S03E01: From a CTO's perspective: Top tech trends shaping 2024

Lars Reger (00:00):

It was 10 years ago called the Internet of Things, but what we call it now, we are moving towards a world that anticipates and automates.

Kyle Fox (00:22):

This is a Smarter World Podcast focusing on breakthrough technologies that make our connected world better, safer, and more secure. I'm host Kyle Fox. Each episode we introduce bright minds and their approach to a more sustainable world. We discuss the opportunities and challenges they face and how technology can change the world for the better.

(00:40):

Today, we have a very special guest to kick off the new year, NXP's Chief Technology Officer Lars Reger. As CTO, Lars is responsible for managing new business activities and R&D in the automotive, Industry 4.0, Internet of Things, mobile connectivity and infrastructure focused markets. Fresh off his trip to CES, I'm excited to talk to Lars about some of the highlights from the show and the emerging trends he saw that will carry us into 2024 and beyond. Welcome, Lars.

Lars Reger (01:09):

Hi, Kyle. Great to see you.

Kyle Fox (01:10):

For our listeners, if you've never met or heard of Lars before, he's an absolute powerhouse in the industry, full of energy, and passionate about all things tech. So Lars, before we dive into CES, please tell our listeners a little bit about yourself and your history with NXP.

Lars Reger (01:24):

So I'm 53 years old, 3 kids, married, grew up in Central Germany. I'm a physicist from Bonn University. Did my MBA during my tenure at Infineon, where I started 26 years ago. Moved then into Continental, navigation system development, very car-centric work. And then moved in 2008, so almost 16 years ago, into NXP. There I started at one of the most difficult moments for NXP, when the company was almost bankrupt. I joined here and they told us we have still cash for a quarter, so I called my wife in Bavaria and said, "Hey darling, stay home, don't pack the bags. I'll be back in 6 weeks."

Kyle Fox (01:58):

This will be over within three months maybe.

Lars Reger (01:59):

Yeah. That was really a shocking experience, of course. I thought I had made the mistake of my life, but then private equity pushed very hard, turned around. So we had to get rid of some of our portfolio, had to get the company more profitable again.

(02:13):

So we did an IPO, and then a couple of years after, we had been financially healthy enough to merge with Freescale. So Motorola Semiconductors and Philips Semiconductors managed to merge and that, honestly, was one of the best moves that I've ever seen in industry because two totally complementary portfolios came together, and not for big storage, not for big compute, so not for the cloud, but for all sorts of smart connected devices. This was an almost ideal portfolio. So a lot of microcontrollers, microprocessors on the Freescale side. Lot of analog and interface solutions, security solutions on the NXP side, and that is all you need to build little robots. And whether it's driving robots at home or in manufacturing, we have all that silicon out of that. That is our success story until today.

Kyle Fox (03:00):

So sitting there at a time when you really want to be ready to get into the Internet of Things explosion, the need for lots and lots of silicon out there.

Lars Reger (03:07):

Exactly. So Kyle, old guys like us, we call it still Internet of Things. Today, it's the world that anticipates and automates, or whatsoever. In principle, it's all the same concept. Kyle needs a pizza on demand, press a button on the mobile phone. Lars needs an Uber, press a button, get the cab here via the mobile phone. What we see now is this big shift. It was 10 years ago called the Internet of Things, but what we call it now, we are moving towards the world that anticipates and automates.

(03:35):

So a world where maybe 70 billion little connected robots, by the end of this decade, try to anticipate what Lars and Kyle wants to do, and then try to adjust Kyle's climate in the house before he's there; get Lars the car prepared before he starts driving: all of these type of things without us interacting. So, in principle, we are removing barriers from our brains and we have the IoT, the Internet of Things, creating this world that anticipates and automates. NXP can be proud. We are one of the very few companies who have the silicon for all of these devices.

Kyle Fox (04:11):

It's removing those barriers. I loved how you said. It's Kyle and Lars, what we need to do and providing the infrastructure to be able to do that. And Lars, you're no stranger to see CES, so you and I have crossed paths a few times over the years in Vegas and your vision from a while back, it was starting to play out at the show.

