DevelopmentAid Dialogues

Season 3. Episode 15: From Starlink to Scarcity: Dialogue with Jonathan Criss - the SpaceX Engineer Solving Earth's Water Crisis

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Hisham Allam: Hello and welcome everybody to DevelopmentAid Dialogues. I'm your host, Hisham Allam. Today we're exploring one of the most basic human needs in a very high takeaway - clean water. Not just for big cities with strong infrastructure, but for more remote villages, disaster zones, and the communities that are already feeling the pressure of climate change.

Our guest is someone who spent more than a decade, literally looking down at Earth from space and is now focused on solving one of Earth's toughest challenges - water scarcity. My guest today is Jonathan Criss, CEO and founder of Vital Lyfe. Jonathan has spent over 13 years at SpaceX, where he served as lead integration and test engineer and product manager on both the Starlink and Dragon programs, playing a key role in the product development Lyfe cycle, including delivering the first reusable spacecraft.

His background spans across UX, graph engineering and product development, and also Jonathan has helped bring multiple Starlink products to market around the world. Now, he had turned that experience toward a decentralized water solution with Vital Lyfe, developing a desalination and purification system that can operate without traditional infrastructure to deliver safe drinking water to remote, disaster affected, and environments with limited infrastructure.

Jonathan, welcome to Developmental Dialogues. It's great to have you with us.

Jonathan Criss: Yeah, thank you so much. It's a pleasure to be here.

Hisham Allam: Jonathan, for listeners who don't know you. How do you explain your journey in one or two sentences from SpaceX and Starlink to founding a company focused on water?

Jonathan Criss: Yeah. It's been quite a fun journey throughout my career. I really reflect back on what are the things that drive me; and it's really solving hard problems. All the way throughout my SpaceX career, literally starting from making cargo racks and straps to put cargo inside through owning the Dragon Reuse Program, it was just another step of: What is the next hard challenge that needs to be solved?

So when my co-founder and I started chatting about, you know, leaving and starting our own thing, we really wanted to make sure that we were going to work on a problem that could make a meaningful impact in the

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world, and then also solve a really hard challenge that really drove us forward in picking something in this space specifically, because nothing makes a bigger impact than water, right?

Hisham Allam: Of course. That personal evolution sets the stage nicely. You worked on huge, complex systems on the orbit. What was the moment or realization that made you say: "My next big engineering problem is water scarcity on Earth".

Jonathan Criss: It's actually a really good question. When we were leaving SpaceX, like I said, we really wanted to work on a hard problem, something that can make an impact. And we have a ton of experience from traveling around and really experiencing people around the world that had water scarcity.

But with the early days Starlinks, we would travel to remote villages and countries setting up internet for these people, and you would see the impact of giving them a traditional, centralized system via a decentralized system-via a "Starlink". So really going back and looking at that from a water standpoint was pretty eye-opening and thinking through, okay, what are the real engineering problems inside of water scarcity? How do we attack those from an engineering fundamentals, and apply all the things that we learned at SpaceX directly to water scarcity.

Hisham Allam: Building on that realization, let's ground it on today's reality. If you were explaining today's global water crisis to a non-technical friend, how would you describe what is actually going wrong? Is it lack of water, bad infrastructure, or broken governance?

Jonathan Criss: Yeah, I think it's actually a combination of all of those things, each one of those has a large impact in people's lives around the world.

And it's not just a singular thing, but a combination of all of them. When we look at water, from like a macro or a resource standpoint itself, it's like, man, 70% of Earth's surface is water. 95% of that is ocean water. So our current technologies focus solely on the 2% of available fresh water; and that's pretty much where 99% of all drinking water comes globally. If you look at that from a technology standpoint, we have abundant resources of water. We just have a technology gap in getting that water to people. So that's kind of the point of Vital Lyfe: it's really open up that box of cleaning all water sources, that are readily available and not just the one. When you're solely reliant on the single water source, then you run into a ton of problems that we're seeing globally. You have leaky pipes, aging infrastructure and you know, climate change and disruption, really impacting people's ability to get hold of that water.

Hisham Allam: Can you explain it in a simpler way?

Jonathan Criss: Yeah, Earth is covered by water, right? But we only clean a small fraction of that. We want to make that available to as many people as possible by making the technology available to everybody.

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Hisham Allam: That brings us neatly to your solution. We hear phrases like "decentralized, desalination, and purification". These words are repeated a lot nowadays. In everyday language what does a decentralized system look like on the ground, say in a remote village or refugee camp or after a hurricane?

Jonathan Criss: I do agree that "decentralized" is a bit of a buzzword now. In our minds, decentralized means giving traditional, centralized systems to individuals that can own and operate them themselves.

That means that you have to make a product that is easy to operate, is affordable, and is not reliant on traditional infrastructure. A good example would be you can make a fan. A fan is moving air. But it's solely reliant on an energy source that's coming from a grid. So we need to be able to build products that can completely live outside of existing infrastructure and be operated by anyone.

And that's what we really focus on with, with our product, making sure that it's affordable, easy to use, and has really low maintenance and operational costs.

