Beyond AI: Why Organoid Intelligence is the Next Frontier in Medical Innovation Transcript

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Good morning everyone and welcome to Good morning everyone and welcome to Signals and Symptoms podcast. I'm Signals and Symptoms podcast. I'm extremely grateful today for Edmond extremely grateful today for Edmond Wyatt to join us from Germany. He has a Wyatt to join us from Germany. He has a very unique perspective and very unique perspective and in all honesty, I'm actually above my in all honesty, I'm actually above my pay grade what he's going to discuss.

pay grade what he's going to discuss. So, I'm going to let him introduce So, I'm going to let him introduce himself and then talk about AI today or himself and then talk about AI today or OI tomorrow, which is organized OI tomorrow, which is organized intelligence. And one of his thesis and intelligence. And one of his thesis and of course he has done some major work in of course he has done some major work in it. He's essentially a biomedical it. He's essentially a biomedical innovator and an author, but he's going innovator and an author, but he's going to tell us about what he thinks of AI to tell us about what he thinks of AI today and then we're going to look into today and then we're going to look into organoid and as usual, you know, I'm not organoid and as usual, you know, I'm not a good host. So, I'm going to push back a good host. So, I'm going to push back between organoid and quantum computing between organoid and quantum computing and then discuss all of that and give and then discuss all of that and give them hard questions as usual. Uh again, them hard questions as usual. Uh again, I'm grateful to my bestie and co-host I'm grateful to my bestie and co-host and Harvey is probably in his way. By and Harvey is probably in his way. By the way, if you're not following Harvey the way, if you're not following Harvey on his Substack, please do so. Uh this on his Substack, please do so. Uh this is a very small read. I love it that he is a very small read. I love it that he basically, you know, concentrates on one basically, you know, concentrates on one point and goes from there. A few updates point and goes from there. A few updates from the week before uh towards brain from the week before uh towards brain MRI foundation models from clinical MRI foundation models from clinical findings to the former challenge. And findings to the former challenge. And again, these challenges essentially again, these challenges essentially produce a lot of data that you can produce a lot of data that you can actually use. Most of them is this open actually use. Most of them is this open source. And then you can actually go source. And then you can actually go ahead. This is very interesting study.

ahead. This is very interesting study. Anyone who's interested in looking at Anyone who's interested in looking at how to develop brain MRI foundation how to develop brain MRI foundation models. And we discussed this last time models. And we discussed this last time that the way the foundation models in that the way the foundation models in uh radiology is going to happen is that uh radiology is going to happen is that there's so many findings, like so brain there's so many findings, like so brain scan has a ventriculomegaly, scan has a ventriculomegaly, intracerebral hemorrhage. Yeah, intracerebral hemorrhage. Yeah, yeah, if you can name it. Like if they yeah, if you can name it. Like if they have devices or not devices, etc. So, have devices or not devices, etc. So, we're going to pull these into like CT we're going to pull these into like CT brain model with multiple pathologies brain model with multiple pathologies and that's going to have CT abdomen and that's going to have CT abdomen model and that is going to roll into a model and that is going to roll into a major model which is called CT major model which is called CT foundation models and therefore we're foundation models and therefore we're going to have MRI foundation models in going to have MRI foundation models in the future. So this is how we're the future. So this is how we're stepping forward towards it and we're stepping forward towards it and we're going to see major changes coming in going to see major changes coming in behind and as I said last week as well, behind and as I said last week as well, we're going to remove a lot of tasks we're going to remove a lot of tasks from radiology but the job of radiology from radiology but the job of radiology is not going to go away but tasks are is not going to go away but tasks are going to go away. Multi-center external validation of clinical radiomics model.

validation of clinical radiomics model. And this is again one of those things And this is again one of those things that we are now able to use. Radiomics that we are now able to use. Radiomics is some of the extra data, metadata.

is some of the extra data, metadata. Think of a picture that has your geo Think of a picture that has your geo tag, where it was located, something if tag, where it was located, something if you look at Google photos you can you look at Google photos you can actually check your metadata on a photo.

actually check your metadata on a photo. Think of an MRI's metadata is actually Think of an MRI's metadata is actually called radiomics and I can use that called radiomics and I can use that metadata now because now I have access metadata now because now I have access to AI and do something about it. Very to AI and do something about it. Very interesting study, you should look at interesting study, you should look at it.

it. it. Confirm upstaging biopsies. So very Confirm upstaging biopsies. So very small use cases but very interesting as small use cases but very interesting as we go along. Oh, this is the data set by we go along. Oh, this is the data set by the way of for this study the way of for this study that we had and you can actually go that we had and you can actually go ahead and download it if you want to ahead and download it if you want to from hugging face. Artificial from hugging face. Artificial intelligence for end-to-end intelligence for end-to-end antimicrobial resistance. And this is antimicrobial resistance. And this is again a review paper but it's again a review paper but it's fantastically written that how you can fantastically written that how you can go ahead and actually use a standardized go ahead and actually use a standardized pragmatic framework that is aligned with pragmatic framework that is aligned with the fire line durations etc. and then the fire line durations etc. and then use AI to do this. Very interesting use AI to do this. Very interesting read. I think we're going to put on the read. I think we're going to put on the show notes in our show notes in our sub stack as well. Hospitals are already sub stack as well. Hospitals are already using AI. Why implementation would using AI. Why implementation would determine its impact. And this is again determine its impact. And this is again one of those things. We have talked one of those things. We have talked about it. Ed is amazing about it and you about it. Ed is amazing about it and you know, it's it's basically know, it's it's basically any tool you introduce, you can for any tool you introduce, you can for example a hammer, you can hammer a nail example a hammer, you can hammer a nail or you can hammer a thumb.

or you can hammer a thumb. I hope you don't hammer your own thumb. I hope you don't hammer your own thumb. You actually hammer a nail. So the You actually hammer a nail. So the question really over over here is that question really over over here is that AI is a tool and we need to implement it AI is a tool and we need to implement it properly and that's what exactly this properly and that's what exactly this determine again it's a okay read but the determine again it's a okay read but the point was I wanted to re-emphasize what point was I wanted to re-emphasize what Ed teaches us all the time.

Ed teaches us all the time. Augmenting structure diagnosis through Augmenting structure diagnosis through use of pre-trained large amount clinical use of pre-trained large amount clinical notes. What does structure diagnosis notes. What does structure diagnosis mean? There's there's two things which mean? There's there's two things which is called ICD-10 codes by the way which is called ICD-10 codes by the way which is insane like why we use it for is insane like why we use it for billing. It is actually World Health billing. It is actually World Health Organization International Organization International Classification of disease but since we Classification of disease but since we are US we didn't design a different are US we didn't design a different proper coding system for billing but proper coding system for billing but what we did was we reuse ICD-10. But what we did was we reuse ICD-10. But what this does is actually how you can what this does is actually how you can extract it better for real clinical use extract it better for real clinical use in terms of diagnosis in terms of diagnosis because ICD-10 has its limitations so no because ICD-10 has its limitations so no matter its limitations and I think at matter its limitations and I think at some point in time we're going to build some point in time we're going to build a brand new system rather than using a brand new system rather than using these medical oncology but come up with these medical oncology but come up with a new oncology for the age of AI. I hope a new oncology for the age of AI. I hope so it happens. Technical challenges in so it happens. Technical challenges in autonomous robotic ultrasound organic autonomous robotic ultrasound organic examination. Did you see that Ed? This examination. Did you see that Ed? This was insane. You can now have robots was insane. You can now have robots doing your ultrasound.

doing your ultrasound. Freaking Freaking Freaking it's just crazy. it's just crazy. And then And then again this one goes through it again how again this one goes through it again how it uses digital twins. It's insane like it uses digital twins. It's insane like where we are in robotics as well.

where we are in robotics as well. This is my favorite topic because I This is my favorite topic because I believe patient-centered outcomes believe patient-centered outcomes depends on gamification.

depends on gamification. It's a it's a bias of mine. I think we It's a it's a bias of mine. I think we as humans are as humans are relied on our pleasure centers and relied on our pleasure centers and something that has to take our you know something that has to take our you know dosage in the brain to go through this dosage in the brain to go through this and of course you know we have Apple and and of course you know we have Apple and we have Google Fitbit air by the way we have Google Fitbit air by the way highly recommended. I wish Google was highly recommended. I wish Google was sponsoring this sponsoring this segment but what I'm saying is that segment but what I'm saying is that insanely good and we need to see those insanely good and we need to see those visual status gamifications rewards, and visual status gamifications rewards, and of course social accountability because of course social accountability because my brother is saying, "Hey Janette, it's my brother is saying, "Hey Janette, it's been 3 days and you're sitting in your been 3 days and you're sitting in your ass. Why aren't you moving?" And that is ass. Why aren't you moving?" And that is very important. Gamification with social very important. Gamification with social accountability, I believe is the only accountability, I believe is the only way that you can treat health way that you can treat health patient-centered outcomes. So, very patient-centered outcomes. So, very important paper and how it's going to be important paper and how it's going to be incorporated in clinical trials. Again, incorporated in clinical trials. Again, Harvey's not here and we are always Harvey's not here and we are always talking about medtech, which is just a talking about medtech, which is just a semantics I came up with is talking semantics I came up with is talking about medical technology, FDAs, all of about medical technology, FDAs, all of this, which is this, which is quote and quote a sick care problem. And quote and quote a sick care problem. And then of course health care, which Ed is then of course health care, which Ed is championing about wellness and all of championing about wellness and all of that and how they're crossing over and that and how they're crossing over and building the new health care system. And building the new health care system. And that's actually what's happening is how that's actually what's happening is how we're using these gamifications to we're using these gamifications to improve actually moving in acceptance in improve actually moving in acceptance in clinical trial. That's the key term. We clinical trial. That's the key term. We are actually seeing these movement into are actually seeing these movement into clinical trial and showing it to FDA as clinical trial and showing it to FDA as a real endpoint for approving some of a real endpoint for approving some of these things. So, very interesting these things. So, very interesting movement in terms of digital technology.