Lars Reger (04:27):

As you say, you see that trend coming through now, these digital twins of Kyle's digital representation, health-wise representation in the cloud. Kyle's car has a digital twin in the cloud. Kyle's house has a digital twin in the cloud. Kyle's manufacturing side has a digital twin in the cloud. And now, you have all these analog to digital transitions and from there these digital twins can start talking to each other, and that's the magic that I see.

Kyle Fox (04:53):

It is going to totally date me, but the image that came to my head was the movie "Tron" where I have a digital twin of myself like there's a part of me in the system to be able to do that. So that's some of the trends that you saw in there. What really rose to the top at CES? This scalability, autonomy, you've hit on a lot of different key topics. What else really got your attention there at the show?

Lars Reger (05:11):

Very honestly, what this merging of these digital twins can start doing to you. So what I just said earlier is if the car knows Lars is, if the car knows how it's doing, if the house knows where Lars and the car are, you can create suddenly reactions that Mark Zuckerberg would call the metaverse. The only point is the metaverse is not realizable without guys like us. The cool stuff is Mark Zuckerberg would be a digital program developer if he would not have the interface from the digital world into the analog world. The vision of Metaverse of course stands, but how do you work that? This requires companies like us to sense the environment, get the data from the cloud, think then of a smart advice, and send this smart advice to the arms and legs of a little robot and that in a trustworthy way. That is what you cross the board.

(05:56):

Now, big trends from CES is how do you, for example, convert hundreds of connected devices in your smart home into a true smart home? Because so far, there are tons of talking devices in my house, but they all don't interface with each other. And what I of course want to have is I want to create use cases where my solar cells are producing energy. As soon as my daughter switches on the hairdryer, my fridge has to go off grid because my fridge is keeping the temperature for 8 hours, but I only need a peak of energy for 5 minutes for that hairdryer. And then I can decide whether I take that energy out of the car battery— so my rolling power bank is plugged into the house— or I take it from the solar cells. But for that, you need to understand who is participating to that grid, what is the mission profile of each of these devices, and how do you work with them and interface with them?

(06:49):

Now, what is the technical solution that we could see this year massively coming through? This is a common language for smart connected devices. So you are from the U.S., I'm from Germany, we talk English with each other and this common English language for smart connected devices is called Matter. A couple of the big companies, Apple, Google, Amazon, NXP, a couple of others, we have decided to define that Matter standard and, therefore, to

enable all of these devices to nicely talk with each other and then form a smart home on top of all the connected devices.

Kyle Fox (07:26):

The picture in my head that is that instead of having these almost like endpoints, I have a security system over here. I've got solar power over here. I've got, like you said, two or three different devices I can talk to, but they're not connected. You're describing emergent behavior where I can come in and say, "I have walked home and I want to turn on certain lights and I want to be able to have the house morph itself to what my preferences are." That's what you're talking about is getting these systems to talk to each other.

Lars Reger (07:52):

So just imagine a very simple use case. Go to your house and say, Hey, Alexa switch on the lights. Hey Siri, switch off the lights. Hey Google, switch on the lights." Good luck, and Matter enables that. So we could show that at our booth, "This is exactly where the Matter gateways are having this..." Now Siri event on here on my mobile phone. Apologies.

Kyle Fox (08:11):

See, right there.

Lars Reger (08:12):

With my test case.

Lars Reger (08:14):

This is exactly what your smart home is doing. This is exactly what you want to have. To enable this market to further grow, we have to come to this common language because my dad in the mid-80s, he stopped buying equipment already saying, "Lars, for me, it's a nightmare to hook it up, and secondly, I don't know what I buy today, whether this still is usable tomorrow because it might be outdated again and the window blinders don't talk to the fridge and so on." If you are on one language, you can be pretty sure that in 5 years from now we still can talk English.

Kyle Fox (08:48):

Exactly. The language isn't going to change. What you're describing is, and this is really dating me, the modern day instantiation of the problem of programming your clock and your timer on your VCR back in the 80s.

Very few people could do it. It's the modern day equivalent of it.

Lars Reger (09:02):

Indeed, Kyle. And of course, modern day equivalent for these type of things. How do we talk with little voice enabled devices? How we embed that into the end points? But then, from

there, how do you really go to central gateways? How do we do building management? How do we use then in the gateways, AI and machine learning? That was stuff that we were showing. And how do you bring these mesh networks complex systems to life that they add value to you as an end customer, and that they truly anticipate and automate what you want to do?

