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VIP Fireside Chat:

Secrets for Success – Learning from the Past & Planning for the Future, Dr Mary Lou Jepsen, Chairman of the Board, Openwater

led by Harry McCracken, Global Technology Editor, Fast Company

Featured Speakers:

Dr Mary Lou Jepsen, Chairman of the Board, Openwater
Harry McCracken, Global Technology, Editor, Fast Company

Harry McCracken, Global Technology, Editor, Fast Company
Thank you so much for joining us. This is going to be fun and intriguing and inspiring, I think. Shall we just dive in?

Dr Mary Lou Jepsen, Chairman of the Board, Openwater
Sure, okay

Harry McCracken, Global Technology, Editor, Fast Company
We just heard about some but not all of your accomplishments, you've done a lot of interesting things leading up to this. Your work currently with Openwater, which seems ambitious even by your standards. So just to set the stage, talking about how this company came to be and the problem you're trying to solve and the approach you're bringing to it.

Dr Mary Lou Jepsen, Chairman of the Board, Openwater
I guess I'll start with something, I know how all of you in this room are going to die, so half of you are going to be taken out by cancer, or cardiovascular disease, heart attack, stroke, then the next 25% by diabetes, kidney disease, infections, like COVID and other things. If you're lucky enough to get to 80/90, you're going to be taken out by neurodegenerative disease. So we know this, we all think somehow we're immortal. And statistically, we know this to be true. So I thought why not work on these problems. And so I was very happily at Facebook working on advanced virtual reality and augmented reality seven years ago, running the advanced group of that to enable us to get beyond the screens you were all staring at. You know, and I'm all for screens. I love that we've made the laptops and cell phones and other things. But I noticed some things happening discontinuities in Moore's law that might enable us to address this - how we're going to die problem that I thought was more important. So I thought no one else sees this. Like the fact that pixel sizes on camera chips, were going to go to smaller than the wavelength of light to enable a different type of physics that I thought could let us see inside of our bodies in higher resolution, a very low cost higher resolution than MRI or CT. These multimillion dollar scanners that have probably saved many of our lives, including mine, and that we could turn it in reverse and right our bodies as well, to start to address cancers and mental disease and neurodegenerative disease. So as crazy as that was, I thought, well, no one else is going to do it. So I should and luckily, I was very well paid at Google and Facebook and so could self-fund because I couldn't get anyone to write a check for it. But seven years later, we're making huge progress. That's the Genesis,

Harry McCracken, Global Technology, Editor, Fast Company
you're building hardware. Can you step us through exactly what it is that you're bringing to this

Dr Mary Lou Jepsen, Chairman of the Board, Openwater
Sure, we're building a single piece of hardware that can cure cancer, mental disease like depression, OCD, addiction, neurodegenerative disease and stroke, which is our first product. And we're doing at very low frequencies, and very low intensities, in the sound of case of sound, low frequency ultrasound. And so what we're doing, for example, for cancer with human glioblastoma, a fatal form of brain cancer. And this could work for all cancers, we noticed that there was a mechanical property for all aggressive cancers that none of the current therapies exploit. The current therapies are basically radiation and chemotherapy that harm both the cancer and your healthy cells, although they harm the cancer more. Like that's why you lose your hair and so forth when you have treatments. But we noticed that it had a mechanical property these fast growing cancer cells that were akin to the mechanical properties of a wineglass and its brittleness and an opera singer could burst that glass and not harm anything else in the room at all. So we tried it, we grew up these human brain organoids, which you can do now we've got 1000s of little brains that are in Los Angeles at UCLA. And we grew glioblastoma on them. And we compared our results of finding the right sonification parameters to kill the vast majority of those cells to chemotherapy, best drugs, were only 5x better right now than the best chemotherapy for cancers. And this can apply to any cancers. So we're growing up all these mice right now a few hundred mice and we should be I hope ready for compassionate use for humans at the end of this year, because glioblastoma is a death sentence. But then we have other agencies coming to us saying, can we try this on other aggressive cancers that also have these properties. So we can find basically the magic harmony of sound that basically blows up that cell. And when you blow up that cell, it's not like it's ballistic, it just sort of belts, but it

