

The Great Simplification

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[00:00:00] **Olivier Hamant:** So resilience, I used to use the word, I don't use it anymore because resilience is you fall and then you bounce back. Robustness, it's you create the conditions in which you don't fall. This is something we miss because we are going to say it's a problem of the climate, it's a problem of pollutions, it's a problem of energy.

[00:00:16] All this makes our life more unpredictable. And so when we know that, the solutions have to be built on standard deviations. And so when it happens, you're not afraid. S- serenity basically, right? Because you know that you always find a solution because you've made everything so that it's possible to change all the time

[00:00:39] **Nate Hagens:** Today I'm pleased to be joined by biologist and biophysicist Olivier Hamant for an exploration of some of the newest research on what are referred to as robust systems, and what that tells us about the fragility of our modern hyper-optimized human civilization. Olivier is the director of the Michael Serres Institute and serves as director of research at the French National Research Institute for Agriculture, Food, and the Environment.

[00:01:10] He also teaches at the ANS de Lyon in Lyon, France. In this episode, we discuss Olivier's decades of work studying living systems and how they compare to human societal models, particularly in the face of unpredictability. Olivier unpacks what we can learn from robust biological systems, including the characteristics that enable them to withstand disturbances, and what that portends for a society currently optimized for performance and output at the same time we're facing a decline of cheap and abundant energy and materials.

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[00:01:53] Ultimately, we talk through various ways that we might make human societies more robust and dig into the deeper question of how this would challenge the very foundations of what we value and what we aspire to as individuals and as a society Today, instead of asking you to subscribe to our YouTube or our Substack, channels, I will make a different request.

[00:02:20] If you enjoyed and learned from this fabulous conversation, both of which happened for me, please share it with some friends and host an in-person convening, to talk about it. That's always been my hope with this podcast, and this was one of my favorite conversations in the last year, or longer, and so what better time to ask you, the audience, to share it?

[00:02:46] With that, I hope you enjoy this one. Please welcome Olivier Hamant. Olivier Hamant, nice to meet you.

[00:02:55] **Olivier Hamant:** Nice to meet you, Nate.

[00:02:57] **Nate Hagens:** This is, one of the fringe benefits of, running a long, running podcast is I've never heard about you, and your name came up dozens of times in the comments section on my recent work talking about robustness and, nature and so here we are, our first conversation, and, welcome to the program.

[00:03:20] **Olivier Hamant:** Thank you for having me.

[00:03:22] **Nate Hagens:** So, you are a biologist and biophysicist, I understand, and you've been working on challenging one of the deeper assumptions in modern society, that of maximizing efficiency is always the best path forward. And you argue instead that nature, tells a very different story and provides a different lesson, and your research is built around this idea of robust systems versus performant systems, particularly, as I understand it, in regards to how

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human civilization compares to biological system in terms, of things like efficiency and specialization and redundancy and, the like.

[00:04:11] So, for those might be learning about your work or hearing about you for the first time, maybe we start with you giving, an overview of what you mean by systemic robustness versus performance, and maybe you could also explain how you came, to believe this idea is central to your work.

[00:04:32] **Olivier Hamant:** Well, thank you.

[00:04:32] It's, I mean, if say it, you have to say it in, one sentence, it would be, that the great simplification is a great over-optimization in some ways.

[00:04:42] **Nate Hagens:** Oh, the great, the, great simplification's inevitability is a result of a great over-optimization.

[00:04:49] **Olivier Hamant:** Yeah, there you go. Exactly. Yeah. Yeah, that's the root cause for me.

[00:04:52] So maybe we, we-- I need to define words just to, to make sure we're on the same page. So when I talk about performance, it's, for me it's a sum of, efficacy and efficiency. Efficacy is to reach one's objective, and efficiency with the least amount of means. So when you reach your target, your performance basically.

[00:05:13] And robustness, it's, the capacity of a system to be stable and viable despite fluctuations So for instance, a tree in the wind is stable, but it's also viable because it's able to withstand, you know, drought, freezing temperature. So the, the space of viability is very large.

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[00:05:32] **Nate Hagens:** So, forgive me, I, I may interrupt you, because I have a lot of questions.

[00:05:38] So you talked about efficacy, efficiency, and, r-robustness or stability, but, does it matter what time? That could happen during one day or over 100 years?

[00:05:51] **Olivier Hamant:** So it's, it's really a property of any system, so it can be for a second, for a century. It's any system. I mean, there's a trade-off between the two, and that's, the main point.

[00:06:01] we've-- we, we have been in a society of performance. We are still in a society obsessed with performance, with, KPIs and, all this. But if we understand a little bit, deeper this, this society of performance can exist because we have abundant resources, oil, to say it very simply. So we can play around with competition, with performance because there's a safety net, which is the abundance of resources.

[00:06:28] When you're not in that safety net, when you don't have that safety net anymore, when there's fluctuations, turbulence, uncertainty, but you don't have that safety net, so y- so your safety net is not the abundance of, matter, it's the abundance of interactions. And what you do with these interactions, symbiosis, you do robustness, you make robust systems with, diversity, redundancy, so counter-performances to the service of robustness.

[00:06:55] And so this is why, living beings are so, exemplary, I would say, that they've been around for millions of years. And so what's in their genes, in their cells, in their physiology, in their ecosystems is robustness before performance. What we human societies of the twenty-first century have built is the opposite, performance before robustness.

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[00:07:18] And so that's why we are in, what we could call a normal accident.

[00:07:22] **Nate Hagens:** A normal accident? What do you mean by that?

[00:07:24] **Olivier Hamant:** So that's a, that's an expression. I sh- I should quote the, source, it's from, Charles Perrow, someone who is working on organizations. He's written a book on normal accidents. So a normal accident is when a system is very, complex and very interdependent, then, the accident is unavoidable.

[00:07:42] It will happen. And we are in this... I mean, there are many examples where we see, I mean, globalizations, AI, I mean, all this is designed to fail.

[00:07:52] **Nate Hagens:** Well, one could argue that as soon as we figured out how to mine vertically, in addition to horizontally, and we accessed this ancient sunlight, that there was a, an inevitable normal accident.

[00:08:05] **Olivier Hamant:** Exactly. Exactly. I mean, this, the, if I, can use the word of a biologist here, but if you take a living being and you put it in a ecological niche with a lot of resources, which what happens when we can mine vertically, we suddenly have, you know, the Pandora box, then you turn into a parasite. So that means that you optimize yourself.

[00:08:26] You're just an extracting machine basically, and you lose a lot of other, capacities, let's say. You can only mine basically, and th- this makes you very, fragile So it's, really the abundance that triggered that.

[00:08:40] **Nate Hagens:** So how do you measure all this in nature as a biologist? How, do you look at an ecosystem or a species, and, claim this is a robust system?

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[00:08:53] **Olivier Hamant:** So there's a good, test for this. It's called the stress test. You know, you, take-- It can go for an organization. It's the same, but in living beings it's the same. So you challenge them, right? So you can challenge them, virtually to say, well, for instance, what happens if suddenly there is a drought, suddenly there is a mega fire?

[00:09:08] So how do you respond to this? And so if you're robust, you have, a plan B, basically. you have some redundancy, you have some, allies, and so you can, survive the fire. If you're very optimized, you're sure to be, well, very efficient, but, or thus very fragile. And so, I mean, the stress test is almost the antidote to the indicator of performance in some ways, right?

[00:09:34] The stress test is a dynamic test, a dynamic tool to live in a fluctuating environment, in a, an unstable environment.

[00:09:41] **Nate Hagens:** So first of all, what's the opposite of robust? Would that be--

[00:09:45] **Olivier Hamant:** Fragile.

[00:09:45] **Nate Hagens:** Fragile. Okay. So, so what characteristics of, human civilization would potentially signal to a biologist that our system has become overly fragile?

[00:09:56] And was that always the case? Probably not.

[00:09:59] **Olivier Hamant:** No, exactly. Homo sapiens, I mean, three hundred and fifteen thousand years, it's most of its, time, for Homo sapiens, it's been about robustness. Like when, you know, the hunter and everything, but that, that's not a place where there was a lot of cooperation, social hunting and, these kind of things, right?

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[00:10:16] So a lot of cooperation. It's only, recently in some ways, I mean, if we can, maybe there's some points, the Neolithic Age when we start to, invent agriculture, we start to be sedentary. So we start to have a safety net, abundance of resources, abundance of food, then it starts to derail in some ways.

[00:10:34] We start to optimize, I mean, of course, the food, the plants, the animals, and then plantations at the Renaissance, right? Colonization and then mechanization. And it's a race towards more and more performance. But that, that's very recent in the history of humanity.

[00:10:50] **Nate Hagens:** According to your research, and contrary to what I think most people in our culture might think, those that even believe in evolution, usually does not select for the most efficient organism.

[00:11:04] And why is that, and how does that pattern differ from the most basic economic principles about reducing waste in order to optimize, efficiency and output?