(09:31):

You are approaching your front door of your house; you have ultra-wideband there. We know exactly where Kyle is by his mobile phone in the pocket or the smartwatch. You can close your car with that type of stuff. The open sesame use cases around you can react to the ultra-wideband beacon in your mobile phone or in your watch. The digital twin of your house sees where the pocket of Kyle is because in that pocket there is your mobile phone ultra-wideband beacon, and this is how we automate.

Kyle Fox (10:00):

I love that image of having that pocket. It's basically my little world that is important to me and it's not going to be important to you because you have a different type of pocket.

Lars Reger (10:08):

And you also want to have this highly secure, so you want to make sure that I don't steal your key. The two of us, we are in a pub together. In the evening, I steal your key; I drive your car. That is typically what I can avoid now with modern electronics, because if I would steal your mobile phone and would walk to your car, the mobile phone can sense that my walking pattern is different than your walking pattern and can already say,

"Hey Lars, either you are approaching me in a walking pattern that is not usual, so either you are so drunk that I anyhow should not open up the car, or can you please recognize yourself with a face recognition to authenticate yourself?" So much better than a piece of metal to unlock your car is this modern electronics. You can do the same now for your house, for other property topics, for building access, for moving from A to B.

(10:55):

I could have my digital bubble even following me. I leave my car locked up, I walk the walkway to my house, the lights are switching on as I approach the lights. So very energy saving. My front door opens for me, but not for you if you want to tailgate. My sound system, my light, my heat follows me as I move through my house. Doesn't wake up the entire family. When I'm walking from the kitchen to the living room, my little sound bubble follows me, and I can use this electronics for child presence detection in a car, for example. Never lock your car when there is still a living object in your vehicle and that is all stuff that we have on display and that we can work with.

Kyle Fox (11:33):

The word that keeps popping into my head as you describe this is autonomy. I know that sometimes when I talk to people about autonomy, I think their heads go straight to, "Oh, my

self-driving car and I want to just sit there in my car and go to work with without having to worry about it," but autonomy and the bubble, and that sort of thing, it actually is a little bit of a larger scale here, it looks like, at CES. There were a lot of autonomous solutions that were being shown. It was cars, insulin pumps. I was excited about seeing some of the home power distribution. How are some of these solutions that NXP was showcasing and putting together helping customers? Can you give us a few more examples?

Lars Reger (12:06):

Absolutely. It was a big debate. Maybe you recall 5-6 years ago there was this big debate that there will be a big bang now and the car is a brain on wheels, and then everything is solved, and two years later our kids are going to the kindergarten without steering wheel, without mom and dad, just autonomously. It was all solved just by a few companies that could build big AI accelerators.

(12:26):

In the meantime, the industry got a bit more sober again. And now, the key question is, "Hey Lars, how do you really build these type of robots?" What I always say is, "Look at yourself. You are looking at the biological robot." And the biological robot is built mainly of three compartments. You have a brainstem, a neural system where your reflexes are residing, so ultra-fast reaction, ultra-real-time. If you stumble; you straighten your leg before knowing what you stumbled over. That is irrelevant. You straighten your leg; you stabilize your body.

(12:55):

Then you have your cerebellum for the functional safety and real-time requirements: temperature control of your body, stability of your body, movements of your body, heartbeat of your body. So all real-time, highly functional, safe type of system. And then, you have your main brain, your cerebrum, and that is the big AI accelerator. That you do not need for transportation because look at insects. An ant is doing very nice transportation. A mosquito is doing very nice transportation only on a brainstem and the cerebellum.

(13:27):

Where you need this AI accelerator is for creativity. For example, when you are stuck behind the car, so your reflexes, camera, radar, LiDAR, shout, "There is an obstacle, there is an obstacle, there is an obstacle." Your reflexes say, "Emergency braking." You come to a standstill. Then, you try to detect what is in front of you and you say, "Oh, I use an AI-enabled detection methodology," so AI for better detection. Not for creativity, for better detection. You identify this as a vehicle in front of you and now you have two things where you need creativity. You need to find an exit strategy. You need to identify whether this car in front of you is the end of a traffic jam and just overtake and get going is a very bad exit strategy when you are at the end of a traffic jam. But waiting for four hours behind the parking car is also bad exit strategy. So there, suddenly creativity kicks in on a certain level to say, "Okay, here the deterministic rules do not work anymore." You overtake that car, you're getting out of that deadlock situation and then deterministic rules come in again.