movement in terms of digital technology. Fast food large uh Fast food large uh Okay. Okay. Okay. Um so, when you are actually looking at Um so, when you are actually looking at large language models, how do you adopt large language models, how do you adopt them and how to create them? You're them and how to create them? You're going to see that those who are actually going to see that those who are actually deep into moving these technology deep into moving these technology forward, uh this is a very interesting forward, uh this is a very interesting read. Uh it's more technical than for read. Uh it's more technical than for everyone's case. And then of course uh Q everyone's case. And then of course uh Q using fold. Now, of course everyone using fold. Now, of course everyone knows about AlphaFold. AlphaFold was knows about AlphaFold. AlphaFold was done by Google. Uh it is very done by Google. Uh it is very interesting that uh quantum neural interesting that uh quantum neural network for multi-dimensional thinking network for multi-dimensional thinking and discovery in protein folding. The and discovery in protein folding. The reason I'm actually indicating this reason I'm actually indicating this right now is that we're going to see right now is that we're going to see biologics personalized biologics personalized much faster much faster as we go along in the future because it as we go along in the future because it will take my DNA, my RNA, my process of will take my DNA, my RNA, my process of protein folding and may design a protein folding and may design a medication. Again, uh we thought it's medication. Again, uh we thought it's going to be honestly, I thought this was going to be honestly, I thought this was just, you know, somebody bullshitting.

just, you know, somebody bullshitting. But, uh no, it's not. It's it's it's But, uh no, it's not. It's it's it's movement is very fast on that regard.

movement is very fast on that regard. So, we're going to see some amazing So, we're going to see some amazing things coming forward. And then, this is things coming forward. And then, this is again a quan- qualitative, not again a quan- qualitative, not quantitative, multi-frame methodology quantitative, multi-frame methodology for analyzing health information related for analyzing health information related with patient safety incidents. Again,

with patient safety incidents. Again, it's a very uh important topic of mine.

it's a very uh important topic of mine. I really think that, you know, patient I really think that, you know, patient safety issues need to be centered. And safety issues need to be centered. And how do you develop a whole platform how do you develop a whole platform around it is a very beautifully written, around it is a very beautifully written, the graphics and, you know, the whole the graphics and, you know, the whole process. So, uh very informational good process. So, uh very informational good read. Again, we'll include it into our read. Again, we'll include it into our system. So, coming back to our amazing system. So, coming back to our amazing host host uh host host uh Edward Edmond White, I would really Edward Edmond White, I would really again very grateful and I would like you again very grateful and I would like you to please forgive me of not doing the to please forgive me of not doing the right justice on your introduction, but right justice on your introduction, but reintroduce yourself and then go from reintroduce yourself and then go from there.

there. there. >> Well, uh thank you very much, Jana >> Well, uh thank you very much, Jana Janet, and uh very honored to be Janet, and uh very honored to be participating in your podcast today. So, participating in your podcast today. So, and greetings from Romania. I live in and greetings from Romania. I live in Germany, but I'm in transit there for Germany, but I'm in transit there for some meetings uh this week in in some meetings uh this week in in Romania.

Romania. Romania. Um so, um yeah, just uh a little intro Um so, um yeah, just uh a little intro so about about myself for people who so about about myself for people who don't know who I am.

don't know who I am. So, I've basically been working in sort So, I've basically been working in sort of medical innovation up to 30 years of medical innovation up to 30 years now. Um and primarily now. Um and primarily really most most of my life has been really most most of my life has been working with technologies that really working with technologies that really when patients are sick and coming in for when patients are sick and coming in for arrhythmias, heart failure, and helping arrhythmias, heart failure, and helping them to to with devices to to improve them to to with devices to to improve their outcomes. And um their outcomes. And um been doing that for various different been doing that for various different guises in large corporate, startup guises in large corporate, startup companies. Um and then about a few years companies. Um and then about a few years ago, um started um ago, um started um reading and thinking about how can we reading and thinking about how can we get prevention more into the equation.

get prevention more into the equation. So, for example, you know, can we So, for example, you know, can we actually stop these patients coming in actually stop these patients coming in so late and get earlier on intervene?

so late and get earlier on intervene? And I saw on the AutoPodcasts someone And I saw on the AutoPodcasts someone talking about prevention, I think Philip talking about prevention, I think Philip Sherwell. And kind of triggered so this Sherwell. And kind of triggered so this kind of triggered my mind. So, about kind of triggered my mind. So, about 2024, 2024, 2024, 23, 23, 23, um um um brain organoids came I was thinking brain organoids came I was thinking about brain organoids and about brain organoids and I was looking really about Well, these I was looking really about Well, these models have been been around actually models have been been around actually for many years. Um but at that time the for many years. Um but at that time the frontier models started coming in. So, frontier models started coming in. So, you had like OpenAI launched you had like OpenAI launched and Tropic came. And there was a kind of and Tropic came. And there was a kind of AI was a piece which hadn't really um AI was a piece which hadn't really um hadn't really been there hadn't really been there uh with organoids before.

uh with organoids before. Um so, there's a kind of like a nexus Um so, there's a kind of like a nexus and I was actually working on what we and I was actually working on what we call call call digital twin technology. So, I was digital twin technology. So, I was working for an organization where we working for an organization where we could take could take 3D echoes actually of children's hearts 3D echoes actually of children's hearts and congenital heart disease and make and congenital heart disease and make them into 3D models. So, we could them into 3D models. So, we could actually look at twinning technology. Um actually look at twinning technology. Um so, all these things were starting so, all these things were starting floating in my mind and I thought And I floating in my

mind and I thought And I started delving deeper into this whole started delving deeper into this whole topic about uh topic about uh uh brain organoids and there was just so uh brain organoids and there was just so many different dimensions coming out of many different dimensions coming out of that from a medical point of view. First that from a medical point of view. First of all, of all, there are many other other aspects there are many other other aspects uh there in terms of personalized uh uh there in terms of personalized uh well, personalized medicine uh looking well, personalized medicine uh looking into energy efficiencies, for example, into energy efficiencies, for example, and looking into computation and whether and looking into computation and whether models could you know, we live in a very models could you know, we live in a very much a silicon world today dependent on much a silicon world today dependent on on chip technology. Could these be an on chip technology. Could these be an infrastructure for our future? Uh but infrastructure for our future? Uh but always with For me, it's always about always with For me, it's always about patients got to come first. Can we build patients got to come first. Can we build um um um Yeah, can we build technologies that Yeah, can we build technologies that help the patient outcome? So, this is help the patient outcome? So, this is what kind of kind of got me thinking, what kind of kind of got me thinking, researching, and actually eventually to researching, and actually eventually to write a book cuz I just felt this really write a book cuz I just felt this really needed the message really needed to go needed the message really needed to go out there about organoid intelligence.

out there about organoid intelligence. There in the organoid intelligence is There in the organoid intelligence is really the combination of really the combination of So, brain organoids were developed from So, brain organoids were developed from induced pluripotent stem cells back over induced pluripotent stem cells back over a decade ago. There was a lady called a decade ago. There was a lady called Madeline Lancaster from Cambridge, and Madeline Lancaster from Cambridge, and she was doing some research into this she was doing some research into this sort of microcephaly. So, so patients in sort of microcephaly. So, so patients in probably heard of about 10 years ago or probably heard of about 10 years ago or longer actually that in South America longer actually that in South America the Zika virus the Zika virus and the babies were being born with and the babies were being born with small small heads, and she was doing small small heads, and she was doing some research into that using organoid some research into that using organoid models to see how that was how that was models to see how that was how that was developing. And then about 2016 developing. And then about 2016 John Hopkins University So, Professor John Hopkins University So, Professor Tom Hopkins group have been really Tom Hopkins group have been really scaling up brain organoids. And it scaling up brain organoids. And it wasn't until about 2023, 2022 perhaps wasn't until about 2023, 2022 perhaps we'll come on to this is that there were we'll come on to this is that there were some experiments done to really test the some experiments done to really test the input and output of these organoids input and output of these organoids in a kind of closed loop system to see in a kind of closed loop system to see if they could actually train them. And if they could actually train them. And that's where the kind of organoid that's where the kind of organoid intelligence kind of was created. So, a intelligence kind of was created. So, a group of scientists came together in group of scientists came together in Baltimore Baltimore Baltimore and created this new kind of discipline.

and created this new kind of discipline. And And And And for me it was fascinating cuz there And for me it was fascinating cuz there was just so many things that will impact was just so many things that will impact our lives out of this uh our lives out of this uh both today and also we look scientific both today and also we look scientific future future future as well. So, that's kind of what was as well. So, that's kind of what was driving me. And I I I work in the driving me. And I I I work in the medical space tech space, but I also medical space tech space, but I also have a very strong interest in this have a very strong interest in this brain organoid brain organoid >> Fascinating. Ed, do you want to go first >> Fascinating. Ed, do you want to go first or as a neurologist you want me to or as a neurologist you want me to comment?

comment? comment? >> Oh, >> Oh, >> Oh, well, I was going to say yes, I'll go well, I was going to say yes, I'll go first, but then you then you added a first, but then you then you added a qualifier there. So qualifier there. So >> Yeah, so I just want to set set the >> Yeah, so I just want to set set the stage up and then I'll let Ed go.

stage up and then I'll let Ed go. So as a neurologist as you said, organ So as a neurologist as you said, organ weight weight weight is extremely important and essentially is extremely important and essentially going back to the basics. If you go to going back to the basics. If you go to cell stem or you go to neuron but again cell stem or you go to neuron but again of course that's that's a little too of course that's that's a little too deep for me, but I mean

one of the deep for me, but I mean one of the things that I have been concentrating on things that I have been concentrating on since my birth of my first child which since my birth of my first child which was actually a premature and then how was actually a premature and then how much I had to spend time to make sure much I had to spend time to make sure that the language is is is important.

that the language is is is important. And you have seen all of these kids that And you have seen all of these kids that we do like they're going to say like for we do like they're going to say like for example yesterday my 7-year-old said I example yesterday my 7-year-old said I hurted my elbow, hurted which is a hurted my elbow, hurted which is a grammatical error but then grammatical error but then I was looking at it so on some research I was looking at it so on some research like how many kids do this error.

like how many kids do this error. Interestingly it's only 4% of the time. Interestingly it's only 4% of the time. And then I realized like how LLMs And then I realized like how LLMs actually learn. And then of course actually learn. And then of course one of the biggest problem with Sam Sam one of the biggest problem with Sam Sam Altman always says, well, we are using Altman always says, well, we are using this much energy to train LLMs, but this much energy to train LLMs, but think about how much energy a human think about how much energy a human being uses to come to a PhD level. And being uses to come to a PhD level. And that was like a very controversial that was like a very controversial statement. So that's number two. And statement. So that's number two. And number three number three you're absolutely right that uh you're absolutely right that uh we are living in a commoditization and we are living in a commoditization and demonetization of intelligence itself.

demonetization of intelligence itself. And then energy demands are actually And then energy demands are actually going significantly up and we need to going significantly up and we need to figure out a problem to solve over here.

figure out a problem to solve over here. So number one learning itself in terms So number one learning itself in terms of human versus machine. And number two of human versus machine. And number two big statement is how do we go back to big statement is how do we go back to the basics how humans learn and human the basics how humans learn and human stem cells work and protein and how to stem cells work and protein and how to how to optimize our process because at how to optimize our process because at the end of the day I know the end of the day I know Claude and ChatGPT are amazing and Claude and ChatGPT are amazing and unfortunately I have to compare myself, unfortunately I have to compare myself, but my brain uses 20 kJ calories as but my brain uses 20 kJ calories as compared to what they are using.

compared to what they are using. So, So, So, at the end of the day I have a very at the end of the day I have a very efficient system here as compared energy efficient system here as compared energy efficient system. So, that's number two efficient system. So, that's number two layer that you probably suggested. And layer that you probably suggested. And then of course the last one uh then of course the last one uh does it matter or we should just put does it matter or we should just put some more solar farms? So, I'm going to some more solar farms? So, I'm going to let uh let uh Ed start with the conversation now.

