bunch of apps and such. So

like you got to get that cost down or you're going to just limit the amount of possibilities that happen. Starship is going to be a total game changer in the ability to put mass and accelerate into orbit. And from there, you know, again, it's just, there's so many possibilities that could come from it. Are you thinking low G manufacturing for like actually to bring product back to Earth? Is that what you're applying or just to create more, I guess, infrastructure and tooling for outbound exploration? Well, look, I'd say like the moment you create, you know, low cost mass production capabilities of Starships, almost the point that they could, you know, even though they're reusable, they could almost essentially be disposable too, and that you could put up 20 of them and just dock them and have essentially like a city in low Earth orbit. If every one of them has the potential of maybe like its high density configurations of 100. So let's just say it's like 20, you can really populate a lot of people on orbit. Then what are they doing up there? Like what was worth the investment? Well, first, we don't know if it was actually even that big of an investment at that point in time. It might actually be like very reasonable to get up there. And then what bet what can you accomplish in microgravity better than what you could potentially do, you know, here on Earth? I think that remains to be seen because you've just had so little opportunities to test up there. I mean, again, it's only a select few experiments periodically make their way up to the International Space Station. But we'll find out, right? I mean, we certainly weren't going to find out when it was \$250 million every time you put a satellite up. But now we've got CubeSats up, and it's just it's just changing quite rapidly. But I agree with you like fundamentally, we have to answer the question on like what that economy looks like in order to justify some of the more like extraordinary investments. But fortunately, like it's not like SpaceX is oblivious to this. I like that's where Starlink does come in. And I would say they will be the category leader in payload to low Earth orbit for quite some time. To me, it seems as if for you have to cry across some kind of price threshold for Mars, I think Elon said this, where it's basically somebody can give up on Earth, sell their house and try to become a colonist and make their fortune on the market. And so there is, you know, some like taking of capital in the US that would go into people like paying for the journey out there, even if it's a one way trip that we're still along with. Yeah, I don't even I prefer to just keep it at the let's just reduce the cost of getting mass to low Earth orbit and let the possibilities kind of span from there. Because once you start talking about like SpaceX can't solve everything for Mars. And believe me, long before somebody selling their house here and deciding

to like colonize Mars, there are social and psychological issues that, you know, have not been sorted out yet. Space just even low Earth orbit could come with a lot of stress. I mean, physiologically, everyone 100% of people feel different when you're on orbit. And there have been challenges throughout human spaceflight. And you're essentially call it hours from coming home safely from the space station, your two and a half days to come home safely from the moon,

your nine months every couple of years to come home from Mars, and it is a spec. Like long before we figure out how people are going to make a living on Mars, we have to make sure they don't lose their mind on Mars as well. So there's a lot that needs to be figured out. And it's again, it's SpaceX can't solve all these things. But believe me, once we start shifting the conversation there, there's a lot of, you know, questions to still be solved. And there's no analogs here on Earth or throughout human history, like you can not not crossing the Atlantic during the, you know, the Renaissance or the age of exploration, not Antarctica, like there are no, there are no analogs, fitting bread to what you're saying. I think just today they, they found Shackleton ship endurance. So similar journey as, as Musk has put it, in a way though, right, because

you know, you have water, you can fish, you know, if you came across the Atlantic, you generally know that with wood, you can build a house. And if you're successful trading anything, you can reward yourself by maybe building a bigger house. You know, you can buy more cattle, like there are some things that are just totally like for like, even if you're going into a strange land on here on earth, you could spend your whole life on Mars, doing what's in the best interest of the, of the colony, and you still live in your same dome. You're not going to go outside and chop down more trees to build yourself a nicer dome. There are no real analogs, you know, kind of whatsoever. But that doesn't mean it shouldn't, it shouldn't stop us from, you know, taking these kind of bold steps that are probably, again, in the best interest of humankind. Is this kind of cautionary tone inspired by your inspiration for mission? Did you almost lose your mind while you were in orbit? Oh, no, I'm quite sure, like, we were pretty well monitored, like psychological training was part of it. I'm quite sure they would not allow me back up if I did. No, I'm actually just kind of just, you know, sharing from my, my education experience. And it is that, I mean, 50% of people have space adaptations syndrome on orbit. It doesn't matter who you are, you could be a great fighter pilot and fly upside down all the time. And you won't feel so great for a bit. And throughout the entire duration on orbit, just based on lack of gravity and fluid shifts, you'll feel different. So it's not the same as, you know, taking off an airplane and kind of clearing the pressure, you know, build up and everything's fine. It's, it's a little bit different, but it's not meant to like slow down progress. It's actually just more meant to highlight the things that need consideration while we're in parallel, while SpaceX, you know, brings all this fun sci-fi back to reality. The future of Web 3 games and digital ownership with Polygon Studios CEO, Ryan Wyatt, Episode 146. Kind of get people aligned on what Polygon's future is going to look like.