[00:11:16] **Olivier Hamant:** Yeah. it's crazy for the, way we've read Darwin, over the years and centuries even, I mean, the decades, let's say, it's been crazy because if you read Darwin, The Origin of Species, actually, it's really a claim to the selection of the most adaptable, not the most adapted And so what we've done actually when, we look at evolution, it's exactly what you said.

[00:11:38] We don't select the most efficient. Evolution does not select the most efficient. Evolution selects the most robust By definition, because for a species to survive several millions of years, over several millions of years, you have to experience a lot of fluctuations. And so species that have to go through these fluctuations, they have to be robust before they can be efficient.

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[00:12:01] **Nate Hagens:** Let's drill down on that a little bit, because evolution works over large tracts of time. And it could be that you could look back and say, "Oh, what arrived here today was the most robust." But you also could say that it was a long contiguous series of selecting for the most efficient or the most capable in that one timeframe, and then another timeframe, and then another timeframe.

[00:12:30] And what arrived here was the result of what was collectively more robust. And then a related question that comes to mind is multi-level selection on individuals and larger groups, and I'm sure you have something to say about that too.

[00:12:46] **Olivier Hamant:** For living beings to go through evolution, they have to go through populations.

[00:12:50] Some of them are very efficient, and they are going to serve the ecosystem in some ways. And so these other species are going to live in a world where there are efficient and non-efficient or less efficient species. So they benefit in a way, or they're built on this diversity. But the species that go through tens, hundreds of millions of years, they are robust.

[00:13:12] I mean, a shark is robust. It's not efficient for sure. But if you think of some orchids that we see today that have co-evolved with a specific insect or something like this, they are very specialized, very optimized. Those ones, they're going to disappear most likely.

[00:13:30] **Nate Hagens:** Okay, I have a ton of questions now because this could go in many different directions, because what we've built into the pipeline in terms of exceeded planetary boundaries, global heating, which if you're in France right now, you're aware of–

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[00:13:45] **Olivier Hamant:** We know it

[00:13:45] **Nate Hagens:** a little bit of a glimpse of coming decades. So robustness in nature is going to be incredibly relevant in coming decades and centuries. What animals, what organisms, what sorts of systems are going to make it through the bottlenecks of the 21st century? So that's an interesting question.

[00:14:07] **Olivier Hamant:** It's not going to be individual species that will survive.

[00:14:11] It's collective populations that will survive. So for instance, because the trap would be to think that we're going to select a tree that will resist drought, freezing, and everything, right? And so we'll make a monoculture of that tree, which will attract a pathogen, and that forest will disappear. So what will resist is collective robustness, so a collection of different species that will mutually help each other, and that's going to be robust.

[00:14:38] So it's, that's where it's, difficult for us because, after decades of performance, we also, we often think in a silo, right? In solo as well, right? So, so what will survive is groups, heter- heterogeneous groups that are robust.

[00:14:54] **Nate Hagens:** Let's drill into that a little bit, because in biological systems, as you're describing, diversity is extremely important.

[00:15:04] On the other hand, human economies often eliminate diversity in favor of standardization and efficiency and profit. so can you outline specifically why diversity is important to underpin robust systems in nature and in human economies, and, what might that look like going forward?

[00:15:26] **Olivier Hamant:** Well, I mean, diversity is a form of heterogeneous redundancy if you want, right?

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[00:15:32] So if you have, you know, if I take for instance, if you only have a car to go to work, that's very efficient because you know what to do, it's easy, you know the road and everything, but you have to control your car a lot because you really depend on your car. So if you don't have diversity, your car is not working, you can't go to work.

[00:15:50] But if you have a bike, if you have a neighbor that can bring you to work, if you have all this diversity, then you always have a plan B. And so you don't need to control your car so much. You can be serene because you have enough plan B. It's the same for biology. If you have a diversity of solution, you can resist.

[00:16:06] I was taking the example of the monoculture. So when you have a wheat monoculture, for instance, you know that all this wheat is the same everywhere, right? So this is going to attract the pathogen. The pathogen will be selected in a place where everything is homogeneous. It's the same for informatics, by the way, the cyber attacks, they attack the dominant software, right?

[00:16:29] So diversity is also a shield against pathogens, for instance.

[00:16:34] **Nate Hagens:** So how does this work? How did this work historically? You have these ecosystems of different species that implicitly, but probably not consciously collaborate with each other and build a robust ecosystem. But in the human case, 200,000 years ago, were we consciously advocating and supporting diversity and robustness in our systems?

[00:17:02] Or was it just an externality or a spandrel to use an evolutionary term of just our daily lives and behaviors?

[00:17:10] **Olivier Hamant:** I would buy the idea that it's just because we could do competition, we could do performance because we had a lot of resources. When I

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say we, it's caste, it's not everyone. But there was a group of people who had enough resources who could determine an economic model in a way, and we've just followed.

[00:17:29] Because even if you're poor, you can by mimicry think that's the model, right? So even it's crazy, right? It's really in the culture. The culture of abundance is everywhere. And so if you're in that abundance, then you're going to perform because you can. The three years after World War II, so 1945 to 1948, after a big trauma, we have developed robustness.

[00:17:52] Social security, human rights, IUCN, I mean, all this has been created because we had the experience of fluctuations. And so we developed robustness. But after 1948, it was back to performance and more than ever because oil was even more present than before.

[00:18:08] **Nate Hagens:** So it's a little bit of a double-edged sword that a huge amount of energy surplus makes redundancy, and robustness feel less important because we have do-overs, we have mulligans.

[00:18:25] If we screw something up, it's so cheap that we can just do it again. But gradually that is causing a lack of creativity and a lack of evolutionary response to a biological organism that naturally wants to have a plan B and a bicycle and, and all those things and be robust. But the, the signal for that has been squelched because of the carbon pulse.

[00:18:51] **Olivier Hamant:** Exactly. Exactly. Yeah. Let's take an example. You have, a false banker who is trying to be-- to scam you, right? If you use double authentication, so a lot of control, a lot of performance to be really, controlled, your vigilance is going to decrease And that false banker is going to be much more credible because there's more control.

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[00:19:13] So it's a bit counterintuitive, huh? Because when we increase the level of control, actually we increase the level of insecurity. And it's the same with, performance. When we optimize, we think that we're doing the right thing because it's more efficient, but actually we are, more fragile and we don't see it.

[00:19:30] **Nate Hagens:** For every question I ask you and all of the concepts that we're gonna discuss today, there are kind of two answers or two lenses with which to view them. One is a large aggregation of humans, society or the total human population of eight point one billion or individual humans. So I think my understanding is m- most of your work discusses institutions and, systems, but, how does all this map onto individuals?

[00:19:59] do modern individual homo sapiens people optimize ourselves in the same way that our civilization- civilization has? It's

[00:20:08] **Olivier Hamant:** crazy because it's actually, at all scales. We even optimize ourselves in some ways. We optimize our food, we optimize the routine for the breakfast, we optimize the plan for the holidays.

[00:20:20] So it's at all scales. We are contaminated by this ideology that performance is always positive. It's not that it's always negative, huh? we like to have a fireman that is performant, of course, efficient. I mean, when you're in the fire, when you're in the middle of a crisis, you want to be performant. At the peak of the crisis, you want to be performant.

[00:20:41] But the rest of the time you have to be robust. But what we do the rest of the time, we are performant. We claim efficiency all the time, and it's really at the individual level, at the family level, at the company level, at the world level. It's everywhere.

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[00:20:55] **Nate Hagens:** As a biologist, and I assume that part of that is you've studied history, how does this differ from our ancestors hundreds of years ago, thousands of years ago, hundreds of thousands of years ago?

[00:21:07] Take your pick.

[00:21:08] **Olivier Hamant:** For me, the turning points, there's the Neolithic Age, the Renaissance, and of course, the, the Oil Revolution. Let's say the Industrial Revolution. That's definitely, towards this. But if you look at the longer time before that, I mean, humans were rather cooperative. So it was robustness because they had to live with fluctuations.

[00:21:28] You can't survive if you're performant with fluctuations. It's too dangerous. So you, can't-- I mean, it's a, basically it's a lesson of viability. So if you, for any living beings, if you live in a niche, an ecological niche with a lot of resources, you can, I mean, you have to be competitive because there's a lot of resources, and so there's will be a lot of competitors, so you have to be the most efficient, the most performant to survive.

[00:21:53] You take the same living being, you put it in an ecological niche with less resources, fluctuations, scarcity, shortages, they cooperate. That's symbiosis, and that's what's dominating on Earth. There's a lot more symbiosis on Earth than, parasites. And so that, that's, what we should see. I mean, if you take the ocean, for instance, the ocean is a very, I mean, it's an ecosystem with, very little resources, very poor, very scarce.

[00:22:21] There's a lot of cooperation. I mean, there are a lot of papers analyzing the network of interactions between the species. They are cooperating. So we, can have the image of the shark, you know, when we think the ocean, it's the shark and the danger and everything. Actually, no, it's, all this, you know, for plankton and everything that is cooperating.

