

Jurij Dreo: Detecting Dementia Early On

JURIJ DREO: There are 55 million people living with dementia currently globally, five to 10 million people get diagnosed every year. And currently, while there's no definitive treatment, you cannot cure dementia like you can cure pneumonia, but there are promising treatments that are effective.

But they are only effective if you catch the disease early on. So the race now in medicine and in neuroscience is twofold. There's one race, which is aimed at developing a definitive cure, but there is another race which is aimed at detecting this disease as early as possible.

RAMA CHAKAKI: This is Jurij Dreo, the co-founder and Chief Technical Officer of a company called BrainTrip, based in Malta.

JURIJ DREO: And we are a company that does translational neuroscience and that's a mouthful to be quite honest, but what it means is that we are a company that takes basic science research in the field of neuroscience, which is the the part of medicine and science that deals with the brain and the nervous system. So we take that basic science knowledge and we attempt to create practical and useful tools for physicians to use in their everyday clinical practice.

RAMA CHAKAKI: Specifically, BrainTrip is innovating quick and accessible screening tools for early detection of dementia.

JURIJ DREO: There's this wall between traditional neuroscience and clinical practice, a wall, which has persisted for the past few decades, but we always thought that there shouldn't be walls between different disciplines in medicine and in science. So our idea was to kind of try and not necessarily knock the wall down and not necessarily climb over it, but maybe create pathways around the wall that are a bit more gentle.

RAMA CHAKAKI: In today's episode, we're exploring Jurij's disruptive innovation and the challenges of having a startup in the medical sector.

I'm Rama Chakaki, and you're listening to Innovate with Purpose, the official podcast of Expo Live, an innovation programme by Expo 2020 Dubai.

[INTRO STING]

RAMA CHAKAKI: The statistics around dementia are rather alarming.

JURIJ DREO: Because when you get over 60, that's where your risk of getting dementia starts increasing sharply.

It actually doubles every five years. So at 60 it's about 1%, at 65 it's two, at 70 it's 4, 75 it's eight, and so on. So it doubles every five years.

RAMA CHAKAKI: And as Jurij mentioned, dementia is one of those diseases that we don't have a cure for yet. So early detection is key in alleviating symptoms.

Like many other diseases of the brain, the way patients are diagnosed with dementia is through a manual of symptoms. Here's Jurij explaining:

JURIJ DREO: So basically, the diagnosis manual prescribes a list of symptoms and the physician then basically interviews the patient, talks to the patient, and goes through the list of symptoms.

And then if there's any checks next to the list of symptoms, then the patient gets a particular diagnosis. This is still very common in the field of brain diseases and disorders, especially those that are more psychiatric in nature.

The field of dementia diagnostics has a lot of technologies currently that are aimed more or less at confirming the diagnosis or doing what physicians call 'differential diagnosis'.

RAMA CHAKAKI: Differential diagnosis is a process where a doctor differentiates between two or more conditions that could be behind a person's symptoms.

A doctor may have a theory on the cause behind a patient's symptoms. But a lot of conditions share symptoms, which is why doctors will usually order different tests to confirm the diagnosis.

But the current tests are not able to pick up the disease early on.

JURIJ DREO: So these tests are not aimed to pick up problems early on. But when problems are already apparent the tests confirm, indeed, there's something seriously wrong and the tests also tell the physicians which precise subtype of dementia is present.

RAMA CHAKAKI: That's where BrainTrip comes in. Jurij and his team have come up with a simple, practical and scalable screening test for early dementia detection.

Their innovation includes both a hardware and a software component.

In terms of hardware, BrainTrip scans a patient's brain activity through a device called an EEG.

JURIJ DREO: That's shorthand for electroencephalography.

RAMA CHAKAKI: BrainTrip did not innovate the EEG device. Traditionally, it's used in medicine to diagnose epilepsy, monitor anaesthesia or investigate sleep disorders. But BrainTrip is bringing this device from medicine to neuroscience.

JURIJ DREO: So it's a device that measures the electrical activity of the human brain. It kind of looks like a cap that has these embedded electrodes or sensors in it. And they pick up the electrical activity of your brain. And then the device records these electrical signals; if you were to plot them, let's say on a screen or a piece of paper, they will look like little squiggly lines.

RAMA CHAKAKI: These small squiggly lines measure the tiny changes in electrical voltage produced by your brain. And it turns out that if you carefully analyse these signals, it can tell you a lot about how the brain works.

JURIJ DREO: And we're trying to bring this accumulated neuroscience knowledge back into medical practice so the device can also be used to pick up early signs of dementia.

RAMA CHAKAKI: Now Jurij, where did you get the inspiration to start using EEG devices in this way?

JURIJ DREO: I read a book which was very influential, entitled, 'Electric fields of the brain: the neurophysics of EEG', which is a difficult nut to crack for most readers, but it was written by a physicist and it was intended to be read by medical people.

And I was quite happy to see that there are people out there that seem to share my convictions when it comes to how the brain should be studied, what questions we should be asking and so on.

RAMA CHAKAKI: And what was it that drew you to EEG devices specifically?

JURIJ DREO: It always seemed like a small wonder to me that one is able to pick up one of these small devices and get a recording of what your brain is doing. That's what fascinated me, so that the barrier between myself and the brain seems to have been reduced by these EEG devices.

