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"Science will save the world, but only when it is applied!
No research paper alone ever changed a damn thing."

Also zuerst bitte ich um Entschulidigung. Mein Deutsch ist ein bischen zu langsam. That's why I need to do this in English because I have a lot of things to say. I thought I would talk about how important science but I think some of you might think that's boring. So we added some food in there because nobody thinks food is boring. And if you think of it really hard the most intimate relationship any one of will ever have with anything is with food, not with Alexa yet but with food. You put food in your mouth every day, and it turns literally into you, those atoms will be you. We eat when we are sad, and we eat when we are happy and we also identify ourselves through food. Now my dad is German, he moved to Finland and he eats his bread with marmalade and he makes his own sauerkraut. Nobody in Finland does that but it's his identity and it's really important to him. Now because it's such a core part of our identity that's why it hurts so bad when somebody comes up here and says that food needs to change. The thing is it will need to change because if it doesn't there won't be any food in the future.

In six years, worst case, there will be no fields left. And if the climate warms those two degrees, still, within the limits of the Paris agreement there won't be any corals left which means the ocean ecosystems will collapse. There's two good news: first is that we have all the technology to fix this, we can do that but it will require massive changes and that will hurt a bit. The second good news is that we have done this before already, it's nothing new. Think about it, go back 250,000 years, that's time when we existed already but we used to be hunter/gatherers right? Every one of us would have been gathering our food from the environment, that was the food economy 1.0 if you will. There you go, you go a bit before it, 10,000 years ago started a big revolution, a big transformation, we started farming. And that agricultural revolution changed fundamentally what it is to be a human being.

That enabled us to build societies and build technology and science and also increase in numbers. Now 100 years ago started the next transformation: The Industrial Revolution and industrial agriculture, industrial food production, machines, industrial fertilizers, new breeding technologies, all that enabled us to make, to multiply the food production within a very short period of time. I would call that Food Economy 3.0, one big part of this was the [SL: Harbour Bush 00:05:44] reaction to buy nitrogen from the air using fossil fuels that we just invented. That's 3% of all the fossil fuels nowadays are used for this reaction, to produce nitrogen fertilisers.

Now this last transformation was not without trouble. These are the planetary boundaries. If you come cross them the planet will not recover and we have crossed already three. The nitrogen cycle that harbour reaction, we've crossed that border already a long time ago. Then there is the bio-diversity, that's the biggest problem, we're losing life on the planet. That is because we are using 40% of the land area of this planet to produce our food: 40% and that is the most fertile part of it. And that is all taken away from the biodiversity, that's why we are in the middle of the sixth big extinction wipe. And then there is the climate change, food production produces more greenhouse

emissions than all traffic combined. All these three are directly linked to the way we produce food. So we are literally consuming the planet. This is the Chairman Astronaut tweeted from the ISS just a few months ago. It's a morbid tweet. Everything that used to be green is now brown. Now the climate is fighting back. So it's not only that we are consuming the planet, now the changes in the environment are making our food production really hard. In most other parts where we're choosing a lot of food right now, within a couple of decades we won't be able to produce that food anymore. And at the same time we should produce 70% more by 2050. That means within my working life humanity needs to produce more food than we have produced in the last 10,000 years combined. That is a lot and we have only one planet. So we're screwed right?