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[00:22:37] **Nate Hagens:** In a wide boundary sense, they're cooperating, but the shark is also just directly eating the fish. I don't think the fish feels like it's cooperating.

[00:22:46] **Olivier Hamant:** Of course. Yeah, of course. But, you know, it's, the hunt, that's a moment of performance. The, the lion that is hunting is performant, but the lion is sleeping sixteen to twenty hours every day.

[00:22:57] Right. So when we reduce the lion to an hunter, we are biased by the pro-performance bias, right?

[00:23:04] **Nate Hagens:** So the problem is that in nature you have to perform, but the percentage of your week or life in performance mode is very small, whereas modern humans are thrust into this performance mode ninety percent of our waking time and That can't be healthy

[00:23:26] **Olivier Hamant:** Exactly.

[00:23:27] it, generates a planetary burnout. So burnout for humans, burn-out for public services, burnout for ecosystems. And it's really, I mean, the root cause is this, it's performance. It's not s- selfishness, it's not, individualism, it's not even oil. If you really want to go to the root cause, that's that tropism towards, performance, that compass on efficiency, all the time

[00:23:50] **Nate Hagens:** So that's a more powerful driver than sexual selection or status, relative fitness.

[00:23:57] It's ... Or it's embedded in relative fitness, yes?

[00:24:01] **Olivier Hamant:** Yeah, exactly. It's, embedded. So actually, basically, so if, you have abundant resources, it's a good fitness actually to be performant. I

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mean, the, the main thing is that we could justify this type of behavior when we had a lot of resources and when there was no visible negative externalities

[00:24:17] **Nate Hagens:** So what, would a psychologically robust person look like today?

[00:24:22] **Olivier Hamant:** Well, someone who, likes to do, improvisation. You know? Really? When you do, when, you do improv, you know, you're not in control. You're not trying to say everything you have in mind. You know, you, just improvise, and so you play with what's happening. And so that's a school of robustness. So if I

[00:24:41] I can take an example of a musician, for instance. So if you're a musician obsessed with performance, you're going to read your score very carefully. You're going to practice a lot. But if the wind is taking away your sheet of music, that's it, the music can stop. Whereas if you do free jazz–

[00:24:56] **Nate Hagens:** Yeah ...

[00:24:56] **Olivier Hamant:** and if your neighbor is doing a, a, f– I don't know, like a C# or something like this that is sounding s– weird, you're going to play with it.

[00:25:04] It's going to feed the intention.

[00:25:05] **Nate Hagens:** So, so jazz is robust.

[00:25:07] **Olivier Hamant:** Absolutely. Yep. Absolutely. And not the marching band, of course. The marching band is performance 'cause that's not really jazz, right? So really jazz with improv

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[00:25:16] **Nate Hagens:** So I don't know if I'm skipping ahead logically on the questions that I'd like to ask you, but is it possible to have a robust system with plus or minus eight billion humans?

[00:25:30] **Olivier Hamant:** Of course, it is possible. So it's, I mean, of course, maybe I shouldn't say of course, but I think it's possible. y- I-let's say if we take, agriculture, food, which is one determinant, huh, to have all these people, right now we have increased the demography with, rather efficient performant agriculture.

[00:25:50] But the negative externalities is basically making it very fragile for the future, for geopolitical reasons, social reasons, not only the ecology, huh, for many other reasons. But there are many reports showing that you can switch to agroecology. If we could switch to agroecology, you can feed eight billion people, no problem.

[00:26:11] **Nate Hagens:** H-how do you define agroecology?

[00:26:14] **Olivier Hamant:** So agroecology is like thinking your agro system as an ecosystem, and so that means that you replace, fertilizer, pesticides, irrigation by the biodiversity in your fields. So if you increase the biodiversity in your field, in your plot, then this is providing, nutrients.

[00:26:32] You don't have to add fertilizer. It provides resistance to pathogen. You don't have to add pesticides, and it save the water in the soil because there's a lot more, biomass. And so those, those plots are, much more resistant, much more autonomous, and so they're more robust.

[00:26:49] **Nate Hagens:** Tony Barnosky, is a biologist, at Stanford, and he wrote a paper that showed, in the last several hundred years, the amount of animal biomass on the planet is up by 700%.

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[00:27:03] Most of that is human livestock and humans. net wild animals have declined, but that's because of the energy, Haber-Bosch and the corn and soybeans that we're directing towards animals, In your example you just said, the animals in the world that are going around and, sharing nutrients and everything, that's happening because of this global bolus of fossil sunlight.

[00:27:34] So if fossil fuels dwindled and went away, would we still get that much magnitude of, biomass, benefit from biodiversity?

[00:27:45] **Olivier Hamant:** Of course, because, you know, if you, if you think of a field today, a wheat field or canola field, I mean, whatever, it's-- there is no trees. So if you talk about the total biomass of that field, it's very low.

[00:27:59] Actually, it's the, same yield as the savanna. Actually, it's, crazy because we've, we, like thousands of years ago, we've copied the agricultural model of, Syria, the Fertile Crescent, right, which was a savanna. And we've exported that model everywhere, even in places where there were trees, forests.

[00:28:20] And so if we switch to agroforestry, so putting trees on top of the wheat field, then we produce a lot more biomass per square meter, of course, and we also protect, the field from, you know, the rain. I mean, like, and we maintain the agrometry, and it's all positive.

[00:28:37] **Nate Hagens:** Well, I've had people on to discuss this before, that, higher agricultural productivity is possible without fossil inputs, but there's one major input that's needed, and that is time, human time so I, don't think, we could have the current material lifestyles, at least in the West, in this scenario that you're, Of course

[00:29:07] postulating, but what do you think about that? Of

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[00:29:09] **Olivier Hamant:** course. Yeah, of course, There, there, would be, I mean, there would be more people working in the fields. I mean, right now it's crazy. There's almost no- no one, right? Yeah. I mean, it's really the end of an era in that sense. So there would be more people in the field.

[00:29:20] But we also have to realize that, if we do agroecology, it's not like we're going to go back to the Middle Age. We, have developed technologies, we just need to, make them more robust, repairable in the land, and, etc., right? So if we have this technology, we can repair it, but it's produced locally, r- repaired locally, and then we have, a mix in a way, right?

[00:29:42] So we've learned from the years of performance, but we make it more robust.

[00:29:46] **Nate Hagens:** Is any of this happening in, in France or in Europe that you're aware of?

[00:29:50] **Olivier Hamant:** Yep. Actually, it's, So what's crazy about this, so if I take agroecology, for the past 20 years, the surface area in agroecology has increased every year in Europe.

[00:30:03] So every year it's increasing, simply because when you're a farmer and when you start, you can't start with intensive agriculture anymore. It's too expensive. Oh. So you start with agroecology right away.

[00:30:17] **Nate Hagens:** So what would a classically trained economist think of this conversation so far?

[00:30:23] **Olivier Hamant:** I'd be curious.

[00:30:24] **Nate Hagens:** No, d- tell me.

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[00:30:25] I mean, I'm sure you've steel manned your position, on efficiency, because efficiency ... and another thing that, that upsets me, or frustrates me is there's all this discussion about energy, and we need more energy Our society right now, runs on power, which is useful energy per unit time, which also correlates to biological principles.

[00:30:52] So I think there's a, an often frequent conflation between energy and power. Well, first of all, do you have anything to say about that?

[00:31:02] **Olivier Hamant:** When I, when I had interactions with economists, they always take examples of war, of crisis to teach to their students. And so of course, in those contexts, you need to be efficient.

[00:31:17] You know, commercial war, you need to be efficient. But in the regular time when you're at peace, when you are experiencing situation, you need to learn a different way to, to work, right?

[00:31:27] **Nate Hagens:** Oh, so it's kind of like the lion who hunts once and then sleeps for three days. Exactly. We need an economy like that.

[00:31:37] **Olivier Hamant:** Exactly. So we need-- If you go to, a commerce school, I don't know, a college of, economy, let's say, or engineering school, it's the same. you're going to be taught the lion that hunts, and never you're going to be taught the lion that sleeps. So I'm dreaming of schools where we'd learn about the lion that sleeps, because that's what it's doing.

[00:31:59] I mean, that lion is doing most of the time. It's, I mean, it's-- these are schools of wars. It's, really crazy, and we are, actually teaching kids to be at war. It's, as brutal as this.

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[00:32:11] **Nate Hagens:** Yeah. So, We alluded to this before, but from the perspective of, your research, how big of a role do you think that cheap, abundant energy, you parse it into oil, has played in the way that our universities and our leading thinkers confuse performance and robustness?

[00:32:34] **Olivier Hamant:** Big time. I mean, so we, are really in the era of energy. even for people who are invested in the socioecological question, often energy comes first before life. So we are going to make, you know, a windmill or solar panels more efficient, even if this might have an impact on forests, on the lithium mine, and then on life.

