Season 2- Episode 10

Donald Pearce: My name is Don Pearce and I'm a subject matter expert in strategic trade controls policy, transnational criminal investigations, and national security issues at Torres Trade Advisory, an international trade and national security advisory firm. Today we're joined by Dan Cohen, CEO at Flite and a senior executive with experience in both early-stage ventures and other very interesting opportunities in bringing new technologies to the market. Dan, thanks for joining us.

Dan Cohen: It's my pleasure. Thanks so much for having me.

Donald Pearce: So, before I jump into what I referred to as the probably most "nerdtastic" job I've ever heard, maybe you could tell us a little bit about yourself and your background and how you found yourself with flight.

Dan Cohen: Oh, that's a good question. So, I've got like a lot of entrepreneurs a sort of non-linear background. I started off in information technology and the deeper you get into IT the more you get into a company's real need to be innovative and be aggressively innovative. So, the conversation moved away from bits and programs into what are we doing here and how can we do it better? And that led into the innovation circle. Once I was talking to companies about innovation the door opened up and I began having conversations about innovation strategy, research strategy, and getting away from IT and into other areas. And it all happened so naturally over the course of 20 years, it's almost difficult to say when it began and when it ended. So, over the years I have worked in complex systems and strategy and then moved over to life sciences for eight years. And now I'm working in material science since 2017, and a lot of clean tech in between. So, no straight lines, but that's the story of me and my background. Over the last 25 years, I've worked for more than 50 startup companies and started five of my own, Flite is the fifth.

Donald Pearce: Wow. Tell us a little bit about Flite.

Dan Cohen: So, Flite Material Sciences was born actually when I was working for somebody else in the solar sector, working in the solar industry out of Canada, we were looking for ways to keep ice and snow and frost off of solar panels. We could have more northern installations. And I went to the coatings market and didn't find what we were looking for. And I went to the research markets because that's familiar territory as we'll get into, I suppose, during the

conversation. And I didn't find what I was looking for. There were coatings that were great at keeping ice soft surfaces, but they tended to be black.

Which is not the best thing for a solar panel even though I wasn't a deep technologist, I knew that much. And others were interesting except they were so highly toxic that it sort of went against the story we had to tell as a clean energy company. So, we found this work that was being done at the University of Rochester by a professor who said he could keep ice, and snow, and frost off our panels without any coatings at all. And it seemed very counterintuitive, but we went down to see this distinguished gentleman, Dr. Chunlei Guo, and he demonstrated in his lab that he was able to keep water and things off a variety of surfaces with no coatings whatsoever.

And during the course of our investigation, we asked, have you licensed this to a solar company? And he said, no. Well have you licensed this to a glass company so we can just buy the glass and go back to work? No, not yet. Well, professor, this is brilliant stuff, have you licensed this to anybody yet? And no, not yet. It's still, it's coming out of the lab, and we have some interesting conversations, calls we're getting from corporations, but we haven't put it out in the world yet. So, we asked him about commercialization options and went to the University of Rochester to talk about commercialization license for this technology, and that was the birth of Flite because it's easy to imagine when you see this technology, how it might apply to ships and planes and food packaging and everything else. People ask all sorts of questions about the things they can treat. So that was the birth of Flite material sciences.

Donald Pearce: That's amazing. Let's talk a little bit about that technology. So, you mentioned that it is not a coding. How does this work?

Dan Cohen: Well, again, it was a bit counterintuitive, and we do find ourselves sort of educating the world about this. In the early 1990s, research was done with lasers to make them, the word I'm looking for is go faster, the layperson term is really oscillate faster. So how fast can you drive pulses of a laser into an object? Now a lot of people, when they visualize lasers, they see a continuous beam of energy coming from a source to a target. And that's how things like DVDs are read or laser printing is done.

Donald Pearce: Lightsabers.

Dan Cohen: Lightsabers. That's actually, I think I've got one in my office somewhere for this purpose. But pulse lasers have a lot of applications that are very important. And the faster you can pulse a laser, the faster you can do laser-

based communications, for example. So, the first femtosecond lasers, that's a quadrillion of a second, were demonstrated in 2003, and it opened up a new era because when you apply pulse lasers at that rate to materials, unusual things start to happen. It's not just transferring the laser energy to heat up or burn or cut a surface. But it has interesting effects of putting energy into the surface without building up a lot of heat. And one of the things that this professor and others since then have experimented with is what this does to the metallurgy, or the crystal layers of a metal, what this does to the surface of plastics and glasses. And so, Dr. Guo's work was all about how femtosecond lasers interact with matter in an unusual way. And produce these delightful results of making surfaces that can be tuned to repel water, or repel oil, or kill bacteria, or just change the color without any chemical changes whatsoever.