releases proteins that then vaccinate your body against the very cancer. So now Big Pharma is coming to us and saying, hey, we have these drugs that don't totally work. But maybe as an adjuvant as a helper therapy, we could also use this drug that's not working to sort of two shots on goal for cancers, why not because you want to make sure if you can get your immune system working to fight the cancer, that's pretty profound. And all of this can be done. Ultimately, in the home, like there's no reason this can't have CEE clearance or UL clearance to be used at the home. But we're going through the FDA, because, you know, honestly, it's my first health care product, I've got lots of regulatory clinical people, neurosurgeons and so forth, helping us navigate through the best way to do it, but we just tried the headset right before the holidays. And then we helped another 10 patients for mental disease, for treatment resistant depression. And what happens in depression is you can actually see it on an MRI - neurons are over firing, you go into a loop, the technical term is ruminating on negative thought. And for example, in your default mode network, which is here, and here. You can see under fMRI areas lighting up so what we're doing is at different frequencies, and those are just firing exactly to those areas to quell those neurons. The patients report a feeling of euphoria, they then score lower on scores of depression, and the MRI changes, we no longer see those hot areas. So they all seem correlated, we've only done I think, 15 patients, we're starting a serious trial. This year, we wanted to get the frequencies right and the dose level, right. And now we're being pulled to do that with the same unit for you know, neurodegenerative disease, for addiction. Like when your arms are depressed, we want those thoughts to go away. So you grab for the bottle or the drug or the gambling, whatever the thing is, and so that makes other areas fire over fire. So all of this leads us to brain computer interface ultimately, which might sound offensive to all of you. So we could say, collectively, we don't want to know how the brain works. We don't care about glioblastoma, mental disease, neurodegenerative disease, stroke. We just don't want to know let's not touch it. But if we touch it And we start to cure those diseases, it naturally leads to brain computer interface. Slowly, I think it'll be like Dragon Naturally Speaking of the 90s for a while, and then all of a sudden, there'll be some breakthroughs in AI. And it'll get really good. But one of the reasons I left Facebook to do this was also that we could talk about it. Because if we can talk about it, we can set rules on what we want for brain computer interface and what we don't want, and then try to follow those rules. If we can figure them out.

Harry McCracken, Global Technology, Editor, Fast Company
Are there any basic unsolved challenges ahead for you? Or do you kind of know where you need to go, and it's just a matter of chipping away at it until you get there.

Dr Mary Lou Jepsen, Chairman of the Board, Openwater
It's regulatory. So our first product is a stroke detector for large vessel occlusions, which is strokes, the number two killer in the world and the vast majority die of something called large vessel occlusion, which is the large vessels which basically block more blood downstream. So if you block one of these three vessels in your head here, anterior cerebral, middle cerebral, superior, middle, cerebral, inferior. The majority of people that get that die or don't walk again, don't talk again, don't have a job to go home again. And there's no reason they have to, because we know how to solve clots, we know how to remove clots. So why does so many people die of stroke, it's a time to diagnosis crisis. In the ambulance are at the first point of care of hitting the healthcare like we have a hub and spoke model. Now that patient needs a thrombectomy, they need some means snaked up their carotid artery, and the clot pulled out. But that's not the healthcare doesn't route everybody to the thrombectomy lab, you have to go to the nearest

hospital. By law in many states by ambulance, where you sit behind in our country, the gunshot victims, the stabbing victims, the heart attacks, because it's apparent what they have. So after you get through that, and you get maybe a scan, they figure out oh, there's a stroke, so then they call the helicopter for you. But it's another two hours till you get to the cath lab, there's a two hour window from stroke onset to thrombectomy, where 90% of people with a large vessel occlusion will have no neural deficit whatsoever if they can get that thrombectomy. But right now, it's our 8,9,10. If you're in the rich countries, and if you're not, it's much worse. And so we are actually literally using a camera chip and everybody's phone that has that pixel size, the size of the wavelength of light, we made a really cool laser that pulses. And when we get a bad hologram from that laser, because since we have pixel sizes, the size of the wavelength of light, what our image on that camera chip looks like is like ocean waves. And if we see high contrast ocean waves, that's really bad, because there's nothing moving. And the only thing moving in 100 microseconds and your head is blood. And so that's like, whoa, that's get this person quickly. If we see low con regular low contrast, we know okay, the blood is going through. And so that's how, how we diagnose it. And we've now amassed hundreds of patients over the last few years by scanning people having a thrombectomy right before their skin to amass the data to prove this to the FDA. So we can never tell what the FDA is going to do. But we expect approval next year, we'll get another close to 1000 patients this year to collect that data. So sorry, I'm distracted and explaining that.