Now there's a lot of things we could fix, for example this 83% of that land is used to feed animals. And animals still only produce only 18% of the calories we consume. Now we should move from animal products to plant based diets. If you take random four birds on this planet Earth, three of are chicken. Now that doesn't make any kind of sense to me. So this is one of those easy things. We should definitely consume less meat. But those other, we're wasting one third of the food, we need to stop that. We need to also increase the agricultural productivity especially in the developing countries. If we scale vertically to make it more efficient instead of making more fields we can still do a lot. But these are all incremental improvements, they are not really changing the facts. What we need is this big transformation to Food Economy 4.0 and one big part of that is that we need to decouple food from the environment not only because food is harming the environment but because the environment is changing and harming our food production. So that sounds weird bit if you think of it we are pretty far already. There is a greenhouse in Finland, now Finland is the most hostile place you can imagine for food production. We're the northernmost country on the planet producing food all year round. But we can do it because we have greenhouses protecting the environment and protecting the crops. Now greenhouses used to look like this, now they look like this. See the difference? They don't have windows any more because now we have LED lights and they are developing really fast, they're getting more efficient and they're getting cheaper. That's why modern greenhouse does not need sunlight. Actually sunlight is becoming an annoying and disturbing factor. So we're getting into this controlled environment agriculture where you can produce foods in very precisely controlled environment but all the nutrients are recycled, looped back into the system, nothing leaks out. We'll use water way more efficiently and this is happening. Now that enables a couple of very interesting things: first of all, we can start putting greenhouses anywhere because they are independent from the environment and the most interesting one is being now built to the airport in Dubai, that's not a place for food production but now you can produce fresh green vegetables to be loaded directly on the aeroplanes in a place where all the food had to be imported previously, that's a big change. There's even bigger changes. This is Artic Bramble, you might not know it, I don't blame you, it grows only in Finland and in some parts of Russia and is getting really rare. It's going to get extinct probably within a couple of decades.

It tastes amazing. It has a couple of flavor compounds that we have not found anywhere else. Now that is impossible to form because it's very vulnerable to fungal diseases but there are people working in Finland now creating a vertical farming system for Artic Bramble. So when you put it in a completely closed environment you can protect it from diseases and actually grow it. So we might get completely new berries in our diets. I think we can do better than that. This is me, we go to my childhood trauma, that's my dad. I practically grew up in a greenhouse. It was fun because it was never raining there and also because there was a lot of different kind of things growing then, all tasted different.

And I was fascinated about that taste, why does the strawberry taste different from mint? Probably putting something right there in my mouth it's probably something I should not be eating. So I was asking a lot of questions to my mum who was a chemist and I was reading a lot of books before I went to school about chemistry and plants because that was interesting. Then I went to university to study this whole thing and at some point it all became clear to me. Things taste different because of cells, very simple. The smallest units of life, those biological factories that produce all the interesting compounds that we are composed of also flavours, colours, smells, colours all that. And those cells can be grown outside of the plants, they can be grow on petri dishes without the actual organism. I was fascinated and now the same cells that you take out of the plant they can produce those same compounds that the plant would produce. And that is interesting because now you can produce pharmaceuticals or cosmetic ingredients. That's what the lab was doing while I did my PHD. And the lab looked like this: a lot of colourful cell cultures of all these different plants. And then there's that little boy who gets in there and then the others were foolish enough to leave me working there in the evening alone. Of course I had to try what those things tasted like. I mean there was strawberry cells growing there, could you resist? They had not been studied for food purposes because that wasn't interesting but I insisted that we had to start studying these as food and flavour material and we did. And here is some interesting cell cultures, there is Scurvy Grass, it's a weed that used to be eaten to treat scurvy, there is Strawberry Artic Bramble tobacco cells, Cloudberry cells and strawberry cells. Some of them taste like you would suppose them to taste, like some of them taste like something completely else. Those tobacco cells taste a bit like lemon which is weird. But they do taste like something and they do produce those some fatty acids, Omega-3s for example, high amounts of Omega 3s that you want from your plant-based foods. This is how we grow them, we would toss sugars and minerals into a bioreactor, these vessels and then you mix it for a while and then you get cells out right? That's Lingonberry cells growing in a bioreactor. Now this is quite high-tech and tricky and I wanted to grow these cells at home so I could eat them because you're not supposed to eat things in the lab. So I started to think about this home bioreactor concept. So could I make a simple one that I could have in my kitchen to grow my own cells. Yes, you can, it doesn't really work that easily yet but we're working on it. So it would work a bit like a coffee machine, you put a pod in, water in, turn it on, it bubbles for a week and then you get some of those Artic Bramble cells out of it,
half a kilo a week, I think is pretty good. This is something I cooked up at home [laughs] a couple of weeks ago, it's Lingonberry jam but it never was a Lingonberry.