Hisham Allam: Speaking of centralized alternatives, let's contrast them. For decades most countries have invested in big centralized water plants along long pipes.

Why do you think that model may not be the best long-term answer for climate resilience, especially in the Global South?

Jonathan Criss: I mean this is a problem everywhere, not just in developing countries. In the United States there's a handful of countries on the West coast arguing over the Colorado River based on water assumptions that were a hundred years ago, right?

And these states and the U.S. have been solely reliant on a water source that is starting to be dried up. We're in a decade-long, Super Drought here on the West Coast. And this is really starting to show that, hey, there needs to be other systems outside of traditional ways of thinking in order to really bring water to the masses.

So, you know, centralized systems work great from the start. You can clean water, but it's really difficult to scale those as you're like population grows or being nimble enough as climate changes and that becomes a massive problem on local population.

Hisham Allam: Okay, but those big systems inspire your SpaceX approach. Space systems are built with the redundancy and the failure in mind. How does that mindset show up and Vital Lyfe when you, operate it, say, uh, in a remote coastal community with unreliable power and limited maintenance capacity?

Jonathan Criss: Yeah, I mean, reliability is a core part of our design. It's a core part of aerospace design, right? And that's why we bring aerospace grade technology into this field. We design every single component in part with that end user in mind and that end use case in mind. So we put our products through the most

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rigorous reliability and qualification campaigns that we can even think of and really try to find what are those corner cases that this product will break in.

Once we understand that, then we can take that team or that information back to our team and design around those corner cases. What that ends up giving you is a product that is much more reliable in the field and in everyday use cases, but then also opens up the box of how these things can even be used traditionally.

You know, we're like going through and qualifying our water systems to be dropped out of airplanes. But traditionally, no one's dropping water systems out of airplanes. Why would we even use that corner case? And it's like, well, in order to get some of these things through villages, airlift and airdrop might be the only way to do it.

So we want to make sure that's designed and built into our products from the absolute get go.

Hisham Allam: Okay. I agree that reliability leads straight to the practical hurdles. Desalination has a reputation for being energy hungry and expensive. What are the main trade-offs you are dealing with? Energy use, cost per liter maintenance. And how close are you to something that is truly viable for low income and humanitarian settings?

Jonathan Criss: You're a hundred percent correct that there's a trade in maintenance and energy usage. In running these systems. We believe that the upfront cost has been the true barrier of entry for developing countries.

If you look at traditional systems, they're extremely expensive to manufacture, produce, and maintain. What that does is that drives it into governance. The only people that can really, really design and build these products, and deploy them, which is essentially priced out to developing countries.

We look at it from the other way. If we can make the product affordable and you take that cost and you apply it over the lifetime of the product, your price per liter actually goes down substantially. It's just basic math, right? Like if there's a billion dollar treatment plant and you're producing, uh, x number of liters per day, you're amortizing that billion dollars over the lifetime of that product.

We do the same thing. We drive down the upfront cost and lower flow rate is lower energy consumption. That's pretty basic math in how long does the product last, how much water can it clean; and prioritize that over the lifetime of the product and you actually get on PAR with large systems.

It's quite exciting when you look at it from the cost of upfront purchase price and ownership versus just purely looking at it from an energy standpoint.

Hisham Allam: Getting viable-opens the door to partners. When you think about scaling Vital Lyfe (your company), who do you see as your primary partners? Who would they be?

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Jonathan Criss: Yeah, we have a handful of partners that we intend to work with. Water's a very important resource and everyone does need it, right? The main verticals that we look at is, the normal consumer, right?

There's a maritime industry that exists. We open up the box in overlanders, off graders, preppers, those types of people, because they give a lot of feedback and they're willing to pay for advanced technologies. The second vertical is more partnering with the humanitarian and non-government organizations where they've essentially been priced out of these technologies since their inception, taking what they've traditionally had access to being competitive on that price point opening up the box to what they can actually purchase and use is one of the main partnerships that we want to rely on. And then you know the militaries around the world have water logistics problems. It's quite dangerous to move water and fuel. So we're trying to make sure that other verticals outside of those two primary verticals have the options to get their hands on the product as well.

Hisham Allam: Interesting. Um, scaling means funding; and that is where it gets thrilled. You are building a deep tech hardware company in a funding environment that is not always kind to hardware. What has been the hardest part of raising capital for decentralized water solutions and what kind of investors who want to get it, versus those who don't want to get it.

Jonathan Criss: Yeah. It's, it's been quite fun learning about the investor landscape. That was a new one for me. We've been pretty fortunate living here in Southern California to have one of the largest hard tech hubs, in the nation or in the world. Where everyone here is coming out of these great hardware companies, SpaceX or Tesla, and, and starting to build, in the hardware space.

So, you know, getting people to understand, hey, we're building a hardware company has not been the like, big challenge. The challenge has been explaining to people that haven't witnessed water scarcity themselves, that, this is a major problem globally. We can apply our backgrounds in space, systems, fluid dynamics, and rate manufacturing to this problem and bring a viable product to the globe.