[00:32:58] And what's crazy is that we want to save the machine. We want to save the machine even though our performance is destroying life on Earth. So there's a lot-- I mean, there's a much better way to look at the problem. So if we put the primacy on life, then maybe those nature-based solutions can, I mean, resolve a lot of issues on the climate, on the energy, on work, on the economy, on the wellbeing, et cetera, right?

[00:33:25] **Nate Hagens:** So build- building on that, I love that answer by the way, do you think that declining net energy, is going to naturally force societies back towards robustness or simply produce collapse? and do we have any say in which direction that goes?

[00:33:44] **Olivier Hamant:** So I guess it will depend on, who is going to read that signal.

[00:33:49] So if the people in power with a lot of money, with a lot of power don't see the decline in energy, for instance, if you're going through a heat wave and you have your air condition in your apartment or in your office, you don't see it, right? And so you're going to still go for efficiency. If you don't have air condition,

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if you see fluctuations in your work, in your environment, then you start to question your place.

[00:34:15] You say, "Well, that's not livable. That apartment is not livable without air condition, so I, need to change," right?

[00:34:20] **Nate Hagens:** But if you are in a hot city and you turn on your air conditioner, I don't think you're thinking about efficiency. You're just thinking about personal comfort.

[00:34:30] **Olivier Hamant:** Of course, but that, that's connected in some ways, right?

[00:34:33] because, personal comfort comes with-- at a cost of, right, resources, energy, these kind of things.

[00:34:41] **Nate Hagens:** Yeah. So Jean-Marc Jancovici has a, an interesting way of describing this, which I've used before, that we can become more efficient, we can use our technology better, or sobriété, which is let's choose to take a bus instead of a car, or we actively choose, to do something differently in the face of energy and ecological limits.

[00:35:04] And if we don't do that, the third category is poverty, which is we're gonna be forced to do these things, regardless. I thought that was an interesting framing.

[00:35:12] **Olivier Hamant:** For sure. For sure. I mean, he's, good at, saying this because w--we need to anticipate, otherwise we're just going to experience it, and then it's gonna be poverty for sure.

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[00:35:20] But efficiency and sobriety, I mean, they-- so they both have problems. I mean, and they can be connected because sometimes when we want to do sobriety, for instance, we want to make a machine more efficient so that it's consuming less energy, and we are going to call this sobriety. And of course, we forget about the rebound effect, and the classic example is the plane, that is consuming less kerosene.

[00:35:42] But actually, because it's more efficient, the rebound effect, now it's possible to have a low-cost, flight, ultra-fast fashion, and all this is made possible because our planes are more efficient. And sobriety has generated, exhaustion, of resources, right? Just the opposite. So sobriety is, actually, it's a nice word, but it shouldn't be the cause.

[00:36:05] It shouldn't be the constraint. It should be the, it should be the output. We should create the conditions that generate sobriety, and that's robustness.

[00:36:15] **Nate Hagens:** I like that. I will, send this interview to Jean-Marc. But you made me think of something. So I've often described Jevons paradox, and the backfire effect more, explicitly But never to a biologist.

[00:36:34] So I'm wondering, how does Jevons paradox or the rebound effect or the backfire effect, is there evidence of that in nature, or is that just a, a product of the, the human economic superorganism?

[00:36:47] **Olivier Hamant:** No, it's true everywhere. So, maybe something at, the border between biology and economy, it's, Norman Borlaug- Yeah

[00:36:55] landsparing, theory, right? So you, the idea is that you're going to increase the yield of plants, and by doing this, you're going to prevent deforestation. That's the original idea, because you produce more in your field, you're not going to have to, burn the rest, and so the forest will thrive.

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[00:37:12] Of course, the rebound effect comes in. when you increase the yield, you create new needs. I mean, the palm oil, the soya, I mean, it's very classic, and this is going to increase deforestation. And so this is a classic example where it can also sit in, biology.

[00:37:29] **Nate Hagens:** But what, about not with humans involved?

[00:37:32] Is... Like, what about a lion?

[00:37:34] **Olivier Hamant:** Ah, yeah, no, it can happen as well. So for instance, if you see, birds, fighting for, bread in the park, they are usually... I mean, there's a lot of bread. They are going to fight, so competition because there is abundance, and they're going to, sometimes overfeed because there is a competition.

[00:37:52] So that could be some kind of a rebound effect. They could just, you know, I mean, in a... If there, was some god of bird, they could, you know, divide the quantity for every bird, but it's not what happens, right? So you can have this space. It's, not as complex as the rebound effect we experience in, humans, of course.

[00:38:08] **Nate Hagens:** So getting back to the, sobriété, discussion and, declining energy on the horizon, have you seen or studied any historical, biological or civilizational examples where turbulence itself increased robustness?

[00:38:29] **Olivier Hamant:** So there was the example after World War II, which was an example where we had an increase of robustness.

[00:38:34] You can also look at, endogenous people. So they've been robust for a very long time. and so it's sort, of a school of robustness. If you look at the Kogis, for instance, in the Colombia, I mean, they're, very robust, people. They can

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experience a lot of fluctuations. The only thing though is that their traditions are starting to be obsolete because their environment is changing.

[00:38:57] And so those robust traditions and robustness in their territory, because their territory is not as robust as before, they have to change their tradition. And so these ones are also in danger. But so these would be the two extremes, right? So people who have been robust for a long time because they haven't entered the modernity, the world of efficiency, and us, who have entered modernity, and each time there was a fluctuation, we have increased robustness.

[00:39:22] I mean, if you look at the, the democracy, I mean, the-- We've increased some level of robustness over the years, over the decades, over the centuries. So it's not like it's only a path towards more, and more efficiency. There's been robustness along, but in the recent decades, let's say, because we've been in so much abundance, we've really reduced our robustness a lot.

[00:39:45] **Nate Hagens:** So if you think forward and take out the policy and the planning that's going to be essential in the coming decade, but if you as a biologist and a scholar just close your eyes and imagine two centuries from now or even one century from now, what sort of humans will have made it through the bottleneck?

[00:40:07] They won't be born yet, but what sort of human civilization and structures and such? By definition, they will be robust because that's what made it through this chaotic coming century. What can you speculate about that?

[00:40:24] **Olivier Hamant:** So we are exactly in what we call, what we biologists call evolutive mismatch. So we are exactly this.

[00:40:31] So we still have the culture of abundance, of performance, even though we've switched to a different world. But I agree. So later on, what we can imagine,

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a robust world, it's a world where agriculture is agroecology. The economy, it's not a production economy. It's a sharing economy, cooperation economy, functionality economy, where we produce a lot less goods, but those goods are much more robust, repairable, adaptable, but they are shareable.

[00:40:59] They are shared. So it's the shared car, it's a shared bike, it's

[00:41:03] a shared everything, right? And so this is sovereignty for the land, for the territory. So it's small, looks like there's a lot more participatory approaches which are slower, more heterogeneous, but more robust in the long term. So this is all what we see today. It's already here. I mean, it's already there today.

[00:41:23] It's just below the mediatic line, let's say.

[00:41:26] **Nate Hagens:** So E.O. Wilson is one of my favorite authors. I have every single book that he's ever written, including The Superorganism somewhere on my bookshelf here. He famously said, "Communism, great idea, wrong species." So we talked a little bit about this earlier, but I'd like you to unpack it a little bit.

[00:41:49] Human economics often assumes that competition drives innovation. And what you said earlier is biology suggests that cooperation is equally fundamental. So how do you see living systems now and the future balancing between those two forces?

[00:42:07] **Olivier Hamant:** Yeah. So co-competition and cooperation are, both good for innovation, but it's just that, we humans, we think that, indeed innovation is driven by competition, and we think that in biology is the same.

[00:42:18] Whereas actually it's rather the opposite. So if you, use competition to innovate, by definition you will only have the space that, the competitors leave

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you. So it's a small space, so the innovation is small, and that's all the gadgets that we see, right? That's innovation driven by competition.

[00:42:40] **Nate Hagens:** So th– that, and that historically we've innovated 1.1% a year.

[00:42:44] We've become more efficient over the last 100 years. Around that it's been remarkably consistent.

[00:42:50] **Olivier Hamant:** Exactly. And so, but the, type of innovation, actually it's, the, the problem is that innovation we often find, often, think that, innovation has to be to the service of increased performance, whereas we can certainly think of innovation to the service of increased

[00:43:06] **Nate Hagens:** robustness.

[00:43:07] Increased service to the web of life, increased meaning, increased health. Exactly. None of those things are chosen in our current economy.

[00:43:15] **Olivier Hamant:** Absolutely. Absolutely. And so if you think robustness and robustness of your territory, there's gonna be wellbeing, there's gonna be all this. And so the type of innovation is going to be very different.

[00:43:24] It's going to be connected to life, to, your local land. it's gonna be also, shared. It's gonna be open access. It's gonna be in the Creative Commons, CC BY SA, share alike. I mean, it's all this, right? And so what we do when we innovate through cooperation is that actually we expand the innovation.