Donald Pearce: Wow. Let's talk about the process of finding these types of innovative technologies just sitting in a laboratory. I have to admit when we spoke earlier, I was just fascinated by the fact that there is this potential to find cutting edge marketable technologies just sitting in a lab somewhere. Maybe tell us a little bit about that.

Dan Cohen: So, this field is called technology transfer and it applies in a few areas, but broadly when we talk about tech transfer, we talk about moving it from an academic or research settings into a commercial application or commercial utility. And there are just shy of 4,000 universities in the United States, about half of them have serious research facilities, and not just the Stanford's or Harvard's of the world, but every state university has funded research labs. A little more than 55% of all the research funds come from federal sources, and there are professors working in labs, working on all sorts of technologies all day. And their goal really is for academic purposes to be able to author papers and get grants to create new inventions and you know, make presentations at conferences and bring prestige to their research institutions to attract more students, to attract more grants, and that's the academic cycle that they're on.

As a result, an awful lot of inventions get disclosed to the university. A little more than half a million by now since the late nineties. But the machine that takes those inventions and gets them out into the world is not matched in size. So, if you go to the university closest to you wherever your listener is, and you knock on the door and you say, where's the Office of Technology Transfer, or The Office of SP sponsored research, unless it's a large tier one university, you're likely to find a small office with a few people in it who are responsible for identifying these inventions. And patenting them and helping to apply for grants, but also to try and help find somewhere in the world they could be

turned into utility. Usually that's by licensing, so they'll call up Ford or GM or Ikea or Sherwin Williams or any company in the medical field. And say, we have a new invention coming out of the lab that it delivers drugs in a completely new way without piercing the skin or shows you about cracks in metal without using any harmful x-rays or just about any field. So, every university in the United States has one of these offices, if not multiple offices, and most of them have hundreds to thousands of inventions just waiting for someone to come along and say, I think this would be useful to either bring into my business and make my product better, or I think this could be something I could start a business with. All this under, of course, the legislation of the Bayh- Dole Act and intellectual property.

Donald Pearce: Let's talk a little bit about that. How do you overcome those obstacles?

Dan Cohen: Well, there aren't really obstacles. They just help to make sure that when an invention is created in a university lab, especially if it's an invention that might be patentable or protectable in some important way. That the benefits to its use wind up coming back to, in some way, the organizations that funded it. Again, almost 60% of all of this work is funded by federal sources, and then there are state sources and foundation sources. So, they just want to make sure that if Dan comes into the office and takes this new drug or new device or new machine, that some of the revenue comes back to the university and then ultimately back to the inventor in his lab. And that's what this legislation is there for. So, I don't really see it as an obstacle. They're really operating under this premise, and it's a perfectly logical and reasonable and moral premise to see that the benefits go back to the institute.

Donald Pearce: It's nice to see that something that's regulatory is not an obstacle to innovation. I'm just so programmed for that.

Dan Cohen: Got it.

Donald Pearce: So, you mentioned background in biotech, and we've been talking about some items that could clearly be used in the biotech industry. Do you feel that the United States or the U.S. Educational system in particular is, well positioned right now to bring out the next generations of drugs or biomedical devices? Or do you think that there's room for improvement in projects or in a particular field within the biotech industry?

Dan Cohen: That is a very tough question. I think that the innovative spirit in the universities is alive and well and thriving, and that even though funding in

places like Europe and China for some of these programs far exceeds what the United States has in terms of federal programs outside of the DOD, of course. That money is not necessarily the issue that the United States continues to show great leadership and innovation. The issue is more in on the people side of things. Students are not tempted to go into research as much as they're attempted to go into things that have better pay, better prospects for employment and better chances of fame. The lure of the tech startup as an example, is something that will pull people away from long academic careers in invention, hoping for something with a faster return. That's my take on the cause and effect of this, that students would rather study business or computer science or computer engineering, hoping to become a tech unicorn and not the kind of slow long painstaking research that is required in areas like biotech, biomedical engineering, material science, photonics. These are really hard disciplines. So, every great lab that I've encountered in North America is suffering from a lack of students willing to go through the process of becoming a leading academic researcher and finding that they have to bring their students in from China or from Europe or from Iran. And places where the interest in becoming a researcher or an academic is still high, and the level of patience is still high. That may be a very personal statement on the change of culture, but that I think is more of a bottleneck than any financial or regulatory problems.