Harry McCracken, Global Technology, Editor, Fast Company
this conference is about IoT and security and all kinds of CIO concerns that are not necessarily glamorous, but really important. How many of those issues do you have to deal with along with all the stuff more specifically related to the health aspect of what you're doing?

Dr Mary Lou Jepsen, Chairman of the Board, Openwater
all of them, we're dealing in hospitals and ambulances. And so all of these things that you're talking about are very relevant. It's very interesting to hear all the architecture issues, and I was just seeing the cover of photonics background. And in fact, I met my husband at NFOEC if you remember that the National fibre optic engineering conference. So anyway, he has a background more heavy in telecom than I do. But the issues are real in hospitals, the infrastructure, I worked at Google, right in Facebook, like we're used to good infrastructure, you go to a hospital and like the internet's you know, like, oh, you can't get it in this room. And like, there's just so many things and it's free space optical interconnects could solve some of these issues and other things. But yeah, I know it's highly regulated. And there's, I don't know why anything in the hospital I have to click like 10 times and wait an inordinate amount of time to get through another but every minute counts, and in many procedures, and as we're intersecting with it, it's rather frustrating that their perception of the patient's anonymity seems more important than their care when those minute counts situations that I witness. And I know it's hard because I talked to the same people who, at best are trying, you know, to hold the line and make sure nothing bad gets through, but these people are dying. And it's a million neurons a minute that you lose in these cases more than so I don't know, is there a way to speed it up? I know, 5G should speed it up. But I know you're all working very hard on it.

Harry McCracken, Global Technology, Editor, Fast Company

We'd love to take some questions from the audience in a moment or two. So think about them. And I'll come back to you in a moment. But how much of this is a software issue? And does AI, which is the biggest topic right now in general play a role in what you're doing?

Dr Mary Lou Jepsen, Chairman of the Board, Openwater
Yeah, it all becomes a software issue. I do consumer electronics, you know, we live on 2 to 4% margin. Ultimately, not when it's new, you can charge more, it's new and we break through, but that's where you get to, but can for health, can we leverage the trillion dollar manufacturing infrastructure, which is happy to live on that, like anything you go and touch in the hospital $100,000, the most expensive rooms in the hospitals are the imaging suites by far. And so we can take those out. And so this all becomes an AI play, it all becomes a data play, as we you know, and the manufacturing infrastructure is interested in doing that, because they can start at much higher margin than 2 to 4% for innovative products that can cure the diseases that we're going to die of. So everybody's in on that, right. And it also changes like, what is the hospital of the future? Why is there a brick and mortar place? I mean, do you need it? I've spent lots and lots of time in the hospital. I I'll spare you. But lots and lots time, it's the worst place to sleep. By far, you're far better at home. So you go for imaging and for surgeries, basically, and for nursing care. And if you're solving that, that's also an IT problem, as you know, and the AI problem and yes, all the security, cybersecurity, there really are bad actors out there. So it can't and it is 20% of the economy as well. So can we do it better? Where can we do it? I've just been in a lot of meetings with the FDA. I don't think the US is the place that's going to innovate here. Just because it's such a large country, can we get some of this stuff working in a smaller space that can try the experiments? Is that it? Which country is that? Where do we test this technology? There's a lot of tests going on right now. But that's it, I can go into many, many reasons on the regulatory issues. And of course, as an American company, we're walking through everything with the FDA, but other countries seem much more hungry to go faster, especially because, did I mention diagnostic levels, like our stroke detector, there's more light in your optical mouse for your computer than thing that goes on your forehead, like it's really safe. And the detectors are in every single smartphone in this room. And it's non-invasive, it's a little visor we put on your head. So you know, the meaning of the data needs to be proven, but the safety of the devices. You could view it and you know, approve it or see market and same with the ultrasound units that we're using to resonate your head. Those are at extremely low levels. And so it does become this data play as we get them on more heads and more bodies. And then we learn more about our bodies, which I think we're interested in. Most people want to learn about it. Some people don't, they don't want to know it's true.