[00:43:44] When we innovate with competition, we restrict the innovation. There's a patent, there's a limit, right? And so innovation is much more open when it's open and when it's, cooperative, and that's what happens in biology. Of

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course, when evolution, happens, there is no patent. When there's a new type of leg or a new type of, a wing, there's not a patent on it.

[00:44:05] This is shared. So that's gonna be more like this, right? In, fluctuations you have to share your innovations. And actually also this is happening today, huh? There's, calls for commons actually, so, in France as well, huh? so there are new projects on, cars that are also bike la- la-- sort of a mixed, vehicles, let's say.

[00:44:25] this is a call to commons. So the, the companies that are agreeing to respond to that call, they have to share all their innovations.

[00:44:35] **Nate Hagens:** So you're a communist

[00:44:37] **Olivier Hamant:** So I'm-- I, I like the commons. the,

[00:44:43] the problem with the communists- Kidding. Kidding ... but the communists, the problem with the communists is that it's often the model we have. I mean, the m- most, famous model we have is the Stalinian communism. And, Sta- Stalinism, let's say, it's another type of extractivism. I mean, for me, there's no difference between the US and USSR in the '60s.

[00:45:04] These are two extractivist economy. At first order, they are just pumping oil and mining, minerals at very high rates. And actu-- if, you look at the economy, actually it's crazy because it's the same, the salary, the inequality in salary, decreases from the 1950s to the 1970s, both in USSR and in the USA.

[00:45:26] And after the 1970s, with the oil cracks and everything, these inequalities increase in USSR and in the US. So definitely the driver is not the economic model, it's the abundance of resources and that tropism towards, efficiency. And so that's why, I mean, c- so in a way, the commons, it's more like a, I mean, it's more subtle than just communism.

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[00:45:47] **Nate Hagens:** So in your work, you have discussed how prioritizing robustness, as you've outlined, so far today, can offer an alternative third way, between endless efficiency-led growth and complete degrowth. And can you explain why that is, and what is that third path might actually-- how, would that look?

[00:46:11] **Olivier Hamant:** Well, that third path is taking on the first line in all the scientific report on the socioecological question, which is that we are leaving the era of the mean and we are entering the era of the standard deviation.

[00:46:26] **Nate Hagens:** Oh, wow.

[00:46:27] **Olivier Hamant:** And often this is something we miss because we're going to say it's a problem of the climate, it's a problem of pollutions, it's a problem of energy.

[00:46:34] It's not a pr-- I mean, these are problems, but these are secondary problems.

[00:46:38] **Nate Hagens:** Well, it, the, the, primary problem is, as speaking to a biologist, is ecological overshoot.

[00:46:44] **Olivier Hamant:** Exactly. And so that ecological overshoot is generating the fact that we lose, buffers. And so that's why our climate is getting more turbulent.

[00:46:53] That's why we lose ecosystem, services. All this, I mean, at first order, makes our life more, unpredictable, and that's the number one message from scientists. Our world is starting to be more unpredictable. We're leaving the mean to enter the era of the standard deviation. And so when we know that, the solutions we have to build, they have to be built on standard deviations.

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[00:47:19] So if I just take an example, so if you're living by the sea and you think of the mean, so you're going to say, "Well, the sea level is going to rise slowly," so you're going to build a dike to adapt to this, mean, mean increase. But if you think of standard deviation, you know that there's gonna be a submersion, soon enough, right?

[00:47:41] And it could be tomorrow. So you're not going to build a dike. I mean, you can build a dike, but that's secondary. You're going to make an habitat that can withstand this water coming in, so it's gonna be more amphibious if you want. It will be able to, well, withstand water coming in and coming out. It's a very different solution.

[00:47:59] **Nate Hagens:** If more people understood that we're headed for an era of standard deviation as opposed to mean, doesn't that immediately emotionally activate the lion, hunting dynamic instead of the lion sleeping dynamic, which paradoxically is what we want more people to have?

[00:48:20] **Olivier Hamant:** So if, you live in the world of standard deviation, you do jazz.

[00:48:25] **Nate Hagens:** Okay.

[00:48:25] **Olivier Hamant:** So, you know, you basically, we just have to understand that the risk is, looks like a danger. Risk looks like a danger if we've over-optimized everything, 'cause it's very risky to-- I mean, the little fluctuation is very risky. If you live in an era of standard deviation, you know that fluctuations are everywhere.

[00:48:47] You have to re-enchant risk. So you want to make risk-- risk is your every day, right? So you build all your economic system, all your social systems on fluctuations. And so when it happens, right, you're not afraid. It's really like a

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jazz man or a jazz woman, playing with a group, right? fluctuations are actually even welcome.

[00:49:08] **Nate Hagens:** So I don't know how to play an instrument. I, sing, background vocals on a comedy rap group, but, I'm not musical. So how, would this apply beyond jazz? Give us some more, examples of robustness.

[00:49:24] **Olivier Hamant:** Yeah. So I can give you-- I mean, it's a bit binary, huh? But I can-- If I build a house, for instance, so if I want to be very efficient, I'm going to optimize that house so that, you know, every single room is optimized for a destination.

[00:49:36] A kitchen is going to be a perfect kitchen. A living room is going to be a perfect living room. Even the furniture is going to be built-in and everything, right? Super efficient. The problem is that, something happens, in the territory or something, that house needs to be a hospital or you can, you need to welcome more people, or I don't know, you have more kids than expected or whatever.

[00:49:56] **Nate Hagens:** Multi-use.

[00:49:57] **Olivier Hamant:** Multi-use, exactly. So if you want to be robust, it has to be multi-use. So that means that your house, the walls can move. the house itself, you can dismantle it and rebuild it somewhere else. That's, you know, playing with fluctuations. And so you're serene. It's, serenity, basically, right?

[00:50:12] Because you know that you always find a solution because you've made everything so that it's possible to change all the time.

[00:50:18] **Nate Hagens:** D'accord. That was clear. So there are many sustainability advocates, people that work at county boards and town councils that are aware of climate and ecology and energy depletion and all those things.

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[00:50:32] What-- How should-- I mean, you just talked about jazz and, in your house, how should people in counties and regions be thinking about robustness, especially in where they have manuals and procedures that are set already to maximize efficiency and profit, not robustness?

[00:50:54] **Olivier Hamant:** A good starting point is to, build a repair cafe You know, like, wh- where you can repair your own things.

[00:51:01] It's already, it's very good because you, learn how to repair things. That's a social link. It's a group, local cooperation, so it's already a seed of robustness in the territory. But you can think of many other things. Actually, it's something that we've experienced during, COVID. So, you know, like, we've really planned the city so that they're optimized, and suddenly during COVID, the sidewalks were, waiting, rooms, right?

[00:51:26] the plaza was, vaccination center, right? So we still have those places that are multi-use, and so we just need to cherish them and to actually expand them. But, we also need to see them. They are here, so now is the time to really preserve them.

[00:51:42] **Nate Hagens:** How can we tell whether a policy or an action, in a community actually increases robustness rather than is just simply reducing consumption and throughput or providing a quick fix?

[00:51:56] **Olivier Hamant:** So f- for me, there are four, determinants, if you want. The first one is, redundancy, so it should be another plan B, plan C, plan D. Heterogeneity, diversity, so it means that those plan B must be very different. It's not only the second time the same thing. It has to be different. The third point is a link to life, to the living.

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[00:52:18] So those solutions have to, have a link to the living, creatures on site. They can't only depend on minerals or something that is coming from, outside, so link to the local life, the local water, the local sand, the local, biomass. And the th- the fourth one is, a deep link to the local, territory, so, social, economical, material, to the economy.

[00:52:43] And the tool to do this, it's the stress test. So when you have to take a decision, a strategic decision for your company, for your organization, for your local, community, you have to ask a double question, "Is that project robust? And is it at the service of the robustness of the territory?" And if, to make sure that's the case, you do a stress test.

[00:53:08] So you shake it with a very strong fluctuations, like for instance, oil price, 10 times, higher, there's no more internet for the next six months on the entire planet. I mean, like, you know, big fluctuation. And you're going to see two things, what cracks, what is fragile. So it's going to immediately to give you a, a map of the fragility in your, local community.

[00:53:31] And the second thing you're going to ask, "What do I need to do So that it doesn't happen, so that it doesn't crack

[00:53:38] **Nate Hagens:** I wish I would've talked to you two months ago because I just wrote a, a six-part series, and it's called How to Think About the Future, and I actually included robustness as a key thing and some of the no regret strategies, but you've just made it a lot clearer.

[00:53:54] So thank you. and I'm just wondering, back to your cooperation and competition question, if there are 20 people on a decision-making group for your community or your region, if there's only one person advocating for robustness, that makes it a little difficult. So have you found that there's a critical mass of,

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humans and n- nodes in a network, that make these conversations make more sense and a aha and are actualized?