In terms of maybe summarizing and asking a question here. So you see, you know, Polygon has a technical implementation built out. As you mentioned, that's kind of the hard part of the, you know, the product roadmap. So in terms of Polygon Studios and what you're building in the studio segment, what does that product roadmap look like? You talked about NFTs, you have mentioned gaming a few times, like, what exactly are the businesses that you're going after to try to attract them into this Web 3 ecosystem? We aren't building any products on the Polygon Studios side, right? Like we basically are at service to getting people on the POS chain, getting people on our supernats, getting people integrated under ZKEV. And when you ask like who's people, it's, you know, it's the tool, it's whether it's marketplaces, it's wallets, developer ecosystem, it's liquidity, right? It's all these different things. And so, you know, our team is making sure when you want to build on Polygon, you've got somebody you can talk to to help do that, right? Whether it's as simple as like, hey, we need help with, you know,

looking at our smart contracts or, you know, our token designer, hey, you know, we're making a game,

what are your thoughts on, you know, rolling out our NFT strategy this way versus this way, right? And so basically, that's what we are, are truly just the business function of Polygon and everything that it takes to kind of run that. We actually, Studios is kind of a funny name, because we're not really a studio. We're not making any games in-house. We're not generating, we're not creating any kind of IP in-house. And that's very intentional, because I would never want to see us be at odds with any of the people that are building. So like, say we had a studio where we were making an MMORPG of Polygon Studios, I would look at it as like,

other MMORPGs that want to be on Polygon would be like, are they really going to act in my best interest to make sure that our game is really successful in Polygon? Are they going to make sure their game continues to be successful? And so there might be a time in the future where Polygon does do some of these things in-house. I would never rule it out. But right now, you know, the focus of the company is to be obsessive over developers. And anything that you're doing that distracts you from that is a disservice to the advancement of the ecosystem from my perspective.

And so everything we should be doing is, how do you help developers? How do you give them scale resources? Doing hackathons? How do you market? How do you promote them? How do you make

sure that they're getting all of the materials that they need to iterate on their business model?

Fund them on the venture side, right? You know, give grants out, right? So everything is focused on supporting developers building on Polygon, whether it's DeFi, Games, an NFT project, or Facebook. Got it. And that fits very much with the ethos of Web3, right? You're wanting to support this decentralized developer network with the helping hand, which is now Polygon Studios. So maybe let me reframe the question I asked you then.

What are developers building for Polygon that you're seeing come through Polygon Studios?

What has been kind of the biggest draw for developers, you know, using Polygon?

I think we've been the most successful at bringing Web2 companies in. So it's different. It depends on what group we're talking about. I think we've been the most successful bringing Web2 companies to Web3 for a couple reasons. One, I think they quickly come to the same conclusion around Ethereum

that we do, right? Where it's like, okay, that's a proven, like that has legs, that has history, that has users, that has liquidity, that has developers. There's a lot of traction on Ethereum.

So that makes, and like the other, these other L1s haven't been around for a while. So we don't know. So it's, you know, we'll attach to that idea. And then it's like, okay, let's evaluate how best to build on Ethereum and then look at the offerings that you have across that.