[00:15:12]

I did not need to go to the forest to pick the berries for that, I grew the cells because why not? So this leads us to interesting things, maybe we'll get these supernatural smoothies at some point. So everything is about these natural things now. Maybe we'll get something more, maybe we'll get smoothies that we did not have access to before, wouldn't that be interesting? Yes. Maybe we'll get my favourite, extinct gin instead of extinction. Could we make a gin out of extinct plants? I would love to try that. So talking about extinction, colleagues of ours in Switzerland they did this work, they took cocoa cells and grew cocoa cells in the lab and made a chocolate bar? Why, because we are losing that cocoa, the good people from Mars might know a lot more about that. The good news, if everything goes to hell and we lose cocoa plants, we have a plan B, we're not going to run out of chocolate. [laughs] Thanks for that, somebody loves chocolate. You've probably heard about cultured meat or clean meat, or cell-based meat, nobody knows how to call it nowadays, there's a big fight over it. I think cell-based meat is the term we're going to use this year, who knows what we are going to call it next year. I find it fascinating, we can take those animal stem cells or satellite cells from muscle tissue or from a fat tissue and grow those cells in the lab pretty much in the same way we'd have growing plant cells and make a burger out of it.

Now there are big industries investing ridiculous amounts of money into this in Europe and in US. I don't think that's going to be a big thing, I think they are wasting their money. I'm going to tell you why a bit later, but it does raise an interesting question, do we need animals to produce animal

products? If you think of it, we've been producing insulin without animals, already for more than 20 years. We've taken the gene, the information for the protein and stuck it in a yeast, baker's yeast and then let the yeast produce the protein, so the insulin. And we're doing the same with, for example enzymes for food production, like rennet to make cheese. We've taken the genes from the cow, stuck it in the microwave, produced the protein and the enzyme, put it in cheese and made cheese right? Enzymes, but now that these technologies are improving we can do more, we can take those milk proteins, whey proteins and stick those genes into the yeast to finally make cheese without compromise. Finally, a vegan parmesan or mozzarella that would actually taste of something, that would actually work structurally like cheese. Cheese without compromise. This is what we did at VTT, we solved the biggest puzzle of humankind, egg or the chicken? We took the chicken out, we made eggs. One of these is egg from a chicken, egg white, one of these is egg white that we made, I don't know which one is which, they work perfectly the same way. So eggs without salmonella, eggs without ethical concerns, eggs without variation in quality, eggs without variation in price, that should be interesting. One third of all eggs produced are consumed as ingredients, not as eggs. What if we could replace a part of that? The price right now is not too much higher than that of egg white producing eggs. So you heard a lot of these already today, the explanation development of technology especially when it comes to digital technologies right? I don't need to explain this to you. Here's the news: biology is technology; it's developing exactly the same way.

Think of it 1990 we started the Human Genome Project, a massive project to develop the technologies to read one human genome, it was budgeted for 15 years, 3 billion Euro project, big, big project. Here's what happened: halfway through 1% was done. Now if you are the project manager you're going to pull the plug right? This is horrible, you don't want to see these kind of things happening.