It's been really educating some of these partners in the massive problem that is water scarcity. And then once they start to see it and get it, they're like, "oh man, there's a quite an opportunity here to make an impact in the world". And a lot of people get behind that mission. And it's been a lot of fun educating the investors, but then also getting them excited. And then they're all like, who can we partner with? Who can we help you guys get in touch with? How do we get this into these countries that we care about? So, it is very exciting once we get them educated. But that's probably the hardest part.

Hisham Allam: Impressive. Uh, many development and climate areas get stuck at the prototype stage. What are the biggest barriers you have faced in moving from concept to manufacturing in South California?

Jonathan Criss: I mean, honestly, hiring is the biggest problem that we face. Why, designing hard tech, in my opinion, after getting beat up by Elon for over a decade is the easy part.

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But we're competing in a landscape of engineers that are graduating from university and thinking: "Man, I want to go work at nasa. I wanna go work at SpaceX or Nvidia" - these are great companies that are innovating really fast. Hmm. We have to, we have to not only rally to build a product that these young engineers want to come work on, but build a company and a brand that is meaningful.

So one of the main challenges as the founder of this company has really been building the ethos and and the core of the company around that, that North star that we, we strive for, which is making that meaningful impact in the number of people that have reliable access to drinking water. And then conveying that to new hires and being like, this is the whole point of why we're at this company.

This is why we're on this mission. This is how we're gonna get there. And that's by innovating on this technology. So by far it's really just finding candidates that, are willing to take a risk on a startup, but then also, look outside of traditionally very fun and exciting, rocket companies and come work at an exciting water company.

Hisham Allam: Jonathan, from your own experience, what would you tell the other hardware founders in climate and development?

Jonathan Criss: Get ready for a lot of sleepless nights and a lot of exciting challenges. I think that it's very easy to be polarizing in the climate space and it goes back and forth: you go through waves. It's quite a political cannonball at this point, but have your conviction. Take your understanding of where your company's going to go, what technology you want to advance and live by that, and be ready to actually go out there, build the product, show that it works and be the change that you want to be. That's what we try to do here.

Hisham Allam: Don't you agree that there is a risk that advanced solutions end up serving tourists, military bases, or wealthy enclaves first? How do you think about ensuring these technologies don't deepen inequality, but actually reach the communities who are most vulnerable to water stress?

Jonathan Criss: Yeah, 100%-we actually thought through this and built that into our business model. It's pretty much the same thing we did on Starlink, right. Starlink in America costs a hundred dollars a month or something. But in Kenya it's $8. So what we do is we deploy early models in richer countries that can help us understand and learn the product and drive down the cost.

And then we use that to subsidize the product and the cost in developing nations. So very similar model to what, what we're starting with here at Vital Lyfe, right? We talked about our verticals in some of these humanitarian groups, but then also direct to consumers in maritime and RVs and these people are much more inclined to pay for expensive tech, but what they're doing is they're giving us feedback and they're pushing the boundaries of how this product works so that we can innovate on it and drive down the cost.

So, we've really built that business model of like, okay, let's get a core group of stakeholders that are early adopters of the product, really show us how, how they can own and operate it. And then we can feedback,

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use that feedback for our next product, which is the much cheaper, much higher volume product that we can really start to deploy in the hundreds of thousands in developing nations.

Hisham Allam: So, let's dream big about the impact: if we meet again in 10 years and your business model has succeeded beyond your expectations, what has changed for people on the ground? What did the most concrete human outcome you would want a listener in a fragile or remote community to feel in their daily life?

Jonathan Criss: Yeah, that, that's our zero trillion. The dream that we have is women and children no longer have to walk miles to fetch water every day. They can go to school and really be, an impact in their local community. We have a vision where data centers and industries no longer landlocked. Where the developing countries are no longer driven down by the health impacts of drinking dirty water. It's a trillions of dollars of global productivity unlocked by solving for zero; zero people without access to clean drinking water.

Hisham Allam: This is very ambitious. Jonathan deep tech like yours gets hyped as climate saviors, but credit argue, VC cash flows to flashy demos for resorts or bases, not villages. How do you counter that, and what happens if high-end the markets dominate first?

Jonathan Criss: We strive ourselves in making sure that we're making those impacts. You know, our team just got back from Columbia where we did a demonstration with a really small village that doesn't have any access to reliable water. They wait for a boat to show up maybe every two weeks. And during high season it doesn't even come. We strive ourselves in making sure that we are partnering with those groups early on to make sure that we're not building a product without our end-customer in mind. And as we said, the end customer is those people in remote villages. So we need to make sure that we keep them at the forefront of what we're designing and building every day.

Hisham Allam: Jonathan, thank you for sharing your journey from, uh, reusable spacecraft and global satellite networks to decentralized water systems for communities on the front lines of climate change.

For listener, this conversation is a reminder that the same engineering mindsets that puts satellites in orbit can also be. Re-imaging to deliver something as basic as glass of safe water in places where traditional infrastructure simply doesn't reach. If you found this episode valuable, please follow and share developmental dialogues with colleagues working at climate humanitarian response and infrastructure.

I'm your host, Hisham Allam. Thank you for listening and see you next time. Goodbye.