Dallas

Hello and welcome to episode two of the Innovate UK KTN Geo4Earth Podcast. I'm one of your hosts, I'm Dallas Campbell. I'm a science and technology television presenter.

Suzie

And I'm Suzie Imber, I'm a space physicist and we'll be with you throughout this series, chatting to some of the finest minds all things related to climate change.

Dallas

And today's finest minds, we have Luca Budello, who is the Geospatial Lead at Innovate UK KTN, and also the producer of this podcast series. Welcome Luca, we've got to be on our best behaviour today.

Suzie

Indeed and we also have Geoff Kendall, founder and CEO of Future-Fit. In this episode, we'll be talking about what role innovation plays in the fight against climate change. So Luca, why don't you introduce yourself to start off with and let everyone know who you are and what you're up to?

Luca

Absolute pleasure. Thank you, Suzie. Well, I'm Luca Budello. I am the Knowledge Transfer Manager for Geospatial at Innovative UK KTN. My main role is to support the community of geospatial stakeholders, that is the intrapreneurs, the founders, the business owners, the practitioners, so they use location data in their professional life and I help this community to connect across sectors, with businesses in transport, in finance, in healthcare, in energy, to help build a new product and new services to bring innovation that is cross sector and is collaborative. I do this in a number of ways, I help with raising funds, raising finance but also organising events. One thing that I organised back in November was the Space and Geospatial Virtual Pavilion for COP26. 25 events, 250 speakers, over 11 days, and where we had a fantastic discussion around the role of collaboration, system thinking, innovation to tackle the climate change challenge and this podcast is part of the post event activities, together with a publication that we launched just a few weeks ago. And yeah, this is me for now.

Suzie

Ah Luca, Dallas and I remember that pavilion well. That was an incredible piece of work.

Dallas

Yeah, I was gonna say that sounds really familiar that.

Suzie

So Luca, your work is pretty broad. Can you tell us a bit about how you got into this sort of line of work, how you got to where you are today?

Luca

Absolutely. Well, I didn't have a really straightforward career pattern. I didn't start working on geospatial data when I was 20 and then, you know, for the past ten to thirty years building a career around the sector. I had more of a portfolio career and I think that is actually my strength. I started as an officer in the Italian Army, I was a scuba diving instructor for a few years, I built three businesses in the past 20 years.

Dallas

And you were in a rock and roll band.

Luca

I was in a rock and roll band in my early teens. Yeah. And you know, and one of my businesses was social enterprise, where I helped the Cambodian government to set up a marine protected area in Cambodia. I went back to university when I was 36, doing marine biology and then I become an ecologist using Earth observation data to quantify deforestation, biodiversity loss, ecosystem services, and I define myself as an ecologist more than anything else. I think this is my strength, I'm not a specialist on anything. I call myself a deep generalist, I know a lot of things and I connect dots. That's what I do, I think KTN values these kind of skills, so someone that is more of a connector, understand the problems that transforming new opportunities, sectors and put them together. So here I am, I work now with KTN supporting the geospatial community to continue innovate.

Suzie

That is such a fantastic story. I love hearing this background. You know, Luca, I've known you for a while now. I did not know you were a scuba diving instructor and I didn't know you were in the Army.

Dallas

I don't know anyone in this business or in this kind of line of work who had a kind of straightforward, is there such a thing as a straightforward career path in this kind of world? Let's ask Geoff, Geoff Kendall from Future-Fit. First of all, let's talk about your rock and roll credentials. Were you in a band? Were you in the Army? What's the deal?

Geoff

My rock and roll credentials don't go beyond singing into a hairbrush, in the shower in France.

Dallas

That's okay.

Geoff

But I was really good at that. But no, I don't know how to follow Luca's eclectic background.

Dallas

Just make it up, nobody will know.

Geoff

Okay. Okay, so I was a rocket scientist in my late teens. No, seriously, actually I did start on an interesting path. Back before it was sexy, I did a PhD in artificial intelligence. So this was back in the early 90s.