Now a scientist said don't worry, the technology is developing, we're getting there, and they did. The project was finished ahead of time under budget because technology developed during those 15 years. And now this is happening, this is the price of reading one human genome, it went from $100,000 million down, down, down, down to roughly $1,000 today, we're already talking about $300 gene so it's getting even cheaper. It's a standard technology now. So now that it's cheap we're going to be sequencing everything, every single thing that we find in the nature we're going to sequence that. And that means we're getting a whole lot more information data out of living creatures. Now data rings a bell right, biology becomes a digital technology and we have these genome editing tools, CRISPR/Cas you've probably heard of, everybody's heard of it, it's only a couple of years old thing. Everybody is using it already and it's developing very fast, we have now cheap and fast and efficient ways of editing those genomes, not only reading. Here's synthetic yeast project, it should be still finished this year. Now this is another massive, multinational project to create the first synthetic yeast, that means that we've not only read the whole genome but we rewrote the whole genome. Now the difference is huge. It's like inheriting an old factory from grandfather and then having to work with that, instead of now we drew the blueprint again, we designed a new factory. So when we have all that data, when we can edit the data and when that part becomes a digital problem, it becomes an AI problem and that's where we're going to start designing life. So we don't need anymore to get these cells from somewhere, we can decide that this is the kind of cell culture we want to get, this is the kind of flavour we want to get and we need to tell an AI to design that. We don't even need to know how it made it. So, we're going to come to the point where there is a manmade machine designing a life. That's going to be a big change, not only in food production but history of life.

But it will enable us to do a lot of very interesting things. Now we don't need to produce egg proteins anymore, we can start designing our own proteins because the purpose of a chicken is not to make a perfect meringue. The purpose of a chicken is to make something completely different. Now we can decide that we want to get the perfect protein to make that perfect meringue and we can design it. We can design milk proteins that are not allergenic. Bio* and Gingko Bioworks hooked up last year about this time and they built another joint venture, the aim of that joint venture is to create a microbe that combined nitrogen from the air and gave it to cropped plants, especially [SL: grapes 00:31:07]. Now those are the crops that we need to fertilize with nitrogen fertilizers until now. That's the Holy Grail for agriculture, if that happens we're talking about next revolution in agriculture. The key words: synthetic biology, AI and automation, those are the three things that matter in biology now. It's a bit scary. Many consumers say that "Fuck no, that's not the kind of food I want to eat. Is that safe, is that natural, is that organic? Does that taste like anything?" and you're absolutely right, it's a bit scary, it's a lot of new things. But if you think of it, if you think the most natural thing you can think of carrots. Now carrots used to be small and white or purple in nature, the first report of an orange long carrot is from 1721 in the Netherlands. Coincidence? I don't think so.

Now carrot is a manmade organism, it does not exist anywhere in nature. Cabbage id corn weed, none of that exists in nature and they're grown on fields, fields do not exist in nature. So, it's technology. If you would take a carrot and show it to one of those hunter gatherers they would freak out because it's alien technology.

So that's how natural it is. But I'm not saying that the future food will look very different. I'm actually saying that it will look precisely the same. Here's Pat Brown, he used to be Professor of Biochemistry in Stamford and then he got fed up because he did not think that he was contributing enough to be in making so he took a sabbatical and started to explore where he would be of most use. And he discovered that Americans are eating, on average, three burgers a week, that's a lot of red meat. And he thought let's change that. And he realised that that's impossible because burgers are such a big part of the American identity that you cannot take those away, it's impossible. So he came up with a company called Impossible Food. The goal was to make a burger that is exactly like beef burger but it's not. And they've managed to have done that. The secret source that they put in there is a protein, it's a myoglobin like protein that carries heme. It's the same stuff that makes our blood and flesh red and tastes a bit like fire. So they make that with yeasts and add that into vegan patty and they get this burger that is red and then you fry it, it turns brown and it tastes and smells and looks exactly like beef.