Harry McCracken, Global Technology, Editor, Fast Company
why don't we take some questions?

Hans Steeman, Dutch IT Channel
Hans Steeman from the Netherlands. In fact, what you're developing some kind of microbe pills that sit in your body. They are floating in blockchain somewhere

Dr Mary Lou Jepsen, Chairman of the Board, Openwater
micro pills,. Is that what you're talking about?

Hans Steeman, Dutch IT Channel
How do you bring these micro pills to the area that the problem is and let them stay there

Dr Mary Lou Jepsen, Chairman of the Board, Openwater
we don't even need to. so if you do a pill that's a class three device, although I did see a very interesting pill in the middle of the night I was awake, and it just vibrates and it helps your digestive tracts. It just moves around a lot. So, it's a high frequency vibrate, which is interesting. We don't need that because we can focus to submillimeter anywhere in your head that we want to with light and sound, anywhere we wish to. And that can allow us to read the state of your neurons and write the state of your neurons. Because if you think how neurons communicate with calcium channels and stuff, we just basically open or close up the way, that's the charge, is building up to that synapse to connect it to the next neuron. But we don't need to go in at all. So we're class two or class One - like a band aid. The drug takes $1,000,000,000,10 years and only works 20% of the time. That's like the gold standard for Big Pharma as they say themselves. And it also doesn't work on women because women are less well just statistically. And so there's a lot of work and Big Pharma trying to make sure that they can figure out with precision health, whether the drug will actually work on a certain person, depending on how they phenotype you, but if you do a drug, you need a billion dollars in 10 years. If you're doing a camera chip that's working in a smartphone and a laser, we've worked very hard on this laser - took two years, but we can put it into mass production and we're slipstreaming on the laser being developed for LiDAR, which is one of the enablers for autonomous even though Elon doesn't like it, actually see 300 meters at 300 Pixels Per Degree and make sure you don't kill the kid and so forth. And it's cheap. It should be sub $1,000 and then sub $500, that whole unit and the laser is $500. So why do you have to take the pill given that if you're ingesting something that's 10 years and a billion dollars to develop with a 10% chance of getting through FDA. And once it gets through FDA when you look for the next 10 years, it only works 20% of the time. So those are, those are so awful. With that, those specs, that's a lot of money to be spending

Hans Steeman, Dutch IT Channel
inaudiable

Dr Mary Lou Jepsen, Chairman of the Board, Openwater
No we put a visor on it that either has light going in or sound in the case of the head, but on the body. It's a patch, on the skin.

Harry McCracken, Global Technology, Editor, Fast Company
I saw some other raised hands.

Prof. Martin Curley, Chair of UN Digital Health Symposium
hi, Mary Lou. Martin Curley, currently from Maynooth University and the lead of UN Digital Health Symposium, fascinating talk, and congratulations on what you've achieved. And you mentioned healthcare is 20% of the US GDP. If the airline system worked, like our health care system, none of us would have showed up here, this event. so how come you know the business the industry that is actually so vital

to all of us, is probably the most dysfunctional industry on the planet. You know, we're a laggard in digitalization. We're a laggard in manufacturing science. And are you optimistic that this industry can be transformed because we have spectacular examples of individual clinical innovations. But nobody seems to be taking the system's view and how we might structurally transform the industries all around the world. A nice article this week talking about the imminent collapse of the US healthcare system was no different than France, or the UK and Ireland. So what are your thoughts? How do we fix this as a complex adaptive systems problem?