Ed start with the conversation now. Sorry, I had to put that sort of staging Sorry, I had to put that sort of staging for the episode. Go ahead, Ed. for the episode. Go ahead, Ed.

>> No, I thought it was the super >> No, I thought it was the super fascinating. We'll definitely have to fascinating. We'll definitely have to put the how to order the book in the put the how to order the book in the show notes.

show notes. >> Absolutely, yeah. Um >> Absolutely, yeah. Um >> And I >> And I I misspelled uh organoid, but I think I misspelled uh organoid, but I think everyone knows I'll see in the comments.

everyone knows I'll see in the comments. It's so that this is all new topic area It's so that this is all new topic area for me, so I found it really for me, so I found it really fascinating. And I was wondering Edmund fascinating. And I was wondering Edmund or Ed if you could or Ed if you could if you could share a little bit more if you could share a little bit more about I was just looking at some of the about I was just looking at some of the notes I took. Um notes I took. Um If you think AI is the future, think If you think AI is the future, think again. This is your quote. Uh the next again. This is your quote. Uh the next frontier merges biology with tech, frontier merges biology with tech, building

intelligence from living building intelligence from living neurons rather than silicon.

neurons rather than silicon. So, that's pretty profound. Can you I So, that's pretty profound. Can you I mean we've talked we've touched on this mean we've talked we've touched on this uh on the periphery a little bit, but uh on the periphery a little bit, but can you kind of expand on that? Because can you kind of expand on that? Because again, I I know for you two, you know, again, I I know for you two, you know, you guys are like like-minded and you you guys are like like-minded and you have this uh you know, a very have this uh you know, a very engineering and medical understanding engineering and medical understanding for the but for the bulk of the audience for the but for the bulk of the audience that may not have that. Uh can you that may not have that. Uh can you unpack that a little bit? Because like I unpack that a little bit? Because like I I love the I love the I loved uh neurons rather than silicon.

I loved uh neurons rather than silicon. That that's that's very fascinating. That that's that's very fascinating. >> Yeah. >> Yeah. >> Yeah. For sure. For sure. Yeah, no, for sure.

For sure. For sure. Yeah, no, for sure. So, So, So, look, we all want things predictable in look, we all want things predictable in the world. Our silicon, our chips, the world. Our silicon, our chips, everything we use is all all very everything we use is all all very predictable. And it's been, you know, predictable. And it's been, you know, silicon's been around for over 60 years silicon's been around for over 60 years uh and and as well, you know, in all our uh and and as well, you know, in all our devices we use it day in day out and we devices we use it day in day out and we don't really think about it. We just don't really think about it. We just just have it there in the background.

just have it there in the background. So, it's very good. I mean, there's So, it's very good. I mean, there's nothing wrong with silicon, but one of nothing wrong with silicon, but one of the big issues is that it's energy takes the big issues is that it's energy takes a lot of energy a lot of energy and um and um you know, with the learning language you know, with the learning language models now, the data warehouses are models now, the data warehouses are growing. There's more and more energy growing. There's more and more energy requirements and it's also not just the requirements and it's also not just the energy, but it's the water as well energy, but it's the water as well involved in cooling these big data involved in cooling these big data centers.

centers. centers. So, there's a lot of energy demands So, there's a lot of energy demands exponentiating exponentiating exponentiating in the world today and in the world today and that's one of the drivers and the second that's one of the drivers and the second piece is but in biology, it's biology is piece is but in biology, it's biology is not really predictable. It's adaptable not really predictable. It's adaptable and it's collects it's very and it's collects it's very what's it is very clever in terms of how what's it is very clever in terms of how it works. It doesn't use a lot of it works. It doesn't use a lot of energy.

energy. energy. But, one of the challenges with biology But, one of the challenges with biology is that you've got to nurture and grow is that you've got to nurture and grow that that that cell it needs a nutrient system or cell it needs a nutrient system or something there.

something there. And there's been work today in building And there's been work today in building biological computers. So, biological computers. So, groups like out of Melbourne, Cortical groups like out of Melbourne, Cortical Labs have been developing these Labs have been developing these biological computers. They need biological computers. They need nutrients, they need things to support nutrients, they need things to support them to grow. And I was thinking in the them to grow. And I was thinking in the world today that you cannot I don't world today that you cannot I don't think we could today build an think we could today build an infrastructure around biology and and infrastructure around biology and and replace it with silicon. That's not replace it with silicon. That's not going to happen today, but you could going to happen today, but you could take the best elements of those worlds.

take the best elements of those worlds. So, the silicon reliability, the kind of So, the silicon reliability, the kind of consistency of that with the energy of consistency of that with the energy of the biology and and and and the and the the biology and and and and the and the adaptability adaptability adaptability uh cuz it's very deterministic model in uh cuz it's very deterministic model in silicon, but the biological one is so silicon, but the biological one is

so adaptable that you combine those two bit adaptable that you combine those two bit like a hybrid car where you've got the like a hybrid car where you've got the petrol and electric, you know, you've petrol and electric, you know, you've got that hybrid approach.

got that hybrid approach. That architecture will could start That architecture will could start creeping in more and more into devices, creeping in more and more into devices, into medical tech, into our lives. So, I into medical tech, into our lives. So, I think that's that's where where things think that's that's where where things could head. I mean, um could head. I mean, um in the future. So, it's very much in the future. So, it's very much dependent, but the energy question is dependent, but the energy question is always going to you drive a lot of this, always going to you drive a lot of this, you know, I think you know, I think worldwide for ourselves. And if we're worldwide for ourselves. And if we're using more AI in the hospitals, for using more AI in the hospitals, for example, example, example, to do more decision-making and we're to do more decision-making and we're outsourcing more of that stuff, the outsourcing more of that stuff, the energy, you know, requirements of energy, you know, requirements of hospitals are going to go up and, you hospitals are going to go up and, you know, that those sustainability outcomes know, that those sustainability outcomes of APIs and those hospitals have to meet of APIs and those hospitals have to meet are going to also be under under under are going to also be under under under challenge as well in the long term.

challenge as well in the long term. So, it's kind of like different things So, it's kind of like different things like that, I think. like that, I think.

That kind of explains it in a very That kind of explains it in a very simple way of where where these two sit simple way of where where these two sit together, silicon biology, and that how together, silicon biology, and that how that could could turn out.

that could could turn out. >> Yeah. >> Yeah. >> Yeah. Yeah, makes sense. Yeah, makes sense. >> So, at at the very core issue since >> So, at at the very core issue since 1960s or maybe more, we've been 1960s or maybe more, we've been basically have transistors. And the basically have transistors. And the definition of transistors is zeros and definition of transistors is zeros and ones. And we are making it into a ones. And we are making it into a billion of series.

billion of series. Uh what quantum computing, as we Uh what quantum computing, as we discussed last time, is somewhere discussed last time, is somewhere between zero and one. And therefore, between zero and one. And therefore, that is actually probabilistic that is actually probabilistic computing. By the way, the biggest issue computing. By the way, the biggest issue with quantum computing quantum computer with quantum computing quantum computer works today is the cooling thing. That's works today is the cooling thing. That's another problem, energy consumption.

another problem, energy consumption. But, the second problem is how to But, the second problem is how to convert that into zeros and ones. convert that into zeros and ones.

So, that we can see it on our laptops. So, that we can see it on our laptops. So, that That's That's been the tricky So, that That's That's been the tricky part part part for for like decade now. We have had for for like decade now. We have had quantum computing for some time. And quantum computing for some time. And that's really where at my next question that's really where at my next question is. Like, how do you use neurons? And is. Like, how do you use neurons? And neurons may actually have a different neurons may actually have a different quote and quote uh quote and quote uh base base base um um um layer of architecture, which is layer of architecture, which is different than silicon. And even if you different than silicon. And even if you look at you know, uh ARM diagrams or X86 look at you know, uh ARM diagrams or X86 that has been going on for years, which that has been going on for years, which is again a zeros and ones is again a zeros and ones infrastructure. But, how you infrastructure. But, how you use the instruction set for the actual use the instruction set for the actual memory layer? How do you think that memory layer? How do you think that neurons, and even not just neurons, I neurons, and even not just neurons, I mean, we use neurons as this I mean, mean, we use neurons as this I mean, retina maybe retinal cones and retina maybe retinal cones and as a matter of fact, I'd rather study as a matter of fact, I'd rather study that, you know, rods and cones may that, you know, rods and cones may actually be better in terms of zero and actually be

better in terms of zero and one switching or something else. So, one switching or something else. So, any human cell any human cell would try would have to overcome that, would try would have to overcome that, right? Because let's just be honest. I right? Because let's just be honest. I mean, I I would love to have, you know, mean, I I would love to have, you know, this last uh you know, a month on this last uh you know, a month on charge. But, I don't I still want to charge. But, I don't I still want to Uh what what is that transition plan Uh what what is that transition plan look like to you?

look like to you? From from from like the quantum thing From from from like the quantum thing that I'm saying, how do you translate a that I'm saying, how do you translate a layer layer layer of biology into zeros and ones, or do of biology into zeros and ones, or do you not need it if you're going to have you not need it if you're going to have something completely new?