(14:35):

In Germany or in the U.S. you drive on the right side of the road. If there is a stop sign, you stop. You don't over-speed; you don't cross a crossroads diagonally: all rule-based. You can program that entire robot on rules. That combination now, that bugs the industry at the moment a lot in all sorts of robot building exercises because these combinations are how you build a trustworthy and reliable robot. Be deterministic as long as you can. When you need creativity, bring creativity, but you do not want to have ChatGPT driving you because ChatGPT too often makes severe mistakes, and that is what you cannot have with robots. You need trustworthiness and functional safety and security are the foundations for that.

(15:20):

So there is different ground rules behind robot-building. That is what you can see coming up now stronger and stronger over the last years compared to this gold digger mentality, "AI is solving everything," –5 years ago— to, "Hey, can someone help me now really building trustworthy robots." That is why NXP is so much on stage here.

Kyle Fox (15:39):

I really hadn't thought about it this way, but you literally were describing how these systems should work in terms of a biological analog. It totally makes sense that you wouldn't want to use your example, my nervous system and my reflexes on my hand if I'm picking up a cup of coffee. I don't want ChatGPT to be working on those more deterministic rules of moving my hand and that sort of thing, but I also don't want my brain set up to where it has to think through every single movement. That's not how the human body works.

Lars Reger (16:06):

Exactly. ChatGPT on your cerebrum for writing a love letter, for writing an article, for painting a picture, for playing piano is magic. I don't want to diminish that, but it has a very different functionality in your robot than the functional safety parts, your reflexes, and so on, and together it becomes a robot. There is a good reason why evolution made us as we are.

Kyle Fox (16:27):

You need to have the fast twitch response, is the one that can be relied upon that don't require conscious thought. But then, once that's done, you need to have the ability to be creative about what the next solution is.

Lars Reger (16:37):

And Kyle, what we also see is there is a reason why I'm not running around with a cerebrum of one meter of diameter. Maybe I have the best and the fastest and the biggest brain then, but my body cannot carry it and cannot nurture it. So, there was a discussion where the CEO of Mercedes three months ago said, "There is a good reason why I'm not putting full autonomy into electric cars because if I have these full autonomous systems as of today in the cars, my

driving range of the electric vehicle is shrunken by 200 kilometers, so 140 miles. Why? Because its consumed so much energy."

Kyle Fox (17:09):

Well, it makes total sense. We were talking about cars and we talked about smart home. It is occurring to me that this whole model that you just described doesn't have to be something very big. It could be as simple as an insulin pump or an autonomous lawn mower robot, right?

Lars Reger (17:25):

That has all these different form factors. I made this an allegory of the driving robot and the end. In principle, you have all these different form factors, but what is always the common thing is safety and security ground rules because you want to sense your environment, you want to understand the context that you're in from the cloud, you want to think of a smart advice and send this smart advice to the arms and legs of your robot, and all of that in a way that you fully can trust your device, so functional, safe and secure.

(17:54):

Your insulin pump must not be hacked and must not break down. It must not create any sensing artifacts and it should always calculate the best advice for your insulin level in your blood. So, that is for the insulin pump for your smart thermostat. If your smart thermostat would put your flat to 50 degrees centigrade over the weekend and your aquarium is boiled, you would not trust your device anymore. You have damage at home; you would adjust your thermostats manually again.

(18:24):

If your fridge orders 500 liters of milk or if your car starts erratic driving, you would do the same. So you need to trust these devices because these devices want to have a transfer of your responsibilities to them, and that is the black magic in robot building. It's not just having one prototype out there on the road that can drive a straight line from A to B.

Kyle Fox (18:45):

It's empowering trust. Just as you trust your hand to be able to open and close, you need to trust that your insulin pump is going to do what it's designed to do, and also be able to make creative solutions to things that could be a problem, but you've got to be able to extend that trust.