It's amazing. And this is not sci-fi, they're selling this already in more than three thousand restaurants in the US. So we're coming to this interesting situation, I will call [INDISCERNIBLE 00:26:40] test of food. You get three burgers, one of them is made from beef, one of them is made from animal cells so cultured meat, one of them is made of plant based ingredients with some biotechnological secret cells in it. Now if you cannot make the difference anymore, if you cannot say which one is which, then they will pass the test. And at that point it doesn't matter anymore, it doesn't matter how it was made. And this is why Impossible Foods, impossible foods of the world will win this game because they are good enough already, they are passing that test already while cultured meat is not. But they are on the market already now, it might take another 10 years before cultured meat is on the market. If you make a steak, it's a different story but that's even further away. Now Beyond Meat is another company working on a similar solution and they sell their product next to minced meat, they are on the same market now. They are competing with meat, they are not a vegetarian niche thing, their consumers are the people who eat meat normally. This is something that happened in Finland, Valio is an old, big dairy company, owned by the dairy producers, Fatsa is an old milling company. Now Fatsa took their ingredient and made a

new product out of it. They made an old yoghurt. Valio took their process and took a new ingredient and made an old yoghurt. Now those two companies are competitors. They have never before been competitors but now they are because what is Oat Yoghurt? Is it a dairy product or is it a grain product? No-one knows anymore, we don't know how to call these things anymore. So I'm saying that many more foods are going to pass these tests and then we have no clue anymore what can we call meat, what can we call yoghurt, what can we call cheese?

And then we can take it one step further. If it doesn't matter anymore all food is made of atoms right, oxygen, carbon, hydrogen, nitrogen and a bit of energy to bind all those together, we are composed of the same atoms. Now all those atoms are in the air right? If you take all those atoms from the air, put them in a bioreactor in a tank with appropriate microbes, put some electricity in there for the power you get food. You get food from air. Sounds like sci-fi, we actually made it. And it's already been done since 60s. There are soil microbes that do the trick, they can use carbon dioxide from the air, they combine nitrogen from the air, they can consume hydrogen as their energy source. And hydrogen we can make with electrobes and electricity. And they grow biomass and biomass is 50% protein. It's edible, it's nutritionally similar to soy but it consumes 10 times less land area than soy, 250 times less water than soy.

The funny thing with the land area is that it does not compete with the same land area because now we can put this thing in a container in [INDISCERNIBLE 00:30:18] in Finland and grow food there any day of the year and it gets the electricity from the solar panels in the background. So it's decoupled from the environment completely. The interesting thing is that if we can put it here we can put it here. We can put it to the places where food production will become impossible in a couple of decades where solar power has become very cheap. Now that's going to turn the whole food production upside down, that's going to be rather interesting. And it's not only for the production of protein but you can use the same technology to produce oils, palm oil for example. Science-fiction? We had a spin-out company created this spring Solar Foods: check it out. They're going to commercialise this technology. The aim is that before the end of 2020 the stuff will be approved as food in European Union which is, that's a rocky road to get there. But it will be approved as food by the end of 2020 and they also have a pilot facility producing tons of this stuff every day, anywhere on this planet.

What I'm saying is that a future farm looks a whole lot like a brewery it's not a lab, food is not going to come out of a lab, it's going to come out of [SL: brooveries 00:31:45]. We have these tanks already; we produce a lot of food in these tanks already. If you think of any yeast in your bread, in your beer, every nutritional yeast, Quorn, yoghurt, it all comes from bioreactors. It's not such a new thing but it does realise all these interesting questions, what is real food? What is natural, what is milk, can I eat it, can I not? I mean if you are a food company you will need to answer a lot of these questions, and it will be tricky. Now there was some rabbis that already decided that if the burger is produced from animal cells it is okay to have cheese with it. That is disrupted technology. [laughs] But we're going to have to have a lot more of these conversations. Now do we have to do all this, I think yes because if the environment changes enough, if the climate change goes far enough, as it seems that it's going there is no other way of producing food than decoupling it from the environment. It's harsh, that's the way it might be. Now I would like to see that this is a voluntary and necessary transition that we decide to make and take our food production away from the fertile soil at least part of it and leave that for the biodiversity and produce our food where nothing else grows. Because protecting the biodiversity it should be the priority number one because as far as we know that's the only resource that does not exist on other planets. We can go to Mars for many resources but biodiversity does not exist there so we should protect that. Maybe we can produce all our food on the planet and still keep it green, that would be wonderful, but this transition has even bigger implications just like moving into

agriculture had. If we can produce food without fields that means that we can be coupled from the planet which means that some of us could leave the planet and could produce food on the way which would make us truly an interplanetary species, space monkeys.