something completely new? >> Uh you you're asking that um so, I'm not >> Uh you you're asking that um so, I'm not First of all, I'm not an engineer. So, First of all, I'm not an engineer. So, uh uh uh >> No, that's okay, but >> No, that's okay, but But, what I But, you read more than I do But, what I But, you read more than I do because because because >> Um >> Um >> Um >> I'm just like >> I'm just like >> Yeah, so so I I I I think quantum plays >> Yeah, so so I I I I think quantum plays a huge role. Uh and I think it will take a huge role. Uh and I think it will take off in the in the kind of the psychology off in the in the kind of the psychology of everybody when we get kind of of everybody when we get kind of personalized quantum computing, which I personalized quantum computing, which I believe Microsoft don't quote me on that believe Microsoft don't quote me on that or I have been plans to work on. So, I or I have been plans to work on. So, I think at the moment, the quantum world think at the moment, the quantum world is very much in the the big institutes, is very much in the the big institutes, the cooling, the those big the cooling, the those big I I saw one a few years ago down in I I saw one a few years ago down in Munich in one of these quantum Munich in one of these quantum computers.

computers. computers. Um and it it it it's a heavy piece piece Um and it it it it's a heavy piece piece of kit. Um but, the framework that it is of kit. Um but, the framework that it is creating creating creating with the frontier models uh and and with with the frontier models uh and and with brain organoids and neurons, I think brain organoids and neurons, I think there's going to be some sort of there's going to be some sort of infrastructure one day or quite soon infrastructure one day or quite soon which can build within that and have which can build within that and have some inter- uh connectivity between some inter- uh connectivity between that. Because in quantum computing, you that. Because in quantum computing, you can take signals. So, the brain the can take signals. So, the brain the signal is so much to to decipher uh signal is so much to to decipher uh signaling-wise, you need more than what signaling-wise, you need more than what we have in the frontier models. So, we have in the frontier models. So, quantum system will be able to uh kind quantum system will be able to uh kind of assess that in a in a very very smart of assess that in a in a very very smart way. So, I think way. So, I think the convergence and I I have a Substack the convergence and I I have a Substack thing called Intelligence Life looks at thing called Intelligence Life looks at the convergence of AI, quantum, and life the convergence of AI, quantum, and life science. And I think the convergence of science. And I think the convergence of that will happen. We don't know what that will happen. We don't know what form it will take, but it has to somehow form it will take, but it has to somehow happen at some point. Um happen at some point. Um >> I totally agree with you.

>> I totally agree with you. >> Uh >> Uh >> Uh >> Yeah, I mean, >> Yeah, I mean, go ahead. Sorry. go ahead. Sorry. >> Yeah, no, no, no. I Sorry, I I just >> Yeah, no, no, no. I Sorry, I I just Sorry.

Sorry. Sorry. >> You're You're absolutely right because >> You're You're absolutely right because uh one of the fascinating things is uh uh one of the fascinating things is uh is interesting and I'm going to put that is interesting and I'm going to put that to my to my co-host Ed, which by the way uh co-host Ed, which by the way uh uh is is my mentor as well.

uh is is my mentor as well. Uh so, Ed, here's the thing. We have Uh so, Ed, here's the thing. We have democratized and demonetized democratized and demonetized intelligence. And Ed is uh saying, and intelligence. And Ed is uh saying, and rightly so, that it may take 3 years, rightly so, that it may take 3 years, uh 5 years. And by the way, as you can uh 5 years. And by the way, as you can see, AI is solving problems that we were see, AI is solving problems that we were solving problems that we were thinking not going to be solved. For thinking not going to be solved. For example,

biologics. I I just quantum example, biologics. I I just quantum folding problems and stuff. We know that folding problems and stuff. We know that the acceleration, that flywheel, is now the acceleration, that flywheel, is now active. I mean, the the the way that the active. I mean, the the the way that the LLMs are re- release data so fast, like LLMs are re- release data so fast, like Gemini 3.5 in 6 months as compared to 1 Gemini 3.5 in 6 months as compared to 1 year, year, year, it the flywheel is on. Like, it the the it the flywheel is on. Like, it the the we are off to the races. And then we are off to the races. And then uh uh uh the humanity of ours, as you keep the humanity of ours, as you keep saying, is way more important than, you saying, is way more important than, you know, Junaid's, you know, technical know, Junaid's, you know, technical prowess.

prowess. prowess. What do you think we're going to do when What do you think we're going to do when when artificial intelligence, which is when artificial intelligence, which is going to demonetize and democratize going to demonetize and democratize intelligence that is cheap and does not intelligence that is cheap and does not require that much energy, require that much energy, what are we going to do what are we going to do uh as human beings in general?

uh as human beings in general? The 8 billion people. The 8 billion people. I'm going to let Ed uh Ed and then you I'm going to let Ed uh Ed and then you answer.

>> Oh, okay. So, this reminds me when I was >> Oh, okay. So, this reminds me when I was at Cleveland Clinic and there was this at Cleveland Clinic and there was this group of physicians who started BrainX group of physicians who started BrainX AI. You know, it's a big, you know, AI. You know, it's a big, you know, world global think tank. I know that world global think tank. I know that >> Good friend of mine, too, yeah.

>> Good friend of mine, too, yeah. >> Yeah. >> Yeah. >> Yeah. And so, they would invite me And so, they would invite me every week we'd meet uh in the College every week we'd meet uh in the College of Medicine and it was not too far from of Medicine and it was not too far from my office, so I wanted to show support my office, so I wanted to show support for all these super smart people. So, I for all these super smart people. So, I would dutifully show up, but the only would dutifully show up, but the only problem was they thought that I may be problem was they thought that I may be as smart as them and I'm and I wasn't as smart as them and I'm and I wasn't and I'm not. And so, they would always and I'm not. And so, they would always like present these amazing like these like present these amazing like these mind-blowing ideas like we're talking mind-blowing ideas like we're talking about here and then they would turn to about here and then they would turn to me thinking, oh, he must be the source me thinking, oh, he must be the source of wisdom cuz he's leading, you know, of wisdom cuz he's leading, you know, technology and digital strategy and I technology and digital strategy and I was like, no, actually I'm here to learn was like, no, actually I'm here to learn and I was always learning from them.

and I was always learning from them. Um Um Um but I but I I I don't have a profound answer, I I don't have a profound answer, Junaid, to this. I Junaid, to this. I would really like to hear more from um would really like to hear more from um Edmond, but Edmond, but but I I'm What gets me excited about all but I I'm What gets me excited about all this is that, you know, we run into this is that, you know, we run into limitations as we're talking about that limitations as we're talking about that have, you know, extreme environmental have, you know, extreme environmental impacts.

impacts. impacts. And and we have other possibilities now, And and we have other possibilities now, right? We haven't thought about right? We haven't thought about previously like OI previously like OI that were that were main topic. And um that were that were main topic. And um and there's some other ideas that have and there's some other ideas that have been flowing in the chat as well from been flowing in the chat as well from the audience, you know, other ideas. And the audience, you know, other ideas. And so, I'm just super excited the fact that so, I'm just super excited the fact that yes, with 8 billion people and we can't, yes, with 8 billion people and we can't, you know, with with the what we know you know, with with the what we know about quantum computing today and you about quantum computing today and you know, we would run out of resource, we'd know, we would run out of resource, we'd have to build things in space like have to build things in space like Harvey's working on, you know. Um but Harvey's working on, you know. Um but that's like taking old ways and putting that's like taking old ways and putting it in space. That that doesn't make it in space. That that doesn't make sense to me. You know, I get it, you sense to me. You know, I get it, you know, putting data center in space, I know, putting data center in space, I

mean, it makes sense.

mean, it makes sense. >> I'm I'm going to tell Harvey about it. >> I'm I'm going to tell Harvey about it. I'm just messing with you. I'm just messing with you.

>> Well, cuz what What we're doing I I'll >> Well, cuz what What we're doing I I'll get back to the topic here in a second, get back to the topic here in a second, but what we're doing is taking today's but what we're doing is taking today's mindset like this is the only way we mindset like this is the only way we know how to do it. So, naturally it's know how to do it. So, naturally it's put it in space. That makes sense. But, put it in space. That makes sense. But, as Ed was pointing out, there are other as Ed was pointing out, there are other opportunities. And so, that that's kind opportunities. And so, that that's kind of kind of my general reaction to your of kind of my general reaction to your question.

>> Um love it. Um at at first um >> Um love it. Um at at first um address the elephant in the room because address the elephant in the room because I am actually like honestly scared the I am actually like honestly scared the sh sh sh I'm in this very hard, right? I mean I'm in this very hard, right? I mean this is what's going on. I mean, I had this is what's going on. I mean, I had to fire 50% of my company and which to fire 50% of my company and which really sucks. I mean, I hate it and you really sucks. I mean, I hate it and you know, as a person to do so. Um but um know, as a person to do so. Um but um this is right now this is right now literally coding it out in front Give me literally coding it out in front Give me one second.

one second. I sat down last night and I told them I sat down last night and I told them that I need a complete coding done. And that I need a complete coding done. And this is this is a whole this is this is a whole you know, module being done.

you know, module being done. And this is And this is you know, two three of them are you know, two three of them are currently running. This is my part This currently running. This is my part This is the one that I've completed in the is the one that I've completed in the last month.

last month. And the team has to catch up. And the team has to catch up. So, just just giving you the real life So, just just giving you the real life impact. Like I mean, this is not coming impact. Like I mean, this is not coming out from you know, my ass. I mean, I'm out from you know, my ass. I mean, I'm just saying that I have I'm living it just saying that I have I'm living it with the demonetization and the with the demonetization and the democratization of intelligence. Um democratization of intelligence. Um I and then there I and then there you know, how when you're in Germany, you know, how when you're in Germany, Germany is the highest tax and the Germany is the highest tax and the highest benefits. We live in US, which highest benefits. We live in US, which is is is somewhere in the middle and then of somewhere in the middle and then of course, there countries that are not course, there countries that are not taxed. So, talk about the social impact taxed. So, talk about the social impact of this as well, especially your of this as well, especially your experience living in Germany.

experience living in Germany. Um we're Texans by the way, so we don't Um we're Texans by the way, so we don't like some of the social stuff. I'm just like some of the social stuff. I'm just So, overall thoughts about it?