Lars Reger (19:00):

That trust comes with a huge price take. This is the black magic in value creation for robot building. That is where a lot of the companies struggle and where we try to help, and we try to scale, and we try to do the hand-holding. That is why NXP's in high demand at the moment, why it was such a successful CES for us: because there is a lot of discussions around how do you build that trust into the machines in the best way? How do you scale your architectures? How do you make sure that you don't carry too much ballast?

Kyle Fox (19:29):

That ties us back to what you said at the very beginning. This isn't a hardware play, this isn't, "I need a chip. Thank you very much," and I don't want to say like a cookie cutter solution because this whole discussion has been about how it evolves for a certain person. But it's how NXP and customers can bring these solutions out in a way that is much more than the sum of the parts, the hardware, the operating system, the apps. It's how do you go build this thing to that biological analog? How do you make the equivalent of your central nervous system that you can trust to do something? That makes complete sense.

Lars Reger (20:03):

Exactly, Kyle. We have a lot of discussions of software-defined vehicles or software-defined future. In principle, software is also only a vehicle, a technology. In principle, what we want to do is we want to be the best robot builders, as I said a couple of times. And what is a robot? A robot is a piece of customizable hardware, right? And how do you customize hardware? You program it. So there, of course, software comes in, but software is not a self-fulfilling thing here, but software is just a vehicle to get the optimal robot behavior.

Kyle Fox (20:35):

So you're talking about instead of having to go and build 500 different prototypes of a robot, if you can stay in the software world for a while, you can actually figure out what these behaviors need to be as a vehicle. That's what you're referring to.

Lars Reger (20:47):

Yeah. If you're looking into the different industry segments, for example, in the car industry there is an enormous debate: the next generation is the software defined vehicle. And then, a lot of people try to get the best software programmers from the Bay Area who have developed travel apps prior and say, "Can you now please help us define the software-defined vehicle?" But that is not the kind of software that this industry needs.

(21:07):

In principle, what you need is you need guys who can program embedded systems in our old language and program hardware, and this hardware programming is robot building because with that programming, you customize your hardware and that comes with a lot of advantages. You can test better. You can adapt faster. You can build redundant systems and so on. So AI software, all of these type of modern technologies are the foundation key building blocks for robot building, but they are not a standalone value proposition in themselves.

Kyle Fox (21:43):

It's absolutely fascinating how quickly this is coming together and the challenges that are behind it. I know this podcast is about things related to sustainability, so maybe we can change into that vector.

(21:53):

Talking about sustainability is such a broad topic and I'm wondering if we can walk through, what do you perceive are some of the significant challenges for opportunities in sustainability in the semiconductor industry? But I was thinking about the CES demo showcasing NXP solutions providing smart power distribution in the home. My question is more accurate to ask how does NXP breakthroughs enable sustainable solutions to be deployed by customers into the industry, from a sustainability perspective?

Lars Reger (22:19):

Let's indeed split it into two buckets. The one is, how do we make semiconductor manufacturing more energy efficient? That's a totally different chapter. We use a lot of water and current to manufacture semiconductors. But the other part, and that is by far the biggest lever that we have, is we can build systems that save energy in normal operations.

(22:36):

So the heating system of my house does not need to be powered on the entire winter just because I'm afraid of freezing. I want to switch from here in case it gets cold or, ideally better, my house always adjusts to a level where it never freezes but where, whenever I approach it barrier-free, the house is climatized, but only for that very moment. So optimizing heating and climatization of buildings is a huge lever to reduce carbon emissions.

(23:11):

Avoiding traffic jams: guess how much fuel we are burning every day to day on the roads in standstill. So electric vehicles help there because you don't have a running engine while you're standing, but also a lot of, let's say, congestion avoidance, enormously. If we would have these 50 billion smart connected devices out there by the end of decade, as I said earlier, they would consume 2-3 times the energy that Mother Earth can provide today. So, in other words, this entire thing is not doable.

Kyle Fox (23:40):

I never considered that.

Lars Reger (23:41):

Yes. It's inconsistent in itself, that entire story, unless you assume that we find innovative ways to put devices to a sleep mode and only wake them up when they are truly needed and power consumption only happens then. I'll give you an example.