[00:54:27] **Olivier Hamant:** So the it's a typical case of, robustness even for this. if you're alone in a group, you know, preaching or pledging for robustness and the rest is pledging for efficiency, the way to go forward, so if you speak louder, it's not going to work. That's the performant path, right? It's not going to work actually.

[00:54:46] It's even going to be counterproductive. So the, the art of war is the way to go. So you want to create an active mi- minority. So that means that you find other people, allies, that are very heterogeneous. So that means that they are not like you. So they are CEOs, they are homeless, they are, I don't know, like a baker.

[00:55:06] I mean, like really a very wide diversity of people. And so if that group is, okay to push that robustness, then for the 19 other people, it's gonna be very difficult to say, "Well, you know, you represent the entire population of the community, but we're going to go against you That's an active minority.

[00:55:27] The active minority is activating a silent majority, and that's-- you can't fight that. It's really the art of war, huh, Sun Tzu. It's, it's, almost like, you know, the Go game, huh? The-- you, you encircle the heart of your system, and the heart of the system has two choices: either to disappear or to join, the periphery.

[00:55:52] Actually, that's what happens in the flocks of birds, huh, by the way. So again, biology is, here. So when you look a flock of-- when you look at a flock of bird that is, you know, turning right, turning left, changing its shape, it's always the birds at the periphery that are guiding the group. And so that's what you want to create, that periphery that is heterogeneous and that is guiding the group.

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[00:56:11] So it's a non-violent way to transform a system.

[00:56:15] **Nate Hagens:** I like that. how do we deal with the unbelievable, complexity of, all the issues and the crises that we face? it's a polycrisis. There's all these things, and then there's overlapping strategies and solutions and institutions, and sometimes they contradict each other, as we attempt to navigate uncertainty at larger and larger scales.

[00:56:42] does your study of biology offer any suggestions there?

[00:56:46] **Olivier Hamant:** So yeah, complexity, when it's very complex, of course, it's a difficult case. So again, I would say the, the local level is the way to start, because when you uncircle the heart of the system, it's going to start from the periphery. I mean, I, have doubt very much that, the president of the USA or, the European Commission will suddenly say, "Well, you know what?

[00:57:08] We're going to switch to robustness now." Unlikely. So it will rather come from the basis, it's bottom up. So the more we do locally, the more we create these active, minorities, and the more we are con-contaminating the heart of the system. So I think that's the way to go forward.

[00:57:25] **Nate Hagens:** I'm sure you're aware that the human brain has shrunk, 10 to 15% in, in the last-- since the agricultural revolution, anyways.

[00:57:36] And I think the leading theories are that is a result of us specializing when we used to be more robust as individuals because we could be a jack of all trades in whatever came our way. But then once we had this more and more storable, as Luke Kemp would say, lootable, agricultural surplus, we specialized into different roles.

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[00:57:58] And over time, I, think that a-atrophied our, brains. do you have any thoughts on that?

[00:58:04] **Olivier Hamant:** Sure. I mean, it's a, it's part of the-- You know, when, we optimize, we make everything, narrower. You know, it's the highway. I mean, everything is, you know, like, narrow. And so our brain is like this. Our, our, we, How do you call it? Like a la mâchoire, the jaw. The jaw is al- has also reduced because we are eating things that are a bit, more tender now. And actually, we can see it over this century, yeah? So it's very ... It goes very fast. So indeed, our environment is modifying our body. And so if we're in the environment that is promoting efficiency, promoting performance, our body itself, we-we're actually turning into parasites.

[00:58:40] You know, like a, a parasite is, like the, the most evolved, the most optimized, parasites. They've lost their legs, they lost their wings. It's just, digestive tract, basically. They are just extracting food. That's it. Th-th-and they are produced, but that, that's pretty much it. And so we are, we are-- If we go on like this, we turn like this, right?

[00:59:00] Of course, this will, break before that. But we are seeing this in our body, indeed. I mean, I was talking about evolutive mismatch. I mean, there, there are cases like this very, clearly, stated in the literature. So for instance, the cavities that we have in our teeth is because of agriculture.

[00:59:16] We-- where we have, more sugar in our diets, and so there is more cavities. the same we have, we're missing some vitamins, but because when we were, hunter, like, harvesters, the diversity of the diet was much higher than after agriculture. So all this is, yeah, our body is changing when we change our environment.

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[00:59:35] **Nate Hagens:** I will attempt One sentence from high school French 40 years ago, "Nous ne sommes pas robustes."

[00:59:47] **Olivier Hamant:** Yes. Oui. Je suis d'accord.

[00:59:49] **Nate Hagens:** Full stop, right? Like we are closer to parasites, by your definition.

[00:59:55] **Olivier Hamant:** Yes.

[00:59:57] **Nate Hagens:** and here's the thing too. We talk about energy and, well, we need this base load, so we need a natural gas, generator and turbines and, we need solar panels, but yes, you need 10,000 kilowatt array to get all the things in your house.

[01:00:12] Humans don't need base load. We are base load, and so for most of our history, when it was raining out, we'd-- we took a nap like a lion, and it was sunny and windy, we went out and did work. And so I think that needs to shift somehow in our cultural awareness too, right?

[01:00:30] **Olivier Hamant:** For sure. M- but there are examples, so we're, not condemned to stay parasites, huh?

[01:00:35] I can just take an example of, a, a bakery. it's called Neoloko. they-- So it's a bakery where they make bread with the sun, and it's a solar oven, so it's not with electricity, it's not with oil. It's just with mirrors, so just a plain, solar oven. But when you do this, and you're in France and even in Normandy, where, you know, there's a lot of clouds, how do you make bread when your energy is not always there, right?

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[01:01:03] If you follow the lion, you just wait for when there's enough light to make your bread. So that means that you need to make bread that can be stored for a long time. And so for this, you just use the yeast that is slower, not as performant, so the dough is going to mount, you know, slowly, but that bread you can, keep it for seven days.

[01:01:24] So you just have to wait for the sun to be there. You bake your bread, and that's it. You can sell bread the entire week.

[01:01:31] **Nate Hagens:** So in that example, is the human culture robust, or is the bread and the yeast itself robust?

[01:01:38] **Olivier Hamant:** So it's a little bit of everything actually. The yeast is more robust because it's slower to, to, grow.

[01:01:44] it's also more robust because when you-- when the dough is, well, m-mounting like this, the, the gluten is finding its way, so you don't have to have a mechanical, way to increase the connection between the gluten. It happens naturally. and the baker as well is more robust. I mean, it's economically more profitable because y- you are not dependent on the oil price.

[01:02:05] You're not dependent on, Russia invading, Ukraine. you're not dependent on this. The-- You're not dependent on inflation. You're not even dependent on, competition that is, you know, like when, the state is supporting the normal bakeries, you don't have any subsidies. Actually, you're so robust that you don't even need the subsidies.

[01:02:26] **Nate Hagens:** I find robustness as a goal and a theme much more palatable and relevant and interesting than sustainability. I mean, sustainability was always kind of a m- inaccurate term. We should be more sustainable than we are today, but I really like robustness as a frame.

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[01:02:45] **Olivier Hamant:** You could say, I mean, if I want to play along, your line, you could say that a parasite can be sustainable as long as there is a lot of resources– As long as it has

[01:02:53] a...

[01:02:53] **Nate Hagens:** Yeah ...

[01:02:54] **Olivier Hamant:** it can extract, right? So to be robust means that you've understood that you're in an environment that is unpredictable with shortages, with scarcity, so you have to maintain viability over the long time, so you have to be robust.

[01:03:07] **Nate Hagens:** So robustness will require Homo sapiens to actually live up to our name wise, ape, wise man, because cleverness is in service of efficiency today, for the most part.

[01:03:22] **Olivier Hamant:** Which is crazy because if we think of, intelligence in terms of, evolution, intelligence is the ability to adapt. It's adaptability–

[01:03:31] **Nate Hagens:** Yeah ...

[01:03:31] **Olivier Hamant:** rather, right? So the most intelligent living beings are the most adaptable. And so if we were Homo sapiens, really, we would be, Homo adaptibilus or something like this, right?

[01:03:42] It's adaptability that will, maintain us in the long term.

[01:03:45] **Nate Hagens:** I think I have to ask you, how does AI fit into your, concepts of robustness and, fragility?

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[01:03:53] **Olivier Hamant:** AI is here, and it's here to stay. It's like an alien that would have come from another planet and is now with us, so we have to play along with that, new partner, if you want.

[01:04:02] But of course, in a world of efficiency, AI is at the service of efficiency, and so we are delegating a lot of our tasks to a machine which is doing it much more efficiently than us. And so by doing this, we are, well, exporting our knowledge to the intelligence, let's say, but we're losing competency, right?