So, overall thoughts about it? >> Yeah. >> Yeah. >> Yeah. No, no, it's it's it's a it's a very No, no, it's it's it's a it's a very good point. I mean, I been thinking good point. I mean, I been thinking about this more and more actually the about this more and more actually the last few months about about what we're last few months about about what we're going to do when we can outsource our going to do when we can outsource our intelligent intelligence to to to this.

intelligent intelligence to to to this. So, So, So, um um um UBI, so universal basic income, yeah, um UBI, so universal basic income, yeah, um is a kind of idea has been touted. I is a kind of idea has been touted. I think one of the countries has been think one of the countries has been exploring that. Um exploring that. Um So, give everybody a uniform, so yeah, So, give everybody a uniform, so yeah, income income income and then let them get on with their and then let them get on with their creative pursuits and what they want to creative pursuits and what they want to do, their hobbies and so on. So, there's do, their hobbies and so on. So, there's been ideas like

that. Um so, time uh or been ideas like that. Um so, time uh or you know, traditionally we we sat at a you know, traditionally we we sat at a computer, we've given up or we've given computer, we've given up or we've given our time uh for many years, decades to our time uh for many years, decades to work and uh maybe that might be in 10 work and uh maybe that might be in 10 years time you look back and think, "Oh, years time you look back and think, "Oh, that's a quaint That was a quaint uh that's a quaint That was a quaint uh time time time that we we don't actually do that." And that we we don't actually do that." And so, there's going to be a kind of new so, there's going to be a kind of new dynamic to the work. Uh but the the dynamic to the work. Uh but the the problem is at the same time obviously problem is at the same time obviously we've got in parallel we've got all we've got in parallel we've got all these humanoids that are going to be these humanoids that are going to be produced and going to do all the tasks produced and going to do all the tasks and do the production.

and do the production. So, I I actually have a very So, I I actually have a very controversial view about the things are controversial view about the things are going and I don't think many people are going and I don't think many people are going to like this. So, I'll I'll I'll going to like this. So, I'll I'll I'll explain it for the first time to you explain it for the first time to you guys. Um guys. Um I actually think the cost of everything I actually think the cost of everything We all think inflation, everything's We all think inflation, everything's going up in price today, you know, you going up in price today, you know, you know, petrol, fuel, you know, in in know, petrol, fuel, you know, in in Germany we feel it a lot, you know, um Germany we feel it a lot, you know, um >> Mhm.

>> Mhm. >> Mhm. >> I actually think prices of things >> I actually think prices of things eventually will go down in price. So, eventually will go down in price. So, things will drop because The reason is things will drop because The reason is that we're going to be producing robotic that we're going to be producing robotic systems to produce uh our our our systems to produce uh our our our our our infrastructure, our our world our our infrastructure, our our world around us and that cost won't be so around us and that cost won't be so labor-intensive.

labor-intensive. labor-intensive. And therefore, the cost may eventually And therefore, the cost may eventually drop for everything that we have. So, in drop for everything that we have. So, in fact, that you know, there's worries fact, that you know, there's worries that we think about working and you that we think about working and you know, we need jobs because we need to know, we need jobs because we need to support the economy and support and grow support the economy and support and grow that. But eventually, if there's no jobs that. But eventually, if there's no jobs because we AI has taken all the jobs, because we AI has taken all the jobs, where does the money come from? We get a where does the money come from? We get a universal income, but then who's doing universal income, but then who's doing all that? It's all robotic robotizing all that? It's all robotic robotizing and the costs just come down. So, maybe and the costs just come down. So, maybe eventually we'll have a complete eventually we'll have a complete opposite. Prices will go down to a opposite. Prices will go down to a ceiling or something like that. So, ceiling or something like that. So, I don't know. That's just what I think I don't know. That's just what I think could happen maybe in the next 15 years.

could happen maybe in the next 15 years. But it's happening as you say, Jurene, But it's happening as you say, Jurene, it's happening very quickly. it's happening very quickly.

Uh you know, we can do, you know, Uh you know, we can do, you know, different tasks, and we can automate different tasks, and we can automate that. Um you know, there's a lot of that. Um you know, there's a lot of organizations out there that are native organizations out there that are native AI or coming in and doing, you know, AI or coming in and doing, you know, tasks with particular repetitive tasks tasks with particular repetitive tasks at the moment that need to be replaced.

at the moment that need to be replaced. So, those tasks which can So, those tasks which can uh and in and in Germany, I think there uh and in and in Germany, I think there is a, you know, we're seeing a a a big is a, you know, we're seeing a a a big challenge, obviously, in energy. The war challenge, obviously, in energy. The war is is generating the cost pricing, generating the cost pricing, um and the industry, car industry is um and the industry, car industry is under attack, for example, from China under attack, for example, from China and and bringing There's a lot of and and bringing There's a lot of different things going on. But there's different things going on. But there's also a lot of jobs in them which are are also a lot of jobs in them which are are very kind of standardized routine which very kind of standardized routine which will could be quite easily done by AI will could be quite easily

done by AI eventually. So, eventually. So, I think you're right. Um there's going I think you're right. Um there's going to be a lot a lot of thinking around how to be a lot a lot of thinking around how we're going to have a new different type we're going to have a new different type of society in the future given what of society in the future given what we're seeing playing out. But it's we're seeing playing out. But it's happening real time now, and it's, you happening real time now, and it's, you know, we're living in a living know, we're living in a living >> You know, my theory is very simple. Um >> You know, my theory is very simple. Um sorry, go ahead, Ed. Um I'm going to say sorry, go ahead, Ed. Um I'm going to say >> No, no, finish your theory, and then >> No, no, finish your theory, and then I'll jump in.

I'll jump in. >> So, well, cuz I I'm going to >> So, well, cuz I I'm going to I'm going to go a little bit I'm going to go a little bit off topic. off topic.

>> So, let me let me show you. So, we the >> So, let me let me show you. So, we the realities of life have been challenged realities of life have been challenged over time.

over time. I mean, um you know, from fire to tire I mean, um you know, from fire to tire to horse and buggy to tools from knife. to horse and buggy to tools from knife.

I mean, tools have changed humanity over I mean, tools have changed humanity over time. time. time. I mean, you guys are I mean, you guys are uh uh uh come from a, you know, higher society, come from a, you know, higher society, Germany, US, all of that. I I already Germany, US, all of that. I I already used to wash clothes with hands. We did used to wash clothes with hands. We did not have washing machine.

not have washing machine. In Pakistan. In Pakistan. And oh my god, the washing machine was And oh my god, the washing machine was like so great invention.

like so great invention. It again requires electricity every new It again requires electricity every new invent. But the point was that we have invent. But the point was that we have seen these and people keep saying that I seen these and people keep saying that I think think think we will find ways to do something.

we will find ways to do something. That's number one. Number two, we need That's number one. Number two, we need to reinvent how we do things. to reinvent how we do things.

Just for as an example, the economy is Just for as an example, the economy is probably going to shift from physical probably going to shift from physical money to banking notes to stable coins.

money to banking notes to stable coins. And what we call you know, actually And what we call you know, actually Europe is leading more than US in terms Europe is leading more than US in terms of digital currencies. And that's that's of digital currencies. And that's that's a new reality we're going to live in. So a new reality we're going to live in. So the whole taxation codes and everything the whole taxation codes and everything can be rethought. I mean, it doesn't can be rethought. I mean, it doesn't have to be things the way we do it. So I have to be things the way we do it. So I think think think as you said at it may not be UBI. It may as you said at it may not be UBI. It may not it may be something else.

not it may be something else. Are you courteous? Are you taking care Are you courteous? Are you taking care of your elders? That's how you get paid. of your elders? That's how you get paid.

You understand? Like there are ways to You understand? Like there are ways to making sure that social impact is there making sure that social impact is there and therefore people keep saying that AI and therefore people keep saying that AI is going to be you know, the Antichrist is going to be you know, the Antichrist looking over and going to go through looking over and going to go through this and that's how you're going to be this and that's how you're going to be able to get a plane ticket which still able to get a plane ticket which still happens in China. But then that's the happens in China. But then that's the real question here, right? Is it really real question here, right? Is it really not that important? I think it might be not that important? I think it might be important to actually bring those uh you important to actually bring those uh you know, important subjects to in line with know, important subjects to

in line with with what we're doing. So that that's my with what we're doing. So that that's my thought. Ed, go ahead. My my bestie thought. Ed, go ahead. My my bestie Harvey is here. We're going to we're Harvey is here. We're going to we're going to catch up catch you up in a going to catch up catch you up in a minute. Hey Ed.

minute. Hey Ed. >> Okay. So yeah, I'll I'll mention this >> Okay. So yeah, I'll I'll mention this and get your feedback. I'll say Edmund and get your feedback. I'll say Edmund so that people know the difference so that people know the difference between the two of us. Uh between the two of us. Uh And and then we come back yeah, like you And and then we come back yeah, like you said, Harvey can catch up. So and don't said, Harvey can catch up. So and don't tell him what I said about data centers tell him what I said about data centers So, people might say that we are in an So, people might say that we are in an AI bubble.

AI bubble. So, I wanted to get your response. And I So, I wanted to get your response. And I And I And I'll tell you like they will And I And I'll tell you like they will say that you and I, Junaid, Harvey, and say that you and I, Junaid, Harvey, and maybe a lot of our listeners are in the maybe a lot of our listeners are in the let's just say 5% let's just say 5% that you know, are out there, we make a that you know, are out there, we make a living, living, living, you know, we leverage AI, you know, we leverage AI, and and we we see a lot of things, and and and we we see a lot of things, and but how much of it is actually like like but how much of it is actually like like translating back down I'm going to I'm translating back down I'm going to I'm going to give you a couple points here, going to give you a couple points here, and then and then and then I'm interested in your and then I'm interested in your reaction.

reaction. reaction. Um so, Um so, when I talk about like what I'm doing when I talk about like what I'm doing now in healthcare with AI, people say, now in healthcare with AI, people say, "Ed, that's you. You You're doing it "Ed, that's you. You You're doing it because you know all this stuff, but the because you know all this stuff, but the average person doesn't know what you average person doesn't know what you know, and that sort of thing." That's know, and that sort of thing." That's That's That's one argument I get. The other That's one argument I get. The other one, which I see a lot, is one, which I see a lot, is that there's so much hype. So, I spend a that there's so much hype. So, I spend a lot of time with uh chief executives um lot of time with uh chief executives um throughout healthcare, mostly provider, throughout healthcare, mostly provider, but uh but uh last evening with a lot of payer last evening with a lot of payer executives.

executives. executives. And there's a lot of pressure from the And there's a lot of pressure from the boards, and the boards are largely boards, and the boards are largely stacked with people that don't know AI, stacked with people that don't know AI, but they read the headlines of the Wall but they read the headlines of the Wall Street Journal or, you know, whatever Street Journal or, you know, whatever whatever. And And so, they put a lot of whatever. And And so, they put a lot of pressure on the C-suite to do AI, pressure on the C-suite to do AI, and so, they do a lot of pilots, and and so, they do a lot of pilots, and nothing is transforms permanently.

nothing is transforms permanently. There's just some pilots that are done, There's just some pilots that are done, they see a little bit benefit, like all they see a little bit benefit, like all the stuff Junaid went through in the the stuff Junaid went through in the very beginning. Like all these great very beginning. Like all these great studies, but it's it's less than 1%.

studies, but it's it's less than 1%. So, So, So, how So, are we in a bubble? Um how So, are we in a bubble? Um and if yes, you know, when when does and if yes, you know, when when does that bubble return to normal, and then that bubble return to normal, and then we see an uptake of actual uh AI-enabled we see an uptake of actual uh AI-enabled uh capabilities, or are we not in a uh capabilities, or are we not in a bubble, and like this is people that bubble, and like this is people that are, you know, it's going to hit are, you know, it's going to hit everyone like a tsunami. Just generally everyone like a tsunami. Just generally your philosophy cuz I get this a lot and your philosophy cuz I get this a lot and I'm very interested giving your past I'm very interested giving your past experience. You're a great innovator.

experience. You're a great innovator. You've invented many things that have You've invented many things that have saved people's lives and now you have saved people's lives and now you have these theories. So I would love to hear these theories. So I would love to hear >> Sure.