Donald Pearce: That's interesting. Do you think you've got a potential cure for that? Or where do you think we should be looking to try to prime that pump for brains?

Dan Cohen: Well, it's good to know that there is work. Things are shifting now and, manufacturing, because of some great movements like the CHIPS Act are going to be coming back to the United States. None of this is going to happen quickly, so it's a good time to prime the pump as they say. The number of people studying photonics and or material science in the United States to me, is not enough to meet the challenges of what's coming in the next 10 to 25 years. But it's a great time to say based on the need for that, we're going to pay for students who are willing to go into photonics knowing there's a hundred percent job placement afterwards. And knowing there are opportunities to become inventors and to be on the cutting edge of something exciting without sacrificing their desire to be inventors and have commercial success. So, I think money can redirect students a great deal. The visa program, I know is a tough hot button issue, bringing in students who want to immigrate to the United States, and study there has to be seen more favorably and less as a threat, if it's well handled. I don't have great suggestions on how to change that mentality or process, but I think it's a definitely a very important ingredient.

Donald Pearce: Let's talk a little bit about the photonic side of this as well. It seems that perhaps not as quickly as Moore's law, but it seems that laser technology has a very quick timeline as opposed to maybe 10 or 20 years ago. Do you think that the ability of a startup or a research and development organization to draw new blood in by saying we're not going to have to be working on this for 20 years, we're about five years out. Do you think there's a way that we can kind of tweak the system so that we can draw those minds into that type of research?

Dan Cohen: That's a sales job. and it's a good sales job to have because pointing to something like laser technology and saying we've only scratched the surface. Look what lasers are doing in communications, in material sciences, lasers as cures for diseases and treatments. Lasers for marking and decorating. It's hard to imagine not painting an aircraft but using a laser instead. But we're pretty close to that. So it's great to be able to point to all these wonderful things and say, this is the industry you can go into and be and be considered a groundbreaking inventor. Whereas, people graduating with undergraduate degrees in computer science or computer engineering or business degrees and creating one of these wealth producing companies may seem like a lottery ticket for some of these young people. And the possibility of going into something where they require. A doctoral degree post-doctoral work, and maybe five years of committed work afterwards, before they become the inventor of something miraculous, may seem like a very poor second choice along the way. So, it's a difficult cultural problem to overcome. But it's not impossible. If we could do a better job across the board of saying these are exciting careers where you could become an inventor. You can get prestige, you can have job security, you can create wealth. There's opportunities for travel. The labs are well funded. These are great ways to market these opportunities. But the material to do that is not quite as abundant or as visible as becoming the next Facebook or the next Chat GPT. So, this is part of the reason why international students who are looking for more general opportunities in immigration possibilities are attempted to come to the United States. And these are the candidates who are now filling the roles in academic labs across the country.

Donald Pearce: So, let's switch the focus to those who would be looking at a startup. Let's say, I was an entrepreneur and I'm a former government guy, so I'm not really entrepreneurial by design. But let's say I was, where could I start to find these types of opportunities at research labs?

Dan Cohen: Well, I wouldn't want to send you to a particular lab and I wouldn't want to say here's a giant website with 40,000 options, because that's like sending somebody into Costco for the first time and it's kind of a shock. It's

easier to start back at the conversation of where do you want to go, how do you want to change the world? And that leads you down a pathway if you're interested in drugs or diseases. If you're interested in materials, if you're interested in communications, or you find you want to help people who are suffering from depression, whether that's young people or veterans or if you it could be something completely different. If you want to explore design or architecture. So, all these things are important questions.

Once you know what focus you have in the world you can go to places like Flintbox or Impart, or just start looking at patents which I guess is a bit of an intimidating task as well. There are places in your local university, wherever you are to start as well. Wherever you happen to be, go to the state university, go to the Office of Technology Transfer, they have a website, and you can just start looking through inventions that they've listed. And the inventions are a little bit technical, but they also talk about generally how these things apply in the world. We've got a new way of getting a drug into the body without piercing the skin, et cetera. Things we've talked about before, would you be interested in this? And that is one click away from a conversation with the inventor and the Office of Technology Transfer about how much money has been put into this research, how long it took where they are in their development stage on the technology readiness level scale. So, you know, if it's really brand new out of the lab or if it's been tested extensively.