Dr Mary Lou Jepsen, Chairman of the Board, Openwater
Well, I love what you're doing on it. We spoke briefly, and his keynote is tomorrow and you have to see his talk because what he's working on is, well, you can speak to what you're working on, but digital technology really improving and not sick care about health care, like catching things early in action. Luckily, most of us want to live. So I'm betting on that being the Trojan horse, but very hard to get to get approvals. When the FDA has to take the definition of, say a seizure. A seizure like the FDA approves seizure things when kids are sleeping because the definition of a seizure is defined by a group of neurologists and neurologists never agree. So they say three people have to agree that it's a seizure. And it has to last more than, for example, three minutes. So meanwhile, kids are dying of seizures in their sleep, because the parents can't be woken up, because it's a very easy thing to put a patch on, like, and so it's an all-volunteer club, that decides the definition, and the FDA has to use somebody else's definition. It's like that for everything. And so I think that going into another country first, could go faster than fixing that - the neuroradiologist wants a job and they're threatened by Google, like, really, information is threatening, my gosh, maybe we should stop all publications, because it's too threatening a patient might read a paper on their disease or go to a conference on their disease. I mean, I don't, but I hope that somebody else can in a different country. And I'm really happy to work with a different country or a different entity that can go faster through these issues. Because if a single payer like, okay, do we want a kid to die of a seizure? I wear a watch, it tells me a lot of information. It seems so broken when you get into minutiae like that, and it's every disease, and it would be sensible, and I think whoever has the disease, if they can get the information would opt out and try it themselves. But then they try to make those services illegal, and like you can learn a lot from the patient's themselves on a certain disease. So I'm hopeful for it, because people want to live. And there's well-meaning groups working on this, and they're trying to follow the rule. No, we can't break the laws of countries who can't break the laws of physics. But maybe we can change the laws of countries to be more sensible to keep us alive, because there's a lot of opportunity. So how do we do that? Where do we do that? I know you think deeply about this.

Prof. Martin Curley, Chair of UN Digital Health Symposium
So welcome to Ireland

Harry McCracken, Global Technology, Editor, Fast Company
has working on healthcare made you more or less hopeful about getting to a better place, especially with the state of the US health system?

Dr Mary Lou Jepsen, Chairman of the Board, Openwater

I get to meet other people also doing great work. And you don't actually have to be a good manager if you switch to health care, because everybody wants to sort of cure cancer. So that's good. And, you know, you find like-minded people. So yeah, I think I'm more hopeful. I mean, I worked at Facebook prior, not everybody likes people that work at Facebook.

Harry McCracken, Global Technology, Editor, Fast Company
So your question up front here?

Steve Cassidy, PC Pro
Hi, Steve Cassidy, PC Pro. I also have a secret identity. I did a few years in the patent attorney firm as their IT director. I was interested in the description before you came on stage, they'd mentioned that you had done 500 patents in like the last two years or something along those lines. Where did that come from? What made you decide that you needed to get a whole load of stuff patented?

Dr Mary Lou Jepsen, Chairman of the Board, Openwater
it's very interesting. I left academia, I don't publish much. I actually had to compile it because I just filed for patents because I invent stuff and I shipped 50 Different pretty unique groundbreaking products, many with multibillion dollar revenue. And to be able to use the contract manufacturing, you need to indemnify them in case there's any IP issues. So as somebody that starts with a blank piece of paper and goes to high volume, mass production, I invent and file along the way. And so in fact, I didn't actually know how many I had. But now I have a bio-sketch for the NIH because we're applying for funding for different things they want to find. So you have to make yourself look academic. And I'm like, Well, I've shipped 50 products and they have you know, 300 patents and listed them off. Because you can google and find all your patents, but it wasn't for the patents itself. It was to enable us to manufacture that we have to indemnify and so therefore, we need a claim structure that shows the uniqueness of what we're doing. So that's the only reason they're expensive. That's the only reason you would do it. About 10k A piece. Yeah.

Steve Cassidy, PC Pro
My only kind of follow up to that is do you feel that lockdown was an opportunity for creativity?

Dr Mary Lou Jepsen, Chairman of the Board, Openwater
An opportunity to create?