And so then I think they come to Polygon because if you look at the kind of executive team we've brought in, you know, it's people, you know, 20 years at EA, you know, 10 years of Unity, eight years running marketing at Facebook, we've got really great kind of Web2, Web3 hybrid executives. And so we have, I think a BD team that knows what good looks like and how to operate at a high level. And I think people, you know, like to associate with that and it gives comfort knowing that you've got a strong partnership because you're going to be working for many years

together. And I think the last part is, you know, kind of our carbon footprint narrative where we're carbon neutral, right? And doing, you know, carbon credit offsets. And so I think when people think about really what's important, if you're going to build on chain is doing it in a sustainable way. And so when you kind of look at it, they're like, boom, right? That's why we'll choose Polygon. Now what is starting to happen is a significant snowball effect, because then you're like, well, Stripe, HTC, DraftKings, Reddit, Facebook, they're all on Polygon. And yeah, so they're, Reddit obviously is a multi-chain and some of these will continue to be multi-chain. But a very consistent theme is Polygon is part of that strategy, right? And I do think the world will be multi-chain. And I think that's okay, right? I think that's not a bad thing. But I think Polygon will continue to be a part of all of this. And so I think that's the web two reason. I think web three is very similar though in nature, why, you know, why they're building on Polygon as well. And we have a games team. I also think we have, you know, when you think about the bat, like the people we've hired from the games industry, when you are in game development, you want to work with people that know and have been a part of the game's ecosystem. And there's a bunch of different ways, whether it's like on the platform side, the publisher side, the game development side, the engineering side, right? The, the marketing side, even stuff like my background, which is actually, you know, parallel to the game industry of watching people play video games, the creator economy. And so I think we've got a robust and well-rounded team that can actually really, really support game developers better than anyone else. And I think gaming has been a really fun and probably a good segue here, but I think gaming's been a really fun category within web three that has a lot of promising potential, but hasn't fully come to life at all yet. And I think that's probably one of the more promising verticals.

Personalizing Private Wealth with Titan CEOs, Joe Percoco and Clay Gardner, episode 151. Jen hits the actual lowering of the functional barriers, but then thirdly, it also helps them see a part of their future wealth. On the other side of this, and Clay, maybe you can answer this, what has been preventing institutional investors from reaching out and trying to build a, build a distribution channel with retail? Why do, why do these alternative products, one of these alternative managers have trouble raising capital from retailer, or why have they not wanted to raise capital from retail in the past? Be all what Joe talked about on the barriers for retail investors.

I would take a couple of jump to mine. Joe alluded to the tangible constraints right around just minimums. And frankly, the cost-benefit analysis, if you whip out a napkin, the quick napkin math is, I'm just going to cherry pick. If you're your Tiger Global or your Sequoia, pick your tier one fund or investment firm. I've heard of these folks anecdotally raising money on the span of tens or hundreds or if not billions of dollars in a matter of weeks. Even if you can make a play for thousands or tens of thousands of retail investors at and somehow figure out how to collect \$500, \$1,000, \$10,000 checks, you're talking about significant logistical complexity in terms of collecting the checks, making sure accreditation requirements are met, wiring the funds, handling capital calls, handling tax for probably a fraction of the capital. And so traditionally, large institutions say, why would I go down the retail route when the institutional route is easier, cheaper, faster, and much less of a headache? So I think those constraints, if you understand the why this hasn't been done before, you can see a lot of those constraints starting to melt away. And we tighten hopes to be a big

proponent and a big pioneer in helping that happen. So check size. We're in the year 2022. I don't think adding a few zeros or removing a few zeros should be the reason an entire swath of investors is locked out of a particular asset class. And that's changing if you have a bunch of different under the hood regulatory structures, whether the registered fund products, SPVs, feeder funds, I won't get into nitty gritty, but those barriers are falling.

Then I would say the second one is one more of Joe alluded to around education. Right. I think there's a general bias or stereotype around retail investors, particularly the last few years with the Reddit, GameStop, kind of Robin Hood, Madness, that retail investors are quite fickle, that they're quote unquote, dumb money, or that they're not sticky, that they're just day trading. We see frankly the exact opposite on our platform at Titan. We think the right products in front of the right people with the right education layer, really giving them a direct relationship with the fund manager can transform behavior pretty dramatically. And so I think if you look at if you're an institution today, you have to go through armies of middlemen, each taking a fee and each removing you steps and steps