(23:56):

The camera at my front door of my house is looking there to a road in Hamburg. On a normal windy day in Hamburg, my neighbor's tree is moving like hell and, if I'm not careful, I'm getting 600 pictures of that crazy tree movement onto my mobile phone. That is exactly the last thing that I need, and just calculate the energy that is consumed by that. Now, what I would like to have is a tiny little system that consumes only picowatts and can be operated on a coin-cell battery for years and this thing is observing and just wakes up and it says, "Hey, there is a non-normal movement in front of me. Ah, it's neighbor's dog. Okay, go to sleep again. Oh,

there is a person, Hey, wake up. And now, can I please wake up my big brother to understand whether this is a family member from Lars or whether there's someone with a toolbox and a black hoodie and they should call the police because here is a burglar at my house?"

(24:49):

How often do I have a burglar at my house? I hope never in my life, but only then the energy consumption of the device should come up and only then the device should run at full performance. Other than that, should ideally never consume any energy. Building these type of systems is going far beyond the microcontroller and we are working a lot on our power management ICs, on the analog electronics, on having smart systems and not only smart products anymore to make sure that they can all live in a sustainable world and help us humans avoid stupid CO2 production, stupid energy consumption.

Kyle Fox (25:27):

It points out to what I said at the beginning is being able to talk to a CTO that can see these trends. I've used that term myself in my own job about billions and trillions of devices and I never considered that we literally don't have the power generation capacity on the planet to power them all. You certainly can't assume that there's some global giant AI that's going to control the sensing of that tree that you used in the example in your home. It would be enormous.

(25:52):

So you've got to push that intelligence down because the devices are going to be built. What I'm hearing from you is that, "Let's focus on something that we actually have a lever on." I'm sure somebody has a stat on how many buildings there are on the planet, so if you could get 30% of those... I'm making that number up, but if you could get 30% of those to be energy efficient, I got to assume that's going to take a bigger step forward in sustainability in terms of CO2 emissions, energy usage than many other levers that I can think of.

Lars Reger (26:21):

Fully agree. That is one of the big energy consumers - the building sector, building management starting from smart meters, really only providing energy when it is really needed in those areas. There's a huge lever.

Kyle Fox (26:32):

So Lars, it seems like NXP is at the right spot to be able to enact this vision. I do remember watching one of your videos from many years ago. You predicted this. You were talking about what the actual implications are and hence that's why you're CTO.

(26:47):

That's where I want to shift to next is, this is a really unique opportunity for me and our listeners to get a glimpse into your professional life. So you're the CTO at one of the world's largest semiconductor companies. You get to experience groundbreaking technology firsthand. And I bet your future take, your crystal ball, is proven to be a little clearer than most.

Take us through a day in the life of a CTO. You're doing a podcast right now. What do you work on? Who do you work with and what's your favorite part of the job?

Lars Reger (27:16):

Kyle, that's a pretty mixed portfolio that I'm looking at every day. So on the one side, one of my big jobs is we have 34,000 people in the company. Everyone has a great idea a day and, how do I funnel these ideas? How do I get these ideas? How do I cluster these ideas? How do I convert the best of them in what, I would say, entrepreneurial innovation? So, how do we find structures in the company to assess the relevance of the next greatest idea? And how do we weed out the stuff that is not needle moving or crazy or not realizable? That is a lot of work. That is what we have done over the last 7-8 years and I spend a lot of calories on that, on tech teams. Never alone, never in the ivory tower, but trying to use swarm intelligence there with our team from the various angles.

(28:05):

The other part is my mom and my dad, they are good sparring partners. So they are in the mid-80s, and if I can explain to them what I'm doing, then I can be sure that I have a lot of followers who understand at least where I'm going. If I have to talk about quantum chromodynamics and no-one can follow me, I'm very likely that I have something in my hand that is totally not relevant for the normal people because I can describe to them my solutions for their problems in a way that there is a relevance for them. That relevance discussion, that is for me one of the biggest topics.

(28:38):

The other part of my job is, how do I drive our organizations into execution excellence? So when we want to build something and we know what we want to build, how do I set the troops into motion in a way that the workbench is perfect, that we are not doing home brew innovation at every corner of our business, but that we use platforms that we are scaling, R&D, and then making sure that we are scaling and de-risking what we are doing. And then, there is the last chapter is what we are doing now. Talk about it and create technical followership by being a technical leader, so go out with that vision and then get feedback from others.