The ease of use, the non-invasiveness, the cost-effectiveness and the practical ability of these devices to change the face of medicine.

RAMA CHAKAKI: This is key.

EEGs are non-invasive. They're portable and light. They're much much cheaper than other brain scan devices. And they don't expose patients to high levels of radiation like CT scans.

The device on its own, however, doesn't do much. Where BrainTrip comes in is innovating the software side. The EEG device takes a reading, encrypts it and sends it to the cloud.

There on the back end, an algorithm compares this reading to those of normal functioning brains and those of dementia patients.

JURIJ DREO: The software sends back a suggestion to the clinician and assessment of the patient's cognitive functions. And then the physician can take this assessment into account in their normal, everyday clinical routine.

Most physicians that deal with the brain aren't used to fast turnaround times. You know, they're used to seeing a patient, talking to the patient then ordering tests to be done, referring the patient to get a brain scan, this test, the other tests, maybe visit a psychologist and then the patient comes back maybe weeks, maybe months, maybe even years later. And then the physician does another assessment.

RAMA CHAKAKI: So BrainTrip massively shrinks that time: doing the test, getting the algorithm to compare the readings and giving a result takes about 10 minutes.

This makes the tests a lot more accessible and affordable for doctors and patients alike.

JURIJ DREO: So our test is not meant to replace the tests that are in the field of dementia diagnostics. It's meant to complement them.

We do not give binary answers to physicians, right?

We do not say this patient has dementia. This is not what our device does. Our device is not a diagnostic tool.

RAMA CHAKAKI: That means it tells doctors there's a likelihood this brain function is exhibiting early signs of dementia. And that they need to do diagnostic tests later on.

The benefit here is that BrainTrip can detect several different kinds of dementia.

RAMA CHAKAKI: Recently, Jurij and his team achieved CE marking in the European Union for their device, which means it's now a fully fledged medical device that can be used out in the field. This has been a huge milestone for BrainTrip.

And it's where the Expo Live grant came in to help.

JURIJ DREO: So the Expo Live grant, I have to say, was a great help to our company for a variety of reasons. Not just for the obvious financial boost that it gave to our company but also I think because of the recognition. If the company is recognized and if our project is recognized by an international body of experts in business and in positive social impact and indeed in medicine, then this is a badge of honour that any project, any startup can wear with pride.

RAMA CHAKAKI: Jurij explained how the grant was used to pay for the expensive regulatory permits that every medical startup needs but also on research and development of the device and algorithm.

JURIJ DREO: So now we are at the cusp of entering this commercialization stage and we are, via certain contacts, approaching physicians, private clinics, senior care facilities, associations for the care of elderly individuals and so on.

So basically we're approaching anyone and everyone that comes into regular contact with people over the age of 60.

RAMA CHAKAKI: So then when you say commercialisation stage, what is your business model for BrainTrip and how does it work?

JURIJ DREO: The device itself in terms of hardware costs, let's say around 15,000 euros. But the person using the device, let's say a physician, can purchase it upfront. That's one possible way of doing business with our physician. Another way is to simply lease such a device from us. And then they basically pay per test performed. So there are many possible ways of collaboration but our primary revenue will come from basically charging per test analysis.

RAMA CHAKAKI: That's quite diverse and much more affordable and accessible for both doctors and patients alike.

So Jurij, what's been the biggest challenge for you along the way?

JURIJ DREO: Probably the most difficult part is lifting yourself by your own bootstraps, as the old saying goes. Because startups, especially medical startups have this endless game of needing something to get something else, but needing that other thing to get the first thing. For example, in the beginning, you need reliable results from clinical trials to convince investors to invest in you.

But you need the money from the investors to be able to do reliable clinical trials. And then you also need a finished product to be able to apply for the regulatory permits, but to do that, you need resources again, and you need the clinical trials. So basically you need three things and neither of which you actually have: you need results from the clinical trials, you need the finished product, and you need resources.

RAMA CHAKAKI: BrainTrip managed to overcome these hurdles by finding supportive investors as well as grants, like the Expo Live grant, to get them their permits, clinical trials and necessary data to get them to market.

Next, the team is working to expand the screening so that it can look for early signs of depression, ADHD, schizophrenia, and other mental health conditions.

RAMA CHAKAKI: Jurij, you trained as a doctor but are now working as an entrepreneur. Do you miss medicine?

JURIJ DREO: Of course one gets a lot of pleasure if one does patient level work because you get to see the problems, you get to solve the problems, and you get to see the gratitude from patients and that's definitely very rewarding.

But for me, I get my reward in this second level way, perhaps I think that if BrainTrip manages to successfully commercialise our technology, then I think we will see gratitude not only in the eyes of individual patients, but hopefully also in the eyes of those physicians who will be able to use our tools. And that's our great hope: to support not only patients, but also physicians with new technology that just improves the lives of everyone.

RAMA CHAKAKI: Ok Jurij, confession time: so how many times have you used the BrainTrip device on yourself?

JURIJ DREO: I have to say probably about 40 times because I'm the go-to guinea pig when it comes to testing our device.

RAMA CHAKAKI: "Innovate with Purpose" is the official podcast of Expo Live, an innovation programme by Expo 2020 Dubai. Innovation can come from anywhere, to everyone.

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