and steps from the end of retail investor, where at the end of the day, whether you're Tiger and Drieson Horowitz or whomever you are, you're effectively relegated to being a ticker symbol in a portfolio. So of course they're going to trade a fund manager like a stock. So by removing middlemen, by removing a lot of the barriers I alluded to, we hope we can break that stereotype because for where we sit on the field today, retail can be an amazing business. And frankly, I think the world needs to remove these barriers as opposed to just just making you wealthy people richer. Yeah, maybe you could go a little bit deeper into that when you said kind of removing the middlemen. It seems like that's something that Titan is really kind of trying to set out to do, maybe a platform for other kind of fund managers, maybe to build a brand and do things like that and directly communicate with their investors. How do you do that? How do you enable that kind of direct link? I'll take a simple example and then I'll pass it to Joe. Joe is actually the chief architect of a lot of the user experience they see in the app today that's made this relationship come to life. Let me talk from the institutional investor's perspective, the world that I would see if I was going and managing a fund, and then I'll pass it to Joe to sort of articulate like how this looks in the Titan kind of 2.0 world. So if I'm an investment manager today and I want to go to retail, here's the tools that are at my disposal. I have a 90 plus page prospectus like literally a thick PDF document. Maybe I email it to you. Maybe I mail it to you. I have a fun website where I'm articulating the typical one year, three year, five year track record, a bunch of additional documents and disclosures and probably a chart that shows my historical track record. And then maybe if I'm super, super innovative, I've taken to platforms like Twitter or YouTube and I've tried to build a brand and a presence there where I can kind of shout at my audience and hopefully they put two and two together. They see recent investments from

my prospectus. They hear me talk on YouTube and they can feel like they're building a relationship with me. So that's the 1.0 world. If you're an institutional investor with a track record and you want to go to retail. So notice there's a bunch of different intermediaries, a bunch of platforms, social media and other and onwards that remove me from the end investor. And the 2.0 world looks a lot different. I'll pass the mic to Joe to articulate what we see there today. Yeah, the 2.0 world is really exciting. It's a working hypothesis that a lot of the great

innovation happens in novel consumer verticals, which then get applied to other legacy verticals, whether it's like finance, insurance, healthcare and so on. And so what you've seen race ahead in consumer technology is the ability for someone to have a one to many audience and build relationships one to many. So for example, whether you're Serena Williams or LeBron James, you can effectively have a relationship with millions of people at once. And it's amazing that that technology has yet to permeate into wealth management or investment management. And so it's really exciting when you do that is as Clay was chatting earlier, they're really, really great iconic managers and asset managers such as ARC. But there are layers and layers of middlemen trying to line up in front of ARC and others to say, I'm in between you and the end retail investor, and you need me to go get access to this. And when you all have started to showcase in a world trying to do as well, is how do you actually just build direct to consumer relationships with tech that can eliminate all the middlemen? So now you can flip from the old world to the new world where let's say you're a manager, let's say you're managing an equity strategy focused on growth tech, you know, ahead of the firm IPO, you can send an Instagram stories like video to entire client base for whoever's ever in your strategy and effectively say, hey, here's the bull case or the bear case on the stock. And that's us is the future of what the wealth management category will look like. No more will you have your investment management tool over here. And then you're going to turn on the TV over there. And you yourself, we're going to have to try to bridge the information and say, is what CNBC is telling me today on the TV, does that apply to my little app over here in my wealth? When you actually bridge the manager, the end customer, you can just get content directly. Breaking down biotech innovations with Dr. Bob Langer, episode 156. One that always comes together so intuitively, but I think it's super interesting. So speaking of companies that have been successful, you're obviously a co founder of Moderna. So maybe we can talk about mRNA a little bit. I think for starters, for anyone who doesn't know maybe on the call, I think it'd be good to hear your definition of what is mRNA, just to start pretty simply. And also we know that this is a pretty ideal solution for the COVID-19 pandemic, as we've clearly seen it play out. It was able to be done really quickly. And also SARS-CoV-2 is an RNA virus. So it seemed like it was just a match made in heaven. But what do you think mechanistically, or maybe a different reason that you'd like to highlight would make mRNA an ideal candidate for some other type of indication like cancer? Sure. Well, one thing to think about is that protein therapeutics have been incredibly successful. For me, I was fortunate being an advisor to Genotech starting in the 70s. And you can see what's happened with protein therapeutics. Now, most of the best selling drugs in the world are proteins. But it takes a long time to make proteins. You have to make certain vaccines and eggs, as you know, may take a year. So you're having to guess at what you're going to do, say in the case of flu. And every protein therapy needs giant cellular reactors and so forth. So there's a central dogma in biology. And that central dogma is that DNA makes RNA, makes protein. So if you could give somebody RNA and do it in an effective and safe way, then you could make protein. Why is that potentially better? Well, one, you can make RNA and figure out the right RNA in a day or two. That's actually what Moderna did in the case of the COVID situation. It really wasn't because that was an RNA virus. It's simply that you do what the structure of the spike protein was, and you could make an RNA against it. So the idea is that it's incredibly faster to do this. You can do it in a day or two to make it, and then you put it in nanoparticles, and it works. And the reason it works so well is that rather than taking a year to make it in eggs or whatever, the body does all the work.