>> Sure. Yeah, so I I I think if we look back Yeah, so I I I think if we look back about about about 25 years ago there was the internet.com. 25 years ago there was the internet.com.

You remember You remember back in the late 90s back in the late 90s everything was about internet, everything was about internet, you know, having dot com was the big you know, having dot com was the big thing to do at that time. You know, thing to do at that time. You know, Amazon came out of that time. Google Amazon came out of that time. Google actually started in the late 90s. I actually started in the late 90s. I remember using the Google remember using the Google browser search engine when it first came browser search engine when it first came out the first day and it was really nice out the first day and it was really nice interface and it was nice but didn't interface and it was nice but didn't realize how how that was going to realize how how that was going to progress. And then there was a a bubble progress. And then there was a a bubble and a burst. So around 2000 I think the and a burst. So around 2000 I think the dot com went dot com went a lot of companies went bankrupt but a lot of companies went bankrupt but there were a few there were a few which kind of survived and and became which kind of survived and and became sort of today obviously Amazon came out sort of today obviously Amazon came out of that and Google some of the big of that and Google some of the big titans there and maybe titans there and maybe the same thing is happening today but I the same thing is happening today but I think it's slightly different in terms think it's slightly different in terms of that it's of that it's I think we're seeing this in the I think we're seeing this in the workplace that we can actually use these workplace that we can actually use these tools to be more productive. Um and so tools to be more productive. Um and so we may be actually we're actually going we may be actually we're actually going through a revolution but there may be in through a revolution but there may be in between in the long term definitely 100% between in the long term definitely 100% but in the short term there may be a but in the short term there may be a bubble. I just my thinking. Cuz you look bubble. I just my thinking. Cuz you look at the valuations of Anthropic, you at the valuations of Anthropic, you know, they're going to go public with an know, they're going to go public with an IPO trillion dollar IPO. They're even I IPO trillion dollar IPO. They're even I just saw an article this morning that just saw an article this morning that you can buy property in San Francisco you can buy property in San Francisco with a with a with stock from Anthropic when it comes with stock from Anthropic when it comes public. So the value is it really is at public. So the value is it really is at its profit at at the highest levels and its profit at at the highest levels and open AI and you know, it's also Race to open AI and you know, it's also Race to Sickness kind of matters. So much Sickness kind of matters. So much money's being plowed in. Um the data money's being plowed in. Um the data centers are being built maybe in space centers are being built maybe in space as well and uh as well and uh you know, so is it is is this all going you know, so is it is is this all going to pop and there's going to be something to pop and there's going to be something there? Could likely, but that's the there? Could likely, but that's the longer term trajectory for sure. You longer term trajectory for sure. You know, I think we're going to have to be know, I think we're going to have to be working in a new new world new working in a new new world new environment. So, I I I would say there's environment. So, I I I would say there's probably maybe a little bit short-term probably maybe a little bit short-term frothy nest and then a bit of a cut and frothy nest and then a bit of a cut and then long-term it will kind of go a bit then long-term it will kind of go a bit like the dot-com boom from like the dot-com boom from That's how I see it, but I don't have a That's how I see it, but I don't have a crystal ball, so crystal ball, so >> Yeah, I think that's pretty >> Yeah, I think that's pretty I tend to agree with that Flossy. Back I tend to agree with that Flossy. Back to you Janay.

to you Janay. >> So, Harvey >> So, Harvey at of course is an innovator and he has at of course is an innovator and he has actually written something what we call actually written something what we call organites AI and towards AI basically organites AI and towards AI basically going from silicon to tissue based going from silicon to tissue based computation and then we have been computation and then we have been discussing computation in general from discussing computation in general from silicon to silicon to neurons or retinal cells or finally what neurons or retinal cells or finally what we call quantum. So, just to catch you we call quantum. So, just to catch you up and then one of the key themes is up and then one of the key themes is essentially energy usage and then essentially energy usage and then um um um uh the question really is at this point uh the question really is at this point and it's just not it's just overall and it's just not it's just overall impact on environment just energy, impact on environment just energy, water, space, you know, an ugly, you water, space, you know, an ugly, you know, factory in my backyard. All of know, factory in my backyard. All of those combined. That's that's what we those combined. That's that's what we have been discussing. I mean, we will have been discussing. I mean, we will focus on energy and since, you know, we focus on energy and since, you know, we have been talking about space, I mean, have been talking about space, I mean, one of the things that came up was that one of the things that came up was that

hey, are we that, you know, are we going hey, are we that, you know, are we going to use the silicon in space or we should to use the silicon in space or we should just wait for, you know, retinal and just wait for, you know, retinal and neuron which is, you know, organoid neuron which is, you know, organoid computing or quantum computing.

computing or quantum computing. So, this is where we are and then the So, this is where we are and then the discussion moved towards social impact discussion moved towards social impact when demonetization when demonetization and which is already happening. I mean, and which is already happening. I mean, Chinese models are so cheap. I mean, Chinese models are so cheap. I mean, it's freaking insane. I don't know. Have it's freaking insane. I don't know. Have you been using DGC version 4? I mean, oh you been using DGC version 4? I mean, oh my my my god. The god. The god damn quality for the price.

god damn quality for the price. I mean I mean I was not able to spend after using 24 I was not able to spend after using 24 hours hours hours for for for for a whole week $3.

for a whole week $3. With two PhD level just With two PhD level just today. today. today. So, I don't know what's going to happen So, I don't know what's going to happen next. So, just to catch you up and then next. So, just to catch you up and then here's my here's the question that we here's my here's the question that we want to go through want to go through that uh that uh of course the one of the biggest factors of course the one of the biggest factors is how do you the computational layers is how do you the computational layers for us is transistors zeros and ones.

for us is transistors zeros and ones. Quantum computing is coming through this Quantum computing is coming through this and then this is going to go. But, what and then this is going to go. But, what do you think in your future given your do you think in your future given your you know purview of very confidential you know purview of very confidential information that you're going to share information that you're going to share with us of course. What's happening in with us of course. What's happening in space computing? How how do you think space computing? How how do you think this progresses in your mind?

this progresses in your mind? >> Yeah, so I I >> Yeah, so I I greetings to everybody. Sorry I'm late. greetings to everybody. Sorry I'm late. I'm in San Francisco. I'm actually in I'm in San Francisco. I'm actually in Palo Alto. I'm in Stanford this week.

Palo Alto. I'm in Stanford this week. Great AI Hub conference that's it's Great AI Hub conference that's it's amazing. Um but to answer your question, amazing. Um but to answer your question, here's the way I see it.

here's the way I see it. We're going to be efficient with We're going to be efficient with everything we have down to like you guys everything we have down to like you guys just gave some examples, but think about just gave some examples, but think about all the compute power. The United States all the compute power. The United States has more compute power on our cell has more compute power on our cell phones than most other places. So, why phones than most other places. So, why not leverage our cell phones? Why not not leverage our cell phones? Why not leverage this compute power that I have leverage this compute power that I have on this iPhone? I'm not using it all the on this iPhone? I'm not using it all the time and we're we're on a network. Now, time and we're we're on a network. Now, extrapolate that concept where it's extrapolate that concept where it's everywhere. Um Nvidia has a uh thing everywhere. Um Nvidia has a uh thing that they're doing experiment with 100 that they're doing experiment with 100 homes and putting the data centers on homes and putting the data centers on their home and then those data centers their home and then those data centers now are in people. And then extrapolate now are in people. And then extrapolate that again to now we're talking about that again to now we're talking about space and having a network of computers.

space and having a network of computers. And I know Ed's really into that idea. And I know Ed's really into that idea. He loves it. And since he's such a big He loves it. And since he's such a big fan of this idea, I know this is a fan of this idea, I know this is a little controversial, but they're little controversial, but they're talking about in the future putting talking about in the future putting nuclear reactors to uh in space to have nuclear reactors to uh in space to have even more power even more power on top of the solar power that's there.

on top of the solar power that's there. Now, when it comes to the environment, Now, when it comes to the environment, yeah, you know, there's a big push here yeah, you know, there's a big push here in the United States saying, "I don't in the United States saying, "I don't want that in my backyard. That's going want that in my backyard. That's going to increase my prices for the data to increase my prices for the data centers." So, with the water uses and centers." So, with the water uses and the power, does make sense. We need to the power, does make sense. We need to go somewhere else. Is that space? Is go somewhere else. Is that space? Is that the moon?

that the moon? You know, where are we going to go with You know, where are we going to go with these data centers? Are we going to put these data centers? Are we going to put a virtual data virtual space station a virtual data virtual space station call with just the data centers there.

call with just the data centers there. So, you know, that's next level. So, you know, that's next level. Now, to your point, Now, to your point, there's a weird inflection point. And there's a weird inflection point. And there's many laws to it, too. If we make there's many laws to it, too. If we make it cheaper and cheaper, we're going to it cheaper and cheaper, we're going to use it more and more, and then we use it more and more, and then we actually make it more expensive. But actually make it more expensive. But then you can also argue that with time, then you can also argue that with time, we use it so much we use it so much and we it's everywhere that we're and we it's everywhere that we're actually at one point, how much do we actually at one point, how much do we really need for our daily living? We're really need for our daily living? We're personally looking at doing edge personally looking at doing edge computing in outer space.

computing in outer space. So, imagine a data center. Now, add edge So, imagine a data center. Now, add edge computing Now, I'm going to add to the computing Now, I'm going to add to the small language models on the actual data small language models on the actual data center, and then everybody can be center, and then everybody can be creative out there of how that could creative out there of how that could particularly help them themselves.