Steve Cassidy, PC Pro
for anybody in any creative type of Endeavour, including patenting inventions, that because everybody was locked up at home, and we were looking at a burst of new ideas

Dr Mary Lou Jepsen, Chairman of the Board, Openwater
I think a lot of people grew, we were in the emergency rooms of hospitals with stroke patients and mid COVID, where COVID got special access, but you know, we didn't, and then we were like, well, maybe we can start to loosen the clot in the ambulance, and then realize maybe we could do cancer, literally,

like 14 months ago, literally thought that we should try cancer and mental disease. And now we have human trials for those as well. So we've been more in ideation a little bit but mostly finding ways into the hospitals with by the way, hardware, the massive shortages of a global electronic supply chain, so we had to net we've been just powering through, but luckily, we're in San Francisco. By April 1, we reclassified as an essential business, because we're doing clinical trials. And because Comprehensive Stroke center loses its comprehensive stroke center thing if they stop clinical trials. And so they slowed them down to molasses, but we were still considered essential. So we didn't get to work from home. We've been slogging through, working together with n95s and the rest for the last three years. Two weeks out, we got two weeks.

Harry McCracken, Global Technology, Editor, Fast Company
I might have time for one more question.

Hector Pizarro, Diario TI
Hello. You're mentioning the legality of your work the applications, and I was thinking of the rather controversial subject, which is the use of psychedelics. In research. And the therapeutical use of things like psilocybin. And well, in my country in Chile, that would be completely forbidden because it would be classified like as a drug, much magic mushrooms, right. And but I believe that there is more an opening here,

Dr Mary Lou Jepsen, Chairman of the Board, Openwater
it's been used for millennia by shaman and as trials are stunning, it's gone from 30% successful level on PTSD with every other drug to 70 with MDMA and a therapist walking through so stunning. Here's where our advantages are, she knows how long the therapy takes. I do six hours. Do you know how that works through workflows in the office? Not very well, you know how long our therapy takes a minute and then you follow somebody and the FDA says that they're having really, it's a moment for psychedelics, and after 50 years of being made illegal for even testing in the US there's a moment and the results are pretty good. It reorganizes your brain it's not that great for chronic conditions so far. Again, the reason I know the researchers there, they're heroic in what they're doing. But in PTSD it looks stunning we're being pulled into a PTS to trial I've thought I'm like well no like psychedelics are having their moment maybe we shouldn't mess with that. But I get this six hour therapy thing how do we pay for it? What do we do, because you have therapists with you, to walk you through the idea, is if you can frame what happened to you in a different way you can see and sort of resolve some of the trauma of it, if you can see that you did everything you could in the situation. It's complicated talking therapy, plus the psychedelics that help you walk through and talk about the pain of it and that's very helpful or you could zap the part that's over firing maybe but again, we're working on some other things depression and addiction first because the PTSD results seem very good. And then the question is a couple of questions like apparently it was made illegal, because (a lot of in the US), a lot of soldiers were using it in Vietnam and it made them not want to fight anymore. Yeah, lovers, not fighters. So that's just no good for soldiers. And so I don't know, it's very complex. But we're doing what we can as part of this and maybe there's adjuvant therapy with those drugs. But you do just get into like the manufacturing line of the hospital and the six hour therapy cycle, which is very long, like a 36 hour surgeries incredibly long and expensive. So that's, I think, but Oregon, I think legalized some form of this last election. Are you up on it?

Harry McCracken, Global Technology, Editor, Fast Company
we've written a fair amount about it in Fast Company.

Dr Mary Lou Jepsen, Chairman of the Board, Openwater
What do you think?

Harry McCracken, Global Technology, Editor, Fast Company
I have colleagues who know a lot more about it than I do. And what I've learned, I've seen from them, but it seems like it has lots of potential. And overcoming perceptions might be one of the big challenges.

Dr Mary Lou Jepsen, Chairman of the Board, Openwater
Yeah, not everybody will do it. We're working on that too. Seems to be doing a good job on alcoholism too. Which is interesting.

Harry McCracken, Global Technology, Editor, Fast Company
Thank you so much, audience for those great nerdy questions. Thank you, Mary Lou, for where you've been so far. I think it's going be exciting to follow and I hope to have the opportunity to talk more about it and see this accomplish what it has the potential to do at scale.

Dr Mary Lou Jepsen, Chairman of the Board, Openwater
Thank you for agreeing to do this.

Harry McCracken, Global Technology, Editor, Fast Company
It's great. My pleasure. And thank you so much, everybody. Thank you