You just take a little bit of RNA, put it in a nanoparticle, inject it into the body, and the body will make the protein. Not only does it do that, you can start to treat diseases you never could have treated before, diseases that are intracellular for a basis or membrane bound for a basis. So it opens up all kinds of additional opportunities. Really, I don't see much limit in terms of what messenger RNA can be used to treat. If you look at what Moderna's pipeline is, there's probably now over 30 different diseases or vaccines being studied in human clinical trials, not just COVID. So there's about nine other vaccines. And by the way, to your question, that even includes personalized cancer vaccines. There was just an announcement yesterday about how Merck and Moderna are working together to come up with personalized cancer vaccines, where you could take a patient's cancer, biopsy it, and know what the right say antigens are, and then train the body by injecting a vaccine to attack that person's specific cancer, which I think is very exciting. But there's so many others too, cystic fibrosis, rare diseases, heart disease. It's pretty unlimited. So, Bob, thank you for that. This is Charlie.

I've got a side question that I'd love to get to if we have time, which is if you'd confess to blowing anything up as a teenager, playing with chemistry, or maybe you want to take that one first before the next serious question. Sure. Well, I'll tell you a story along those lines. I remember a reading about gunpowder, and my friends and I thought we'd make some gunpowder. I think if I remember correctly, it was sulfur, carbon, and I think it was potassium nitrate. And I had two of those three, but then I kept trying to figure out how to get the other one. And I remember we did make it, but I don't think we compressed it right. But a funny story was about 10 years later, you know, when I was an adult, I remember going into a pharmacy, and there's this little kid, must have been about eight years old, and he kept asking the pharmacist for one of those chemicals. I think it was potassium nitrate. And so at any rate, he kept asking it, and the guy kept saying, well, why do you want that little boy? I just like it. And he must have gone on for about 10 minutes. Of course, I knew exactly where the little boy was. I love it. Well, my dad discovered my own gunpowder plot, literally in one of our outhouses when I was a child, when he went looking for his favorite breakfast bowl, which I had apparently taken. And it was my little stash of charcoal, sulfur, potassium nitrate. And it was just drying when he found his favorite breakfast bowl full of gunpowder. Well, I should have been talking to you, Charlie.

Well, thank you for that. Back onto the mRNA questions. Do you think there are certain indications that you believe will be very successful in the longer or midterm that you think would surprise others or where others have most pushback or debate? It'd be very interesting to hear. Well, I'm very hopeful that new cancer therapies will be one of them. You know, what I just mentioned,

I'm very hopeful that for many reasons, I would love to see these personalized cancer therapies be added to the arsenal of molecules that can be used to treat cancer because it's such a terrible disease. And because I think this idea is a very powerful approach. I mean, there's obviously others too, but that might fit into the criteria that you just gave. Thank you. And do you think there are any areas it almost certainly never will apply as mRNA? Do you think there are any blackouts

there? Well, see, to me, let me try to answer it this way. Part of the issue is how well you understand the biology. I was just speaking to a very well-known pharmaceutical company on Monday

night. They had a board of directors meeting and they asked if I could speak to them. They're one