particularly help them themselves. So, it's quite interesting. I'm I'm So, it's quite interesting. I'm I'm excited to be alive at this time in in excited to be alive at this time in in our point. I I couple weeks ago, I was our point. I I couple weeks ago, I was in the Amazons, and I thought, "Oh my in the Amazons, and I thought, "Oh my god, if I lived here, I I don't I don't god, if I lived here, I I don't I don't >> So absolutely true. Just want to give >> So absolutely true. Just want to give you my personal experience. We did move you my personal experience. We did move away from foundation models completely.

away from foundation models completely. We never We always had small models, but We never We always had small models, but we moved up to medium we moved up to medium models. When 3.5 9B, we looked at the models. When 3.5 9B, we looked at the architecture of smaller MOE models.

architecture of smaller MOE models. Gamma 4 is what Google came out at, and Gamma 4 is what Google came out at, and then we are, you know, officially, you then we are, you know, officially, you know, fine-tuning it with 37 billion know, fine-tuning it with 37 billion parameters to 27 billion parameters. And parameters to 27 billion parameters. And they are so more efficient as you they are so more efficient as you suggested. And then, parts of it, what suggested. And then, parts of it, what we call uh we call uh decoding, is a way of you know moving decoding, is a way of you know moving things along faster. Uh we are doing things along faster. Uh we are doing edge base. So, the idea is that you're edge base. So, the idea is that you're absolutely right. A, we're making absolutely right. A, we're making everything more and more efficient. Uh everything more and more efficient. Uh and that's actually asking me to and that's actually asking me to actually move up the chain, just not actually move up the chain, just not serve small models and then go up to serve small models and then go up to medium and then one day medium and then one day I truly believe that we can have a large I truly believe that we can have a large language foundation level model language foundation level model on edge as well, depending on how we on edge as well, depending on how we structure that energy uh you know, and structure that energy uh you know, and everything. Uh I mean, one of the things everything. Uh I mean, one of the things I don't know if you looked at Huawei.

I don't know if you looked at Huawei. Huawei was actually one of the ways that Huawei was actually one of the ways that they're doing is that the chip is like they're doing is that the chip is like this and they're also interconnected.

this and they're also interconnected. They actually folded the chip on top of They actually folded the chip on top of each other and then decrease the each other and then decrease the connections. So, we're seeing new archi- connections. So, we're seeing new archi- So, Moore's law was like we thought it So, Moore's law was like we thought it was a Moore's law. It was broken for was a Moore's law. It was broken for decades, then we hit another ceiling.

decades, then we hit another ceiling. Now somebody came up with folding and Now somebody came up with folding and then we're breaking the Moore's law then we're breaking the Moore's law again. So, again, I agree with the again. So, again, I agree with the second one with an example that there second one with an example that there are many laws and I I don't know what are many laws and I I don't know what the word law even applies anymore the word law even applies anymore because it's just because it's just uh one engineer's dream away from going uh one engineer's dream away from going through this. So, um through this. So, um I'm going back to Ed. Um I'm going back to Ed. Um and and and uh you have a German experience. And by uh you have a German experience. And by the way, just a reminder, we love the way, just a reminder, we love Texans, we love data centers. We're Texans, we love data centers. We're building star shed. We are building in building star shed. We are building in Sherman, Texas, we are building uh Texas Sherman, Texas, we are building uh Texas Instruments. But anyways, Ed um we of Instruments. But anyways, Ed um we of course course course have a different mindset as a society.

have a different mindset as a society. We are generally more We are generally more capitalistic. We have more, you know, uh capitalistic. We have more, you know, uh business oriented. I mean, of course business oriented. I mean, of course everyone doesn't like a data center in everyone doesn't like a data center in the backyard, but at the end of the day, the backyard, but at the end of the day, they're not opposed to sort of some of they're not opposed to sort of some of these things. But there are societies these things. But there are societies who step back and rightly so and ask the who step back and rightly so and ask the bigger question that should we hold off bigger question that should we hold off with this with this extensive base of innovation before extensive base of innovation before society can adopt it. And there are society can adopt it. And there are smaller countries who are adopting it smaller countries who are adopting it much faster, but then of course much faster, but then of course controlling able to control it at a controlling able to control it at a government level. Singapore, Dubai, and government level. Singapore, Dubai, and then I can give you more example. So, then I can give you more example. So, what are your thoughts on what are your thoughts on what Ed was saying, the AI bubble, which what Ed was saying, the AI bubble, which is you're absolutely right. You're going is you're absolutely right. You're going to see a hot hockey stick like a dot com to see a hot hockey stick like a dot com bubble.

bubble. bubble. But how this adoption But how this adoption can be controlled or should be can be controlled or should be >> Um so Ed, does he mean Ed Edman?

>> Um so Ed, does he mean Ed Edman? >> Ed Ed Ed Ed Edman, yes. >> Ed Ed Ed Ed Edman, yes. >> Okay. >> Okay. >> Okay. I I policy regulation, yeah. So, being I I policy regulation, yeah. So, being being in Germany, um we we sit under a being in Germany, um we we sit under a lot of regulations in many different lot of regulations in many different industries as as you know, in the industries as as you know, in the medical tech industry, we have the MDR.

medical tech industry, we have the MDR. We now have the EU AI Act, as you might We now have the EU AI Act, as you might be aware, which was meant to be be aware, which was meant to be implemented in August, few weeks time, implemented in August, few weeks time, but now it's been delayed a little bit but now it's been delayed a little bit out so organizations can catch up. So, out so organizations can catch up. So, there are kind of mechanisms to to to there are kind of mechanisms to to to use to kind of put this a little bit um use to kind of put this a little bit um and keep the moat moat high. Um I think and keep the moat moat high. Um I think um um um and particularly for companies and who and particularly for companies and who can get and meet those requirements, it can get and meet those requirements, it brings them a a lot of um I think I brings them a a lot of um I think I think

validation. If they can get hit think validation. If they can get hit these hurdles in the regulations side.

these hurdles in the regulations side. Um in the brain of space where the brain Um in the brain of space where the brain organoid space, just going on this topic organoid space, just going on this topic again, it's it's a bit of a gray zone again, it's it's a bit of a gray zone because the regulations aren't really because the regulations aren't really caught up in this area. The FDA uh and caught up in this area. The FDA uh and the NIH now can do So, you can do the NIH now can do So, you can do studies for example um with these models studies for example um with these models now um now um and replace the animal model much more.

and replace the animal model much more. Since April this year, the FDA said they Since April this year, the FDA said they want more models using brain organoids want more models using brain organoids or organoid derived type approaches or organoid derived type approaches instead of animal models. So, it takes I instead of animal models. So, it takes I think vision from policies to see well, think vision from policies to see well, where does this actually going to help where does this actually going to help the population, you know? And I always the population, you know? And I always feel like if we can help get the best feel like if we can help get the best patient outcome, done it ethically, in a patient outcome, done it ethically, in a in a good way, then we should encourage in a good way, then we should encourage that innovation at policy.

that innovation at policy. The other question is also about, you The other question is also about, you know, uncontrolled innovation, you know, know, uncontrolled innovation, you know, what happens, you know, we're seeing what happens, you know, we're seeing this I'll give you an example, we feel this I'll give you an example, we feel really feel it quite strong in in Europe really feel it quite strong in in Europe and I work with some colleagues who who and I work with some colleagues who who are based out in Ukraine. Um, the drone are based out in Ukraine. Um, the drone technology has evolved massively in the technology has evolved massively in the last 10 years. I mean, iteration of the last 10 years. I mean, iteration of the tech is I mean, you would never think 10 tech is I mean, you would never think 10 years ago war talking about war talking years ago war talking about war talking about warfare, but has has evolved so about warfare, but has has evolved so quickly. Um, a lot of that's on quickly. Um, a lot of that's on >> of life, you know.

>> of life, you know. >> Yeah, yeah, a lot of that's unregulated >> Yeah, yeah, a lot of that's unregulated and it's been a reiteration and getting and it's been a reiteration and getting out on the front line. And I'm a bit out on the front line. And I'm a bit worried in terms of biology and bio worried in terms of biology and bio weapons and and the way weapons and and the way we're talking about bio hybrid and you we're talking about bio hybrid and you know, if we have unchecked regulation, know, if we have unchecked regulation, you know, what does it take for an actor you know, what does it take for an actor in a different market to bring and and in a different market to bring and and get a advantage by using some of the get a advantage by using some of the tech here. So, it kind of checks and tech here. So, it kind of checks and balances, got to got to get it right.

balances, got to got to get it right. But at the same time, policy's also got But at the same time, policy's also got to, you know, so it's kind of a I think to, you know, so it's kind of a I think it's a balancing act. I mean, we'd love it's a balancing act. I mean, we'd love to see innovation, but we need to keep to see innovation, but we need to keep it just checked and tempered and make it just checked and tempered and make sure no one's doing anything, you know, sure no one's doing anything, you know, incorrectly.

incorrectly. incorrectly. >> I can tell you my personal experience I >> I can tell you my personal experience I mean, I MDR and EU act and everything mean, I MDR and EU act and everything and I just gave up and I just gave up entering the European market.

entering the European market. Yeah, the regulation is is so insane Yeah, the regulation is is so insane that I said man, I saw a world pay that I said man, I saw a world pay because I mean, you you do want I mean, because I mean, you you do want I mean, I'm not you know, I'm not you know, being facetious here, but the US market being facetious here, but the US market is much bigger.

is much bigger. >> Yeah. >> Yeah. >> Yeah. >> Yeah, as compared to, you know, people >> Yeah, as compared to, you know, people talk about Middle East market and talk about Middle East market and Singapore and

everything. I'm just going Singapore and everything. I'm just going to tell you it's 25% of the US market, to tell you it's 25% of the US market, which by the way, if you have two which by the way, if you have two states, California and Texas, it states, California and Texas, it overpowers the rest of the world. Like overpowers the rest of the world. Like literally the rest of the two states.

literally the rest of the two states. I'm not talking about the rest of the I'm not talking about the rest of the America in general. So, then then as a America in general. So, then then as a as a CEO after me, tough decisions as a CEO after me, tough decisions generally. I mean, I cannot do all my generally. I mean, I cannot do all my research everywhere, but you're you're research everywhere, but you're you're absolutely right. Adam Harvey, what are absolutely right. Adam Harvey, what are your thoughts about uh your thoughts about uh policing AI?

policing AI? That's the term I think I'm going to use That's the term I think I'm going to use that. Yeah, you go first uh Yeah, you go first uh Harvey and then I'm going to Harvey and then I'm going to go with uh uh Mark.

go with uh uh Mark. >> Well, uh as we all know on the policing >> Well, uh as we all know on the policing side, it it's a double-edged sword, side, it it's a double-edged sword, right? If we police too hard, are we right? If we police too hard, are we going to police so hard that we stop going to police so hard that we stop innovation or we slow it innovation?