Dallas

What did AI look like? What did that look like in the 90s AI?

Geoff

It was, it was very different.

Dallas

Speak and Spell

Geoff

Kind of yeah, it was code something, see if you think it's going to actually do anything meaningful, and then leave it running overnight and come back and look at the results the next morning. I was looking at artificial vision, so how you get robots to see and so

on. To think that, you know, we used to run these simulations overnight and now a Tesla will do that same work 90 times a second. So yeah, it's moved on a little bit since then, let's say. But I spent 20 years in the software world, and then learnt about the challenges we've got with climate change and we can get into that if you want to, and switched careers and became a sustainability consultant for four years, working with some big companies, but got quite disillusioned with that, in that most big companies at the time, so we're talking around 2012 2013 thought that leadership meant being in the lead. If you're slightly better than your peers, you're doing enough and you can get on with business as usual. And what I've realised in looking at a lot of the work that's been done out there by national system scientists, around planetary boundaries, and so forth, if you know about that stuff.

If you start looking at the Earth as a system that supports the needs of society, and the economy can only thrive if society thrives and that can only happen if we're protecting the planet that we rely on, then you start realising actually, just being less bad than everyone else is not enough. So started looking at how do you measure progress, not from the status quo, which is bad, but towards the future we want and that's why I left to found Future-Fit Foundation, which is a UK based charity, to translate all of that good systems thinking into a form that the average CEO can understand and apply within their organisations. That's something I've been working on now for about eight years. It's called The Future-Fit Business Benchmark and it's completely free for anyone to download and use.

Dallas

Okay, so you advise companies, so companies come to you and companies say, Oh, how can we be better? How can we change the way we do things? and then you you advise.

Geoff

Well, I would say consultancies tend to advise. What we've done, is we've tried to replicate the successes of the software world. So in the software world, it used to be that everyone would create their own software, would try and convince people it was the best and we'd go out and try and compete and sell that thing. Back in the day, when I was younger and I'm showing my age here, but there were around 12 different word processing packages running on Microsoft Windows back in the 90s and the early 2000s and none of them talked to each other, none of them opened the same files, it was atrocious. Then along came open standards and open source as a way to get things interoperating and people started building stuff in their back bedrooms and giving it away for free, and other people could innovate on top of that, and so forth. So with my background in the software world, what I realised is if we want to see change at speed and scale around sustainability, we need to open source it, we need to come up with this guidance and these tools, give them away, enable other people to be successful from applying that and that includes consultants. So there's around 80 consultants around the world that apply our approach in helping companies. So we kind of collate and curate these resources into a usable form, and then let other people go off and build businesses around it.

Dallas

Got it. Right, okay, well, we've got lots of sort of complex terms and complex things we're going to be talking about today. I wanted to really try and dejargonise this, I'm gonna be the metric if I can understand it, hopefully the audience can understand it and words like systems thinking and things, we're going to come to that. But I suppose Suzie, we've got like a pretty straightforward question which which is how does innovation underpin a sustainable future? Should we start there do you think?

Suzie

I think maybe we should start out by asking what is innovation? What do you mean when you talk about innovation? Luca, maybe you could have a first go at this one?

Luca

Sure. Well, innovation can take many different forms. If you look at the dictionary, when you look at the word innovation it is a process that builds something new and the new things could be a product service, it could be a new business model, it could be a new idea and that is innovation. Innovation could work on social kind of issues, that could be social innovation, business innovation, policy innovation, and technology innovation. Now in my work I tend to, well span across all of them, possibly technology innovation is probably the the area where I work most. And in this, space innovation, let's say has two main elements, one could be pushed by technology, which is usually the process of R&D from a university or R&D from a company where you build a completely new technology and there is no product, so the market does not ask for it. Otherwise, or it can be pulled by the market. So there is a market research type of activity where you find out where there is a gap and use technology to build a new product that fits the market. Most often innovation plays with both processes acting together, you build the new technology, you explore what the market wants and then you build a new product. And this is what is happening in space and geospatial, which is there is a profit proliferation of data, there is a proliferation of opportunities because there has been a congruence of a lot of different technology coming together artificial intelligence and visualisation, like you've entered reality, virtual reality, miniaturisation of sensors, which has allowed us to put more satellites in space, collecting more data, and then you have, you know, artificial intelligence that allow us to process data in a way that is more efficient and give us more intelligence and cloud computing that allows to bring a new business model, you know, somebody's subscription services will not be possible without cloud computing, processing data in the cloud and delivering at a global scale. So innovation takes a lot of different form, most often is incremental, so you have a little bit of innovation moving forward to do a better product or services.