And so, if you are interested in that discovery, you can ask the university for an option. And what they'll do, unless somebody else has already been asking for it, is to say, Dan, if you're interested in this, we're going to take this and give it to you on conditions for a little while, for a very small fee, and then you can take this invention and say, now it's in my hands. Now I can go and start to talk to people in the world about how much of a difference this invention will make compared to what's currently out there. How different is it? How groundbreaking, how hard is it? Once you leave the university with that option you can go to any one of the great accelerators in the country. You can go to Y Combinator or Techstars, as examples and there's many others. To say, I think I'm an entrepreneur and I have this interesting technology in my hand. What are the next steps?

By the way, the Department of Defense is doing this directly with the Air Force and Army who are also technology transfer centers, we can come back to doing this with the military afterwards. And they will take you on a 6-to-16-week journey through asking the right questions. How interesting is the market? How prepared am I? What kind of a team do I need to assemble? How much money do I need to raise, if any, to get this going? How do I talk to customers? And

when you graduate, you are one of the many early-stage tech startups the president of your own company with an interesting technology in your hand and licensed to go talk to anybody in the world about how this can make a difference and you're truly on your way.

Donald Pearce: What advice would you give to someone who, let's say, is considering jumping into an entrepreneurial opportunity like this? Like maybe is there something that you might have done differently when you started? Or when you started, what were the things that were the turned out to be the best ideas that you had?

Dan Cohen: Well, for one thing, as a new entrepreneur the advice I would give is you don't have to know everything. There are people you should be able to talk to about technology, about sales, about marketing, about the law, and you should be leaning on these people heavily as your extended team until you can build a team as your own. Being an entrepreneur, people talk about it as a culture, and there's quite a bit of truth in that. If you are an entrepreneur, at heart, nothing's going to stop you. There are no obstacles that will really stop you from going where you want to go. And if you're not really an entrepreneur, then some of these things are going to seem extremely intimidating, like a lot of hard work and carrying a lot of doubt in those early years. And I'm not sure if anybody's advice would get you past that, except ask the question. If you're an entrepreneur, then go through it. The university is there to help you. Unfortunately, in a lot of institutions, the amount of help they can give on the entrepreneurial side is a bit limited, and that's why I'm steering the listener to these accelerators because that's what they do extremely well. Year after year cohort after cohort is making these entrepreneurial people into entrepreneurial performers, and they have tremendous support networks to help do that as well as mentors.

Donald Pearce: Well that actually motivates me because I feel like perhaps, I should be developing the next great compliance technology to help companies get through these. So, let's shift a little bit and talk a little bit about compliance. I know that this isn't your field of expertise, but from your standpoint, when do you think a company, or a startup should start thinking about compliance issues?

Dan Cohen: Well, that starts very early. It starts early because one of the principle questions with a new toy that you have in your hands to bring to the world is, where am I allowed to sell it and not allowed to sell it? It starts with the license that you took from the university or from the inventor. And that may be a license only for the United States. It may have been funded with federal

funds or defense funds, and then you may have limitations on where you can just take that into the world. The second question of compliance is not just in compliance with the laws behind the license, but, in the industry where you're going.

So, if you know for example, that you've got this interesting new way of getting a drug past the skin, then your compliance obstacle, not an obstacle, but a pathway, I don't want to call it an obstacle and characterize it as strictly a negative, is the FDA. And they have a process for taking a new invention and allowing it to go into the public sphere. And that helps to shape how you do your tests and what kind of statements you make about the technology you're carrying so that you don't misrepresent it. So, if it's not the FDA for drugs or food, it is the FAA for aviation. It's the federal safety transportation bodies for if you want to have drones or self-driving vehicles. So, there's almost always a regulatory body somewhere down the line, or even just a standards body that you have to contend with. And if you're not familiar with the issues behind them, then the people you go to as your team members are investors will find you less credible.

Donald Pearce: Dan, thank you so much for joining us and for shining a light on something that I, up until I met you, hadn't realized was not even going on. So, thank you again and please feel free to keep in touch with us and perhaps we can talk about this once the CHIPS Act starts getting some of this money into some of these projects.

Dan Cohen: Oh, it'd be my pleasure. It's my favorite place to be. Once you get bitten by this bug it never leaves. So, I'm ready to talk anytime. Thank you very much for having me.

Donald Pearce: Thanks again and thank you for joining us.

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