Now I'm lucky enough to work for a company where we believe that pride of future is made through technological innovation. That is what we believe in the core, we believe that we have caused a lot of trouble with technology but we believe that we have all the tools to fix these things. That said, no research paper ever changed a damn thing. I know, I've made a couple of those. That paper does not change anything alone. Here's how I see it: in order to make a change you need to be sure that you're solving a right problem. You need science and technological capability to solve it.

And then you need business, if nobody makes money for solving that problem, it wont happen. That's why we are struggling with climate change, it's not really in anybody's interest to solve the problem. So, we aim to go beyond the obvious, beyond just solving the problem, we're trying to help you guys make a lot of money while you solve that problem because we know that that's the only way that we get you to do it [laughs].

Now I want you to go beyond that obvious too. I want you, while you're making a lot of money, solve problems, make sure you commit to solve the challenges that we're facing. Because I believe that there is no business other than sustainable business and responsible business in the future. So here's my thesis: science will save the world but not alone, we need you guys on board too. Thanks.

VOLKER WIEPRECHT: So you're the Starship Enterprise then?

DR. LAURI REUTER: Absolutely! The replicator.

VOLKER WIEPRECHT: The replicator.

DR. LAURI REUTER: We make that happen.

VOLKER WIEPRECHT: Well I don't know how you felt, the audience but I had changing dry mouth and wet mouth, some things sounded promising, at some point well my inner [INDISCERNIBLE 00:36:38] rose up and said "Impossible". You've presented it how many times, that concept, that idea, in front of politicians? Have they ever responded?

DR. LAURI REUTER: Yes.

VOLKER WIEPRECHT: I'm going to do it?

DR. LAURI REUTER: I went to some people in Finland and I asked them how will I get my agricultural subsidies if I make milk in a bioreactor, based on the number of organisms, based on amount of milk I produce? No idea. So I think what we need, like we have this horse power, B & V guys. So some concept to I mean measure power for cars in comparison to a horse, I think we need these new concepts like Cowpacity or something. Cowpacity [laughs], to describe the new concept. The politician really they really don't know what to do with this yet.

VOLKER WIEPRECHT: Well you have to admit that there are some videos out there on YouTube where you were trying the food you were producing and some of your outlooks were not let's say, totally satisfied. I've seen yellowish and greenish colour in your face so some parts we have to swallow because they feed our needs or do we have the chance to make everything delicious?

DR. LAURI REUTER: Absolutely yes. We will make everything delicious, you know it won't work if it doesn't taste good. I mean we started to work with these plant cell pods a couple of years ago, we had no idea how to cook these things. And then we were smart enough to actually involve a chef and that helped a lot because you really talk a lot to the people who know what they are doing, we came with the material for them and they were cooking with it and now it tastes pretty damn good.

VOLKER WIEPRECHT: I think one of the general buts is something about I'm not aware of this type myself but I heard that there's a difference whether I am in a room where they are playing bird songs and playing wave sounds, and they give a certain light and they pretend that there is a forest in front of me instead of just walking through the forest, nature is something different, that is the biggest but. No difference?

DR. LAURI REUTER: How connected are we actually with the food we are eating right now? Do we really know where it came from? I mean no. If eating a chicken nugget, I don't know what the heck that was made of even now so does it really matter if we change a thing or two? If you drink a glass of fresh milk, you know what they do with the milk, they take the milk, they break it into components, they remix that, but yes I mean it's an industrial process. So we are already eating a lot of foods that are coming through an industrial process. Now we just need to make those processes a whole lot better. But I think we also need that connection to food and we also need to go and walk in the forest, we also need to go out and see how food is grown, get that connection maybe on Saturdays and Sundays. But we're eating a lot of crap between those Saturdays and Sundays. I'm not trying to replace all the food, hunting/gathering still exists, different kinds of agricultures still exist and they will exist from now on as well but they increase. That we need to produce in some other way.