Suzie

That's really clear. Thank you, Luca. One for you, Geoff, what kind of innovation does Feature-Fit promote?

Geoff

Well, I think as Luca said at the end there, most innovation is quite incremental. What we're looking for is really transformational innovation. If you think about it, we've got a lot of established industries, populated by established companies and they have reached that point of becoming established companies by getting really, really good at doing one thing, or a handful of things. Right, you know, Apple, build a better iPhone every year, Nestle find better ways or cheaper ways to ship food to supermarkets, whatever it might be. It's really about efficiency and what we need now, if we're to transform the economy, in pursuit of adjust and regenerative future, that benefits everyone, what we need is not so much efficiency as experimentation and that doesn't come naturally to large companies. Now we see small companies, start-ups, social enterprises, and so on, coming up with completely new ways of doing things. So the kind of innovation we're looking for, is finding better ways to meet existing needs. Now of course, better is you know, what does that mean? And we can talk about unpacking that, But that's what I would say, yeah.

Luca

May I add something here? Kind of the role of innovation across this, is that innovation does not work in a vacuum, not in isolation, innovation serves a purpose and usually that purpose is the economic framework we operate. Now, I'm not an economist, don't ask any questions about the economy, economic framework or theories, but our economic framework is built around neoclassical theory, which main tenet is capital accumulation is generating profit. Therefore innovation served that purpose. There was an article from Milton Friedman back in the 60s. Mr. Friedman was a treasury of the United States, which said something along the line, that a business's sole purpose is to generate value for its shareholders and any business that do something different will be at a competitive disadvantage. And that to me, and to many in this century, this statement sounds anachronistic. I want to distil the way we do business today, so what we need to do is to change the way we do business and in this sense, capital allocation plays a big role. If we invest in innovation, in short term time horizons, like two years, three years, we can now have the transformational change that is required to tackle the challenges that we face. If a venture capital want to exit after five years, that is not possible, we need capital allocation for innovation, that is 10 years, 20 years time horizon, so that we can build that that transformational change that Geoff was just mentioning.

Dallas

That's really interesting, that transformational change. I'm interested, you know, you talked about innovation being incremental, the other kind of important thing I think about innovation is that you have to have sort of trial and error, trial and error has to kind of be built into the system, otherwise you can't innovate, which is traditionally why governments and big companies have always struggled to innovate and smaller, more nimble companies do. Are you seeing, Geoff, in your work, are you seeing that becoming more an acceptable idea?

Geoff

Yeah, I think there's this disparity or disconnect there that the big incumbent businesses really struggle with this kind of experimentation. They've got good at doing the same thing, slightly better each year and no one gets fired for slightly improving on what was done last year. Particularly, because you know, I mentioned I think of innovation as finding better ways to meet existing needs. Well, if your definition of better, is more profitable, then of course, you're gonna focus on efficiency, right? Efficiency resources, not needing so many people, etc. But what we mean by better now, is actually protecting the natural systems we will depend upon clean off air, fertile soil, and so forth and meeting the needs of people around the world to eradicate poverty and if that's your definition of better, you need to really experiment beyond the kinds of things that worked in the past.

Dallas

Do we need a consensus on what better means, then? Maybe we should all unpack what we mean by better.