innovation or we slow it innovation? Even if you slow it, especially in Even if you slow it, especially in health care, we're going to affect health care, we're going to affect lives. But at the same opposite spin is lives. But at the same opposite spin is if you don't and we do things not if you don't and we do things not correctly, then correctly, then will these models hallucinate and to the will these models hallucinate and to the point where it's giving advice to a point where it's giving advice to a little kid and they kill themselves little kid and they kill themselves because the AI told them to kill because the AI told them to kill themselves, you know? So, there's some themselves, you know? So, there's some really serious repercussions.

really serious repercussions. As these foundational models are adding As these foundational models are adding the guardrails more and more and these the guardrails more and more and these certain models are getting stronger, certain models are getting stronger, um it behooves themselves to be um it behooves themselves to be regulated because something like this regulated because something like this happens is going to hurt the entire happens is going to hurt the entire industry. So, there's a little bit of industry. So, there's a little bit of self-policing there. Uh at self-policing there. Uh at simultaneously, simultaneously, simultaneously, um these models uh at the beginning, um these models uh at the beginning, their their hallucination rates were a their their hallucination rates were a lot higher, but now we're getting better lot higher, but now we're getting better at how can we make sure that they don't at how can we make sure that they don't hallucinate? And then hallucinate? And then uh the end user, let's just call it uh the end user, let's just call it physicians in my particular case, physicians in my particular case, they're looking at it a little bit they're looking at it a little bit different and like, "Well, wait wait a different and like, "Well, wait wait a second. What if I use it just in my second. What if I use it just in my specialty, just in my box, and then just specialty, just in my box, and then just these certain repetitive task, and it's these certain repetitive task, and it's less likely to harm?" So, it's quite less likely to harm?" So, it's quite interesting to see this this science interesting to see this this science evolve. And you know, I call myself Dr.

evolve. And you know, I call myself Dr. GPT, but you know, in the future, what GPT, but you know, in the future, what what is it going to be? What's the next what is it going to be? What's the next model that's like people going to look model that's like people going to look back and look at GPT and be like, oh, back and look at GPT and be like, oh, that was so cute that back then that was that was so cute that back then that was simple, but like it's really a this, you simple, but like it's really a this, you know?

know? know? So. >> Yeah, I think >> Yeah, I think >> and so the word self-policing is very >> and so the word self-policing is very important and then using the example of important and then using the example of Boeing Boeing Boeing and then you can comment on the whole and then you can comment on the whole picture. Policing AI and of course picture. Policing AI and of course >> To add or admin?

>> To add or admin? >> Add marks. >> Add marks. >> Sorry. >> Sorry. >> Sorry. >> Well, I was >> Well, I was I

was just going to say I was just going to say you know, again, where I hate going to you know, again, where I hate going to the to the to philosophy cuz I don't think United philosophy cuz I don't think United States could pull this off, but we're States could pull this off, but we're spending so much money in all these spending so much money in all these individual hospitals individual hospitals and in the payers and and for sure in and in the payers and and for sure in our partners, vendor partners, our partners, vendor partners, everyone's doing their own little everyone's doing their own little experimentation, right? And it's we're experimentation, right? And it's we're getting limited impact. Imagine if we getting limited impact. Imagine if we could tackle this for all the reasons could tackle this for all the reasons cited cited cited from and I'm not a big government from and I'm not a big government person, but person, but if you took if you took a fraction of all that money that's a fraction of all that money that's being used in all these like everyone's being used in all these like everyone's got a chief in a got a chief in a chief of uh AI officer, right? And then chief of uh AI officer, right? And then they build a team. You see what I'm they build a team. You see what I'm saying? And then they make investments saying? And then they make investments and and meanwhile, you know, the profit and and meanwhile, you know, the profit margins are so small for health care and margins are so small for health care and we're we got populations that are we're we got populations that are underserved, all that kind of stuff. And underserved, all that kind of stuff. And we're pouring all this money having very we're pouring all this money having very little impact. Imagine if we took a little impact. Imagine if we took a fraction of that collective took that fraction of that collective took that money collectively and then experimented money collectively and then experimented in a safe environment and just in a safe environment and just accelerated the pace of change. And and accelerated the pace of change. And and American health care is so slow American health care is so slow uh cuz all the regulations and all the uh cuz all the regulations and all the governance. Um and for good reason governance. Um and for good reason again, you know, I'm always try to think again, you know, I'm always try to think balance, you know, Harvey brought out balance, you know, Harvey brought out some of the points where we don't want some of the points where we don't want these hallucinations. So anyways, I these hallucinations. So anyways, I would love to see us somehow figure this would love to see us somehow figure this one out where we could one out where we could do some serious R&D and rapid cycle do some serious R&D and rapid cycle um because otherwise we're going to be um because otherwise we're going to be we're going to get beat as Edmund was we're going to get beat as Edmund was pointing out. We're going to get beat by pointing out. We're going to get beat by nefarious actors.

nefarious actors. >> Yeah. Yep. And that's that's that's so >> Yeah. Yep. And that's that's that's so true. Uh Edmund, you're suddenly the true. Uh Edmund, you're suddenly the Chancellor of Germany.

Chancellor of Germany. This is your last question for the day. This is your last question for the day. And then uh you have to give three And then uh you have to give three points to your uh Chief AI Officer of points to your uh Chief AI Officer of Germany as a country.

Germany as a country. What are those three points What are those three points uh that you're going to tell him that to uh that you're going to tell him that to work on? Again, that's sort of like a work on? Again, that's sort of like a framework question because the defining framework question because the defining point is that uh policies are point is that uh policies are essentially at the end of the day essentially at the end of the day frameworks and they need to be applied frameworks and they need to be applied uh for institution basis. So, what would uh for institution basis. So, what would be your first the top three things in be your first the top three things in terms of number one, research dollars terms of number one, research dollars going into AI versus augmented or AI, going into AI versus augmented or AI, quantum AI, etc. The second of course is quantum AI, etc. The second of course is the policy that, you know, the policy that, you know, and then the third one would be and then the third one would be pick a topic.

pick a topic. >> Yeah. >> Yeah. >> Yeah. Yeah, uh good question. Um Yeah, uh good question. Um yeah, yeah, yeah, I I think it's Yeah, it's about I I think it's Yeah, it's about prioritization um in in in this in this prioritization um in in in this in this role you'd have to really look at what role you'd have to really look at what what are the segments which are going to what are the segments which are going to have the most impact have the most impact uh for the dollar. Um uh for the dollar. Um you know, Germany you know, Germany Germany, you pay a lot of tax and a lot Germany, you pay a lot of tax and a lot of public revenue and a lot of money of public revenue and a lot of money coming into the funds here, but and coming into the funds here, but and there's a just a side note, there's a there's a just a side note, there's a thing called the black book and you can thing called the black book and you can see

every year where the funding has has see every year where the funding has has been impacted and what what the outcomes been impacted and what what the outcomes have been and it's not always very good.

have been and it's not always very good. But you need to look into um yeah, areas But you need to look into um yeah, areas where you're going to have the most where you're going to have the most innovation, create an environment uh innovation, create an environment uh with that funding that's going to make with that funding that's going to make it that kind of ecosystem, use the word it that kind of ecosystem, use the word ecosystem, flourish.

ecosystem, flourish. So, whether that's having anchor point So, whether that's having anchor point um institutes around um around so um institutes around um around so startup or other companies can organize startup or other companies can organize in some sort of ecosystem.

in some sort of ecosystem. Um Um Um I think to encourage that is is going to I think to encourage that is is going to be very important. Also to make the I be very important. Also to make the I mean the last the the second point would mean the last the the second point would be to to really look at regulations and be to to really look at regulations and really have and I like in America where really have and I like in America where you when you from medical tech side you you when you from medical tech side you have this sort of fast track uh have this sort of fast track uh breakthrough designations which are breakthrough designations which are really good.

really good. Um Um Um And I think we need to do a lot more to And I think we need to do a lot more to encourage encourage encourage in in in individuals or an a system which can individuals or an a system which can encourage innovation to be reiterated encourage innovation to be reiterated and and and really get out there and and and really get out there quickly.

quickly. quickly. Um and Um and it it is happening but it needs more it it is happening but it needs more injection in there um and um to injection in there um and um to encourage us. So I think those encourage us. So I think those those are the kind of things that will those are the kind of things that will get things moving and and I would be get things moving and and I would be ideal.

ideal. ideal. You know and I think um at the end of You know and I think um at the end of the day it's got to have the most it's the day it's got to have the most it's got to show an impact on on the got to show an impact on on the population and also population and also from a competitive point, you know, in from a competitive point, you know, in the global market um the global market um you know, you got to build and train you know, you got to build and train that workforce uh to to to operate in that workforce uh to to to operate in this new environment in a way where this new environment in a way where they're going to feel comfortable um and they're going to feel comfortable um and have at their hand tools and have at their hand tools and technologies that can help um that technologies that can help um that society the society to to do better. Um society the society to to do better. Um there are it's a little bit of a generic there are it's a little bit of a generic answer here but I think answer here but I think I I I you know, I do think it the system I I I you know, I do think it the system needs to be more freer and have a little needs to be more freer and have a little bit less pleasing uh as we said earlier bit less pleasing uh as we said earlier but encourage that um in in that in that but encourage that um in in that in that capacity that So that's that's how I capacity that So that's that's how I would would would um um um it's needed today actually. Um they are it's needed today actually. Um they are not not not um speaking on behalf of anybody but I um speaking on behalf of anybody but I do see there's a critical need in do see there's a critical need in Germany at the moment. Um unless bring Germany at the moment. Um unless bring less risk aversion into that environment less risk aversion into that environment as well.

as well. Yeah. Yeah. Yeah. >> Actually beautifully said. >> Actually beautifully said. As uh my My seas Adam Harvey always say, As uh my My seas Adam Harvey always say, Ed says education, Harvey says culture Ed says education, Harvey says culture or or or they're their two pet peeves. The future they're their two pet peeves. The future chancellor of Germany has said the chancellor of Germany has said the biggest priority is not just investing biggest priority is not just investing in technology, but investing in people in technology, but investing in people to bring in the AI pro worker workforce to bring in the AI pro worker workforce of the future.

of the future. With that, thank you so much for joining With that, thank you so much for joining us. Very grateful for

Edmund to joining us. Very grateful for Edmund to joining my best seeds. See you next week.

my best seeds. See you next week. Thanks. Thanks. Thanks. >> Thank you very much. >> Thank you very much.