VOLKER WIEPRECHT: You are so full of numbers and very calculated, well let's say, sceneries of the future. If we would like to start from now on, changing to your direction how much of the fields will be let's say available for recreating or letting Mother Nature do her job?

DR. LAURI REUTER: I have no idea but somebody calculated that if all Americans would go vegan they could reforest half of the fields, that's a lot. So I would say, don't go vegan, you don't need to do that. If you would just reduce then we could already save a lot of surface area for something else.

VOLKER WIEPRECHT: A kind of saviour as well right at the same time. Any questions as a [speaks a foreign word] [INDISCERNIBLE 00:40:44]? Yes? If you don't mind you get a microphone [speaks in foreign language].

Guest: Hi my name is Nicole Pila*. I'm working in the food industry, Deutsche [INDISCERNIBLE 00:41:04] Control. So we are…

DR. LAURI REUTER: Oh wonderful.

Guest: So we are making stuff out of milk. And my question for you is what did you have for breakfast this morning and how is your breakfast going to change in 10 years?

DR. LAURI REUTER: Oh fantastic. You caught me there. I skipped my breakfast at home. I took a plane to Berlin from Helsinki and I went to some random breakfast place in Berlin and I had, brace yourself: I had an omelette, I had bacon, and I had sausages. Great. I think in 10 years….

VOLKER WIEPRECHT: Sounds like you thought you were landing in London?

DR. LAURI REUTER: It was really my Sunday practice in a way. My breakfast has changed already. So my routine breakfast is yoghurt and muesli, you're going to hear about muesli in a moment. But that yoghurt I changed into old-based yoghurt already. I don't really, the soya thing does not really do the trick for me but the oat yoghurt is pretty good. So that changed already. I think one component at a time I will start replacing things. Then there's things that are really hard to replace like cheese. You can't make vegan cheese at the moment, maybe one day we can, I hope so.

VOLKER WIEPRECHT: You make it sound like a really big thing. This is something that is inevitable coming. I mean no way, so two questions: first of all, you're already on the stock market and what's your stock market number?

DR. LAURI REUTER: Many of these companies do really these bold new things are not enlisted yet unfortunately. Some of them are growing really fast. Now I would really like to see some of the big industries hopping in to it. Interesting thing is Valio, this Finnish dairy company, they launched a full product series of oat products and that is strange to me because they are owned by dairy producers, why the heck would they do that? I don't know but I think I would buy their stock if I had that much money.

VOLKER WIEPRECHT: Second you could actually start, why does it make small sense to start in Central Europe or to start in an area where they have a lot of desert and a lot of air and a lot of sun?

DR. LAURI REUTER: It depends on two things: it would make a lot of sense to take these two technologies to places like Dubai. Now that greenhouse project I told you about, it's ridiculously expensive. They're wasting way too much money for that, some things could have done that cheaper. But they are really struggling there. They need to start thinking how to produce food especially when there is political situation going on [SL: Gatar 00:43:45], they're not self-sufficient so there's money there. Europe is a bit tricky for the thing that we are really strict with our regulations. Now if anybody wants to talk about the genome editing and GMO stuff I can talk about that, Europe is really hard but it has also the positive side. All the food that is on the market in Europe is really safe. So if you can prove in Europe that you're safe and you're good then you can go pretty much anywhere else.

VOLKER WIEPRECHT: Did you ever work on artificial beer?

DR. LAURI REUTER: Our company has been working a lot with beer [laughs] after work. Thank you very much, I got that.

VOLKER WIEPRECHT: Dr. Lauri Reuter. Wow.