(29:16):

I had this with my marketing-communications team regularly. We put a microphone on the table and they ask me challenging questions. One lady asked me three years ago, "Lars, will we have megacities still in future?" And I, at first, was tempted to say, "Yes, of course," but then if you think about it in a little bit more detail and say, "We have video conferences going on. It is expensive to live in the cities. You can live in the countryside with cheaper housing for your families, for your kids, and only you want to be in a big city when you want to move to the opera house or to a soccer stadium.

(29:48):

What you saw over the COVID period, a lot of people suddenly moved out of the megacities into the countryside to have a different pattern in life, so a very justified question. That created a lot of talk on what might be the technology in future that does not even force us anymore into the big conglomerates of the thousands of people work, and you are only there for fun in the megacities, and not for the connection because, otherwise, you don't get your information. It'll not wipe out the megacities. Don't worry. But that might change our pattern in life going forward. And just trying to imagine that, trying to listen to play with that and have fun with it creates, on the one side, really ridiculous outcomes and, on the other side, a great clarity in vision.

Kyle Fox (30:34):

Well, you must love your job because I'm seeing in my head, there are things that have stuck out, where 34,000 employees - one good idea a day. How do you take those energy flows and figure out what works, what doesn't, and combine them? And I love your comment about checking with mom and dad. I do the same thing. I was like, "If I can't explain it to my mom, I'm not quite there yet." I think you just described to a T what a CTO's job is. You're talking and thinking at a level that is two or three levels above the details of our normal daily lives and trying to figure out what would evolve in the next 20 years. It's absolutely fascinating to be able to take the detail that comes into any high-tech conversation and move it up into, what is the future like? It's been absolutely fascinating talking with you Lars, and getting your perspective on this.

Kyle Fox (31:21):

I'm sure our listeners have gotten a lot out of this. Lars has many videos, certainly from CES 2024, but also many other events that you can expand upon and learn a little bit more about where NXP is, where the world's going, lots of different questions that you can get some information on. So I do encourage you to go search them out and check out that content.

(31:39):

And Lars, one of the things we do on every single episode, we always ask our guests the same question, and I'm super excited to hear what your answer is. So I'd like to understand through your eyes, help us and our listeners understand how do you envision a greener world 50 years from now?

Lars Reger (31:57):

So 50 years is a lot of time, so I guess I'm going to see that from six feet under, but let's try to think about it. I think this world will be consuming energy only where it is absolutely needed – so connected by intelligent devices— will be very careful in consuming energy, and will be very smart in generating energy. So local energy generation, local energy consumption: a lot of local decision-making and not that much pump all big data into a big cloud and do something there.

(32:27):

So this world will have a lot of great assistance systems around us to create a barrier-free world. Or in other words, if you would go with me now to an old library and you would dig up texts about how paradise was defined: the land, the milk and honey flows, so where people have enough to eat. "My fridge is always full; it's pre-ordered for me," where you can run around half-naked because it's warm enough, so a climatized house where you have no illnesses, so good health. If you have disabilities, a system will take care for you, where you can live on your own. So even if you leave the stove on, the stove will shut down when you leave the kitchen, and so on.

(33:07):

Basically, a world that's truly a concept of the world that anticipates and automates, that will be in 50 years have moved to a hopefully fantastic thing very close to these old descriptions of paradise. A barrier-free world; a world where you do not have to think about how you're going to get your food, how you're going to make ends meet tomorrow, and how you're going to connect to the ones that you want to talk to. So that is very likely what industry will deliver to us by then.

Kyle Fox (33:35):

Powerful. The word that I was thinking about is freedom. It's the ability to have your basic needs met, so that you can express yourself fully to who you were and who you were born to be. It's a beautiful vision and based on this conversation, NXP is at the forefront of being able to help make that happen.

Lars Reger (33:50):

I'm working towards that goal for sure. Yep.

Kyle Fox (33:53):

Lars, it has been an absolute pleasure talking with you. I've learned a lot and I'm looking forward to our next discussion. So maybe this time next year we could ask you to come back and we'll take a look at 2025.

Lars Reger (34:03):

Looking very much forward to that.

Kyle Fox (34:04):

Thanks so much for being on the show.

Lars Reger (34:06):

Thank you.

Kyle Fox (34:07): Thanks for listening and we'll see you on the next one.