Geoff

So yeah, I mean, I can have a crack because that's the start of our work at Future-Fit. We say that, what we want to see is an economy that is environmentally restorative, socially just and economically inclusive. That's the kind of economy we want, where no one is left behind, where everything we do to the world makes it better and more able to meet our needs and where everyone gets the same opportunities.

Suzie

That definition of better is great. But how do you help these larger companies that have worked in a different mindset, that that are very profit orientated, to shift their mindset towards thinking about things in a different way that may be less profitable? I mean, that must be your challenge, presumably, is incentivizing or helping people to understand the importance of this shift in mindset.

Geoff

It's really interesting, people understand the need for it. You can get a CEO, pull them to one side, give them a beer, talk about this stuff and they say, yeah, I get it but then they say, but I'm operating within a system that values dollars above all else. Right? So what do I do about that? And that and that's why I think you get this disconnect, we said that the big companies don't like it or find it hard to experiment, the smaller startups, that's all they're doing and that's where it's really exciting.

Dallas

In a way Suzie's point is bang on, in a way the hardest thing I can imagine is getting past human psychology and the way people think. We're so used to living in a particular way and the human brain, we do get quite resistant to change, especially

when it's about changing big things like you know, values, value systems. Luca, for you, are you sort of butting up against that quite a lot, that resistance to change?

Luca

Not as much, in the work I do I always see companies, organisations that want to do something new or experiment in a different way. Not always are they in the posistion to do so because they might not have the funding to actually implement the new way of doing business. But when those new opportunities happens, what I see play a big role is collaboration, is the ability of different organisations with different expertise come together and break down those barriers. In fact that this is not a technology problem, innovation is often not a technology problem, finding a new solution is not a technology problem per se, we have many issues that need to be resolved. But technology can be deadlocked, it is more of a frame of mind. There is an example, a case studies, I think that can help with this, The National Underground Asset Register, this is a Geospatial Commission. So a UK based project led by the Geospatial Commission in collaboration with a lot of different utility providers from energy companies to water companies, the aim is to map out underground cables and pipes and there is a reason why they want to do that. They want to do that because they want to reduce the utility strikes, they want to create more productivity, they want to reduce congestion and the form of pollution etc. But the other things that are very important for this project is to see our oldest company which compete on a daily basis, they open up their data silos, they put all that data together, because they developed a single vision in which and a number of value on which they can collaborate, for which they can build something together and still be competitive, but collaborate and this is what we need to see, to see more often. And this is what I see happening nowadays is not just about competition, it is sometimes we compete, sometimes we need to collaborate, to resolve problems and challenges.

Geoff

I think Luca is spot on there. And this, you know, disconnect between the large incumbent businesses that have got good at doing really one thing and the startups that really can spin on a dime and come up with complete new ways of doing things. I think collaboration between those types of organisations is what's really strong. Because if you can get the big companies to realise that business as usual, is not taking us in the right direction, they can then find an invest in those startups and really help them to scale up. So we need both.

Suzie

Talking about collaboration, I guess, a question really as well is, how we need to think about a change in culture when we think about innovation? So Geoff, maybe you have some insights into that sort of idea of culture and how cultural change can help us with innovation?

Geoff

Yeah, I think the biggest thing that we see within companies, is this fear of failure, that failure is not encouraged within large companies. This leads to this kind of paralysis where you think, well, I've got this crazy idea, but actually, it's sticking my neck out to go there. Back in the, you know, many, many years ago, when we lived in a world where the personal computer was just becoming dominant. There was the IBM PC and then there were lots of what they call clone PCs and there were lots of other compacts Hewlett Packard, Compaq and all these and they came out with clones. And IBM machines cost something like three times everyone else's and they were virtually identical but they used to clean up in terms of market share. And the old adage was, no one ever got fired for buying IBM. It's like if your computers goes wrong, and they're IBM, well, then you did everything you could, if they go wrong and you did it because you paid for something that's half the price, well, then more the fool you. And I think we see that today with innovation, a lot of times people will actually, there's not a culture that encourages them to come forward with hare-brained schemes and that's what we need to enable.