[01:04:21] We are actually de-learning. That's what happens to, surgeons and, I mean, it's, really everywhere. So if we wanted to have AI at the service of robustness, actually it's pretty simple. We want to make non or very inefficient AI, where humans have to go afterwards to check, to, you know, verify. So there, there is a link between AI and humans before and after, and this could be to the service of robustness because this could add, new sources, new references, new ideas, so serendipity, these kind of things, right?

[01:04:55] That would be okay, and AI could help. but because it's, less performance, it would have less impact on the environment as well. But this would be the only point where it would be, positive for robustness. The rest is Only performance.

[01:05:10] **Nate Hagens:** Yeah. Well, and, AI defines a goal as using less resources to attain the goal, but the goal is more efficiency and more profit and faster things.

[01:05:22] So un- unless we change that, that goal, it's just going to be a very fast reiteration microcosm of the 15% shrinking of our brains since the Neolithic.

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[01:05:36] **Olivier Hamant:** Absolutely. And it's even, it's even worse, I would say, because the truth of, AI is, correlative. It's correlations, right? And so the, the-- what makes, for AI is going to try to find the best correlation.

[01:05:50] So that means that the attractor for an AI is the mean. It's not the standard deviation. And so the more you use AI, the more you look at, what's more widespread on the internet. But you don't look-- I mean, you don't see what's more unusual. In a world where we have more fluctuations, we should be a lot more interested by the standard deviation, a lot-- and a lot less interested by the mean.

[01:06:13] **Nate Hagens:** So on top of everything else, AI, ceteris paribus, is, going to prepare us worse or less because it's, gonna stifle the creativity, that, that comes from feeling the, pending standard deviations

[01:06:36] **Olivier Hamant:** Exactly. Exactly. So it's, really, it's a tool to de-learn and to be less adaptable.

[01:06:43] **Nate Hagens:** So, one of the recurring themes you may or may not know of this podcast is that our predicament isn't only technological or ecological, but also deeply human.

[01:06:57] And you've spent your career studying organisms that cannot escape uncertainty and who live within uncertainty every single day. So if there was one lesson that non-human organisms have been subtly learning or teaching for millions or hundreds of millions of years that humans needed to hear, what would it be?

[01:07:20] **Olivier Hamant:** So there are three principles. First one is circularity. Everything in life is circular, and actually when you think about it, circularity is when it's not a problem to waste things 'cause it's a gift, basically. So everything is

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going to be used by, someone else, something else, and it's going to re-feed the system so everything is circular.

[01:07:44] So we are the only one who are inventing non-circular systems, huh? nuclear waste, for instance, that's not circular. At least for the life, lifetime of a human it's not circular. So circularity is number one. So circular bioeconomy, for instance, making objects that w- will feed the ecosystems, no tires, anything, right?

[01:08:04] So this-- all this should feed the ecosystems if we are serious about the circularity, so that's number one. Number two is cooperation, symbiosis. So when there is, shortages, scarcity, fluctuations, living beings cooperate. And so I mean-- and we know this, right? When there's, trauma, when there's a disaster somewhere, humans cooperate.

[01:08:24] So w- we are, we have this in us, huh? So it's just we need to activate it and instead of activating competition, which is only okay when you're a fireman in competition with a fire. At the peak of the crisis, yes, competition is okay, but the rest of the time you want to cooperate to prepare that potential that you can dissipate during the crisis.

[01:08:43] So robustness is when you create that potential to be able to dissipate it during the crisis. And the third principle is robustness I mean, I said the third principle, but actually it's the first one and it's the most important. robustness built against performance. and with these three principles, you can be prepared for a century of, lots of fluctuations with joy 'cause it's much more joyful to live like this.

[01:09:11] We are social beings, right? We are social beings, and when you do circularity, cooperation, robustness, your life is much more, much fuller, right? it's just, the, the world of efficiency is very narrow, right?

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[01:09:26] **Nate Hagens:** I'm sure this is resonating with a lot of viewers. It certainly is resonating with me. so as an individual human listening or watching this program, can you give some practical recommendations on how to directionally go in those three categories you just mentioned maybe?

[01:09:45] **Olivier Hamant:** So maybe the first advice is to, clean your vocabu-vocabulary, your dictionary. There's lots of words that we are using that are inherited from the '80s, and we don't question them And so they, embark, a culture that is not existing anymore. So for instance, in, so I don't know if this is in, English, but we have those companies that are, you know, involved in, socioecological questions, and the n- name is, Entreprise a Impact.

[01:10:13] Impact. So impact is a word that we use to say that we want to transform and everything, but actually impact is a military term. It's very efficient, very rapid, you know, turnkey solution. If we want to transform something, it's going to take time, so we shouldn't use the word impact, right? So cleaning the, the words just to see how much of our culture of performance is,

[01:10:32] **Nate Hagens:** So, so there's a big, demographic out there, doing something called impact investing, and so you're

[01:10:41] Maybe they should change that to transform investing.

[01:10:44] **Olivier Hamant:** Absolutely. Exactly. Exactly. Impact is really a military term, so it's why would you use this word? And it's, but it's, only an example. I can ... An- another example, Trustpilot. Trustpilot, that company, you know, that puts stars on the internet or website, you know, four star, five stars, just to, give a level of trust, right?

[01:11:03] When you think about it, trust Trustpilot, it's a oxymoron because you can't pilot trust. Trust emerges from uncertainty. Again, when you do jazz, trust

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emerges because you are in uncertainty. So piloting trust doesn't exist, actually. It's just a tool of control. It's not trust.

[01:11:26] **Nate Hagens:** So our civilization needs to play jazz in– Yes

[01:11:29] of, in sort, in a way, right?

[01:11:31] **Olivier Hamant:** Yeah, for sure. For sure. It's, so improv is a second, maybe a second advice. If you, if you do improv, it can be theater improv. It ... Actually, most of our life, what we do, during our life, this conversation is an improvisation. So, you know, w– in the world of efficiency, improvisation is something that we do, you know, in a specific context, whereas actually in life we keep improvising all the time.

[01:11:52] It's just that we don't want to see it.

[01:11:54] **Nate Hagens:** How does improvisation correlate with fear? And does fear, also help with creativity and stuff? Or maybe there's a difference between fear and, mild discomfort. I don't know. What do you think?

[01:12:07] **Olivier Hamant:** Well, you can, be afraid, of the risk if you've optimized everything.

[01:12:11] 'Cause I would

[01:12:12] **Nate Hagens:** be afraid to go up on stage and do improv.

[01:12:14] **Olivier Hamant:** Of course. So, y– doing it like, from, you know, immediately, that can be very, scary. But if you do it, step by step or if you... Then that's fine, right? And, you know, for, me, the first time I had to do, improv jazz, it was very stressful.

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[01:12:29] But I had a few, drinks, I can share that, you know, to a little bit of less inhibition, and then you go, right? And when you've done it and you've enjoyed it, that's it. You don't need to drink anymore, huh, to do the improv, right? So it's, you can have some help, let's say. You don't have to be drinking, but it can be helping, anything else.

[01:12:46] **Nate Hagens:** I have a, a personal, related example. Recently, like the last year or two, when I'm with friends, or close family, we do speed poetry, and you come up with a title, and I write a poem in like two or three minutes, and they're kind of silly. But it... someone gives a title, and I write a poem, and that's improv, really.

[01:13:07] Exactly. Exactly.

[01:13:08] **Olivier Hamant:** That's it.

[01:13:09] **Nate Hagens:** Do you have any other personal recommendations on

[01:13:11] **Olivier Hamant:** how to– Yeah. Another– Yeah ... recommendation would be the bug. The bug. So we, it, we basically, we are in a cult of performance, and if you are, if you want to convince someone that person is in a cult, and it's not a good idea to stay in the cult, you can have all the rational arguments.

[01:13:27] It's not going to work, right? Because you have your habits and everything, so you're not going to change anything. So the only way you can take someone out of the cult is if you create a bug, like a, a moment of, arrest, that derails, something that is weird where–

[01:13:44] **Nate Hagens:** A, a bug? B–U–G?

[01:13:46] **Olivier Hamant:** Yeah, a bug.

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[01:13:46] Yeah.

[01:13:47] **Nate Hagens:** Okay.

[01:13:47] **Olivier Hamant:** Yeah. So basically, you know, like, so I mean, the burnout can be, it's, like a bug, right? So it's, your body that is arresting you, right? It's stopping you. but you can also, do a trip somewhere, for a long time. If you work for one year in a different country, for instance, when you come back, you don't have the same habits.

[01:14:04] Your head is a little bit different. That's a bug as well. And so when you have this type of ex- artists as well, huh, they can help us because they are generating trouble, right? They are like, you know, per- well, disturbing us in some ways, right? So that's good actually, because we need to derail because we're on rails.

[01:14:21] So if we derail, we need a, a place to start, right? And so the bug is, a- again, it's, it can be joyful. I mean, burnout is not joyful, but there are other ways to, to create a bug that is, a lot more joyful. And then, well, you see a different, paths actually.

[01:14:37] **Nate Hagens:** I don't know if bug is the right English word there.