of the biggest companies in the world. And the chairman of the board said to me, he said, Bob, Beth Moderna, you guys, you come up with a cure for COVID or a treatment for COVID, the vaccine, in less than a year. How come you or nobody's done that for Alzheimer's? And I said, well, the big issue is, in the case of COVID, you know what the issue is. It's a spike protein. You have a target. And if you block that, you can have a huge effect on the disease. Unfortunately, with Alzheimer's, in my opinion, the biology is not understood. So I think really the answer to your question, which is a great question, is when the biology is reasonably well enough understood, I think mRNA is going to be a great way to treat things. But when it isn't understood, I don't know whether it's mRNA or anything that's going to help you. You really need to understand the biology. Innovation is the ultimate leveler with Steve Case, episode 164. Here, the late 19 teens. So we had a pandemic, the Spanish flu. We had a war, World War One. Now, both of those were much worse, I think, than what we are going through now. But there are echoes, the invasion of Ukraine, the coronavirus. But one of the things in, again, looking at the data back then, we saw that and there were probably massive supply chain problems. Again, news didn't travel very quickly. And so inflation at its peak got to 24% in June of 1920 on a year-over-year basis. But by the next June, June of 21, it was minus 15%. And I am wondering, and I think we've been through a massive supply shock. And actually, two of them, the coronavirus, was one that caused massive disruptions and the war in Ukraine as well. And I wonder if we will be looking back at this as those are unwinding or diminishing in terms of their impact on the global economy. If we're not going to be in a similar situation, especially now that money growth has gone to zero and looks like it's going to go, well, you said it is negative. I think it will be negative when the official reports come out. Demand deposits are already negative. I'm wondering if we'll be in more of that kind of an environment where inflation goes from this 8% to 10% whatever metric you're using down to minus something. Is that possible in your mind? Well, there's a big difference. Remember, Kathy, that we were on the gold standard back then. It was Roosevelt that took us off. So eventually, that big inflation that we had post war and speculation and disruptions and policy was reversed because the money supply was brought back down to the level of, by the way, that was the third biggest money supply increase. The first biggest was COVID and you're right in causing the biggest year-way increase in M2 money supply was 2020. The second was 1943, World War II, and the other one I think was 1917 in World War I. But we are obligated to bring that money back down because we are on the gold standard and we had to maintain the parity. So now, the big difference today is we had a 40% increase in the money supply from March of 2020, the beginning of COVID when it struck until March of this year when it stopped dead and then started going down. I mean, it was like the biggest pivot I'd ever seen on that. Now, it's gone down very minor. We are not going to go down to the pre-COVID level. That would require unbelievable tightening by the Fed. I mean, we have to accept the inflation that, again, when you hear about what the Fed says, it isn't, we're going to bring back the price level of 2020. We've had this bump of inflation. Now, we want to get it back to 2%. But we're not talking about getting it back down. And I think that would be a terrible mistake because it was a very severe recession. But it was, again,

on the gold standard. Today, no one would expect that. Again, Volcker, we had that big inflation. We just brought it back down to 2%. We didn't undo the inflation of the 70s because once we broke the link with gold and you have a fee at money, you don't obligated to bring that money supply back down. You can just say, uh-oh, I produced too much. Let's reset. Let's get it back to a 5% growth, which is what I think is consistent with a 2% inflation rate. That's what I think the Fed should do now, lower the interest rate, get that money growth back to the... We had, Kathy, for 34 years from the mid-1980s until the year of the pandemic, we had 5, 5.5% money growth, very steady. And we had 2%, 2.5% inflation. That's what we've got to get back to. And to get back to that means you can't keep on having this money supply go down. That's just going to be way over tight. We have to ease up, get that back to the 5% growth. That will get it back to 2%. If there's a productivity burst, that's all the better. That will lower inflation even more, but it'll be from the supply side. It won't be because we're just over tightening and killing the economy. So when you say negative money growth, you're looking at it from March, and yes, from March to now, it is astonishing that it is happening in the absence of something like the gold standard, right? Yeah, it is. It's never happened before. I mean, we've never had this decline again. I mean, we're not obligated to get back to that standard. Remember, back in the Civil War, we went off the gold standard temporarily to fight the war, and then we pledged to go back on it. And within 10 years, we redeemed all our gold, what's called greenbacks, which were not backed by gold. We redeemed them at gold at the original. And it required a long period of deflation, but the gold standard reigned supreme back then. We're in a different world, so we don't have to go back to that, squeeze the economy down to death to get it back to some sort of parity. And by the way, even the most hawkish Fed members have never suggested we're going to get back to the price level level that we did. It's getting inflation back down and accepting, well, they could have prevented it had they not burst it out so much, we could talk about that, but accepting what has already occurred in the pipeline.

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