[01:14:40] W- how would you give that advice in F- in French?

[01:14:42] **Olivier Hamant:** I would say le bug.

[01:14:44] **Nate Hagens:** Le bug. Oh, okay. Well, maybe it is the right word then. so what, h- how are you finding your reception in the world with communities and individuals, when they hear about robustness? G- 'cause it does at a gut level make complete sense

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[01:15:06] **Olivier Hamant:** So I'm very happy to report that it's actually, percolating quite fast and quite well.

[01:15:13] So I mean, I've been talking about this, but other people have been talking about this. and now I can just tell you for, instance, so in the Francophone world, there are, robustness communities, learning communities. So in France, in Belgium, in Quebec as well, so Francophone world, se-seven hundred people, already.

[01:15:31] It's only there for the past few months, and it's exponentially growing. So these are local people who are trying to, make more robust people in their communities that talk with, each other. And so it's starting to be a movement. There are cities that are putting robustness in their criteria for decisions.

[01:15:48] So that's, Lyon, Rennes, I mean some, cities I know in France. So it starts to be a criteria. There are companies, group of companies, so for instance, Le Centre des Jeunes Dirigeants, so like, it's six thousand CEOs, in France who decided this year to switch from global performance to robustness.

[01:16:08] And so it's happening. it's just happening from bottom up, right? So that's why I, it's, well, I'm hopeful.

[01:16:15] **Nate Hagens:** Are there, resources, for local politicians and, civic leaders to, to learn more about this and maybe some strategies in English?

[01:16:25] **Olivier Hamant:** Sure, sure. So there, there's a, book. I mean, you can, I mean, I, wrote a very short book called, Antidote to the Cult of Performance, and it's available, as a PDF in English. So it's, sixty pages, very to the point. I mean, there, there's a, few other resources in English. There's also, I mean, the re- I mean, the rest is mostly in French, I must say, yeah.

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[01:16:45] **Nate Hagens:** We'll put links in, the show notes. So, What is your day job? Do you teach?

[01:16:52] **Olivier Hamant:** So I'm a researcher. Actually, and by the way, research is exactly into robustness because when you're a researcher, you-- my role is to test the robustness of theories, and so I challenge everything. And all the researchers in the world are doing robustness, right?

[01:17:05] So they're not doing resilience, by the way. They're doing robustness. They're not trying to make resilience here. what's

[01:17:10] **Nate Hagens:** the difference between robustness and resilience?

[01:17:13] **Olivier Hamant:** So resilience, I mean, I used to use the word. I don't use it anymore because, resilience is you fall and then you bounce back, right?

[01:17:22] robustness, it's you create the conditions in which you don't fall. So it's much more positive.

[01:17:27] **Nate Hagens:** And, what's, the difference between robustness and, Nassim Taleb's phrase anti-fragile?

[01:17:35] **Olivier Hamant:** So anti-fragility is like, is a bit like resilience in some ways. You fall, and when you bounce back, you're actually, higher than before.

[01:17:43] So I mean, this can be a dystopian, model, right? So because you would have to fall to increase, right? It's like as if when you're a student or when you're a pupil, you go to school, you would have to fail to learn. well, hopefully the schools, it's not like this, right? You, learn because you succeed, right?

[01:18:01] So you don't have to fall to learn. So rob-- I mean, resilience and anti-fragility, these are trajectories where you fall and you bounce back.

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robustness is a space. It's a space of viability that you increase, and so it's much more free 'cause you, can increase, you can decrease, you can oscillate, whatever, right?

[01:18:18] As long as you're in the space of viability, you're fine. And so it's, much more posi- it's, I, I would say with resilience, I mean, there's a lot of interesting things with resilience, but the way it's, has evolved, it's getting worse and worse. I mean, it's in Japan after Fukushima, the national plan for resilience, to not be afraid of radiation after Fukushima, you have to expose yourself.

[01:18:40] That's resilience. I mean, so you fall, of course, but you select the resilient. That's bad Darwinian, reading, right?

[01:18:48] **Nate Hagens:** So I have, a few closing questions I ask, all my guests. You just outlined, directionally how we can move towards robustness. Do you have specific recommendations for young humans, in their teens and twenties who become aware of our global problematic?

[01:19:08] **Olivier Hamant:** So I can-- There's a very nice paper in the science a few months ago, that they, followed, young people who were, virtuosos, you know, like in, sports, in music, in, whatever, right? And they followed what they became. All of them they went through a burnout, or maybe not all of them, but most of them went through a burnout.

[01:19:31] They never became a champion or a, you know, a virtuous. But when you look at the current champions, today's champions that are 20, 30 years old, when they were kids, they were not experts. They were diver- diversified. They were doing a lot of stuff, very different things: sports, music, chess, playing, whatever, right?

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[01:19:49] So that's what would be my first advice. When you're a kid, do a-- explore. Explore. Be a

[01:19:55] **Nate Hagens:** generalist.

[01:19:55] **Olivier Hamant:** Do a lot of things. Yeah.

[01:19:58] **Nate Hagens:** I,

[01:19:58] agree with that. what do you care most about in the world, Olivier?

[01:20:04] **Olivier Hamant:** life education. Y- you know, I guess biology, maybe that's my own bias, huh? But when I see, companies, schools, engineers, I mean, life is often absent.

[01:20:17] The machine is present. And so if you have education for life, then you think differently, then you think fluctuation, then you think robustness, then you think cooperation, then you think, circularity. And so education to life, and, this can be very simple. So when you're at school, spend some time outside, get out of the room, be exposed to fluctuations, to bees, and all this.

[01:20:38] You're going to develop an emotional link to life, and then maybe you'll have a different, sense.

[01:20:43] **Nate Hagens:** What, were you doing as a teenager? I'm just curious.

[01:20:47] **Olivier Hamant:** There was a lot of plants in my bedroom, and it was a mini lab in some ways, so I, was already obsessed with plants. I'm, doing biology, but actually plant biology, and so, so yeah, I was already like this.

[01:20:58] I was also doing musics, et cetera, right? So I guess... And I was in a little village, in the middle of France. Mm-hmm.

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[01:21:04] **Nate Hagens:** If you could wave a magic wand, and there was no personal recourse to your decision, what is one thing you would do to improve the future?

[01:21:13] **Olivier Hamant:** Change the agriculture. I mean, it's maybe a bit specific, but if we switch to, agroecology or all the permaculture, I mean, all the different versions of agroecology, we are going to depollute the land, depollute the water.

[01:21:31] We're going to store a lot more carbon in the soil, so we're going to solve the climate crisis, I mean, at least start to solve it, and we're going to feed the circular bioeconomy, so we're going to be, sovereign. So agriculture is crazy, but it's the key to, I mean, it's the main key to, revert everything.

[01:21:48] **Nate Hagens:** I, am grateful to all the YouTube commenters that suggested we meet. I quite resonate with what you said, and I, like you, and I would love to have you back on the show in the future. If you would come back in six months or 12 months, is there some topic that you are super obsessed about now that you would be willing to take a deep dive on, something we didn't talk about today?

[01:22:14] **Olivier Hamant:** maybe security. You know, there, there's gonna be a presidential election in France, and I'm sure the topic will be dominant, security, and the way it's designed often is security is control, and security should be serenity, which is the opposite of control. And so that's definitely a topic for the coming year, I think.

[01:22:34] **Nate Hagens:** Were you always the guy at parties that no matter what people said, you, said, came in and did the Costanza thing, like the opposite is actually what we should be discussing?

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[01:22:44] **Olivier Hamant:** Yeah, it's true. I like to invert things, but it's actually, it's a good exercise because, especially when you're in a world that is going, you know, upside down, to invert everything actually suddenly works better, right?

[01:22:56] **Nate Hagens:** Any, any closing comments, for people watching, listening who understand and agree with what you've laid out here today, Olivier?

[01:23:03] **Olivier Hamant:** I think joy, just one word, joy. I mean, it's, w- when you think of robustness, you're pretty, I mean, it's, not y- you see what's coming, right? It's going to fluctuate a lot, but we're going to make something out of it, and what we're going to make out of it is going to be more joyful, and so there's no reason not to go in that direction.

[01:23:23] **Nate Hagens:** Merci beaucoup.

[01:23:24] **Olivier Hamant:** Merci.

[01:23:24] **Nate Hagens:** Great to meet you. To be continued. Thanks, Olivier.

[01:23:27] **Olivier Hamant:** Thank you.

[01:23:28] **Nate Hagens:** If you'd like to learn more about this episode, please visit thegreatsimplification.com for references and show notes. From there, you can also join our Hilo community and subscribe to our Substack newsletter. This show is hosted by me, Nate Hagens, edited by No Troublemakers Media, and produced by Misty Stinnett and Lizzy Sirianni.

[01:23:51] Our production team also includes Leslie Batt-Lutz, Brady Heyen, Julia Maxwell, Gabriela Sleiman, and Grace Brunfelt. Thank you for listening, and we'll see you on the next episode