Dallas

There is a cult, I see it everywhere, we all see it, this sort of culture of fear, everyone's fear of reputational damage or making a mistake or being held accountable for things. You're absolutely right, if you want to innovate and really change things, you actually have to take risks and we seem to be increasingly risk averse. Or maybe that's because I'm just an old grumpy, man. I don't know.

Geoff

I think you're absolutely right. That's why we see startups doing a lot of the really interesting stuff, because you know, they have got less to lose. They haven't got shareholders who are going to, you know, grumble the minute profits stall or whatever. So yeah, absolutely.

Dallas

I suppose just picking up on Luca's point about collaboration, I always think, again, one of the essentials of innovation, is that innovation is essentially a team sport. It's something that happens between brains, rather than just sort of individual brains. The idea of the lone inventor doesn't really apply when it comes to innovation. How important do you think that is?

Luca

It is very important, it is a team sport and not only between the people with different expertise within our team that need to build a project but also that team needs to include the people that fund that particular project, either from a public sector perspective or a private sectors perspective. The team needs to be also as we were talking about cultural change, it needs to be diverse enough to bring in all sorts of different ideas from people that are middle age like myself, with an established way of

thinking and a lot of experience behind them and they know how to manage certain processes, but also ideas from the younger generation, which the world will belong to in the future, they will become the next manager in the future. Needs to have gender equality, so diversity needs to be included in the team and yes, we need to have the cross sector collaboration, this is exactly what we do here at KTN to be honest, because we help to build those communities, those powerful communities, that not only try to grow the economy, but also deliver positive change.

Suzie

So Luca, zooming a little bit on some geospatial data and how that's used. Can you give us some examples of how geospatial data is important for tackling climate change?

Luca

I like to describe geospatial data as the link identifier connecting the dots between objects, the objects that we use every day, the roads, the bridges, our car, our homes, the people, our family, our neighbours, our friends, our community, the system we so heavily rely upon, transport system, energy system, financial system, healthcare system and the environment, the natural habitat that provide us with our well being. Geospatial data, this location data is a data type to help all the other data types to refer to a specific location, makes it very real to us having to live on those areas affected by climate change for example.

I'll give you a couple of examples to help you understand how this is important. There is a project for example called project CReDO. Project CReDO is funded by UK Research and Innovation and led by Connected Places Catapult and it is a pilot project to build a national digital twin. Now, what is a digital twin? It is, in layman's terms the digital representation of a physical ecosystem and what CReDO does, it aims to bring together data about infrastructure assets of energy providers such as Anglian Water, BT, UK Power Networks and what he aims to do, is to use all these data on assets together with the environmental data, like altitude aspects, slope, river catchments in an area, put all this data together and analyse it in a simulation environment, where decisions, where intelligence can be extracted to make decisions, other business decisions or decisions of policy decision for example. And by using the simulation environment on this digital twin, we can extract all these intelligence on the infrastructure and system interdependency, for example, and we can identify, well we can make decisions for example, we can inquire the system, what is the least costly adaptive measure that we need to build to protect those assets from flooding, for example? Or what is the lowest carbon impact? So what are the measures that we need to put in place? Or what is the most effective interventions that we can have to save lives? So by doing these projects CReDO is aiming to build a climate change adaptation digital twin, which in turn, over time, helps also to increase resilience in the entire energy system and doing this in a systemic kind of ladder.

Another example that I think is quite interesting and also because it's quite close to my heart, I've been in Brazil about 10 years ago, working with the National Space Agency of Brazil for a few weeks, and I found this project was extremely interesting and it's

called DETER which stands for translated from Portuguese, Near Real-Time Deforestation Detection System. This is a very long running project from the Brazilian Space Agency, which uses imagery from Landsat and Sentinel, so freely available imagery, also proprietary imagery from Brazil's own satellite system to capture where illegal deforestation happened in almost near real-time. I remember 10 years ago, there was a lot of people doing this almost by hand, using just few simple line of code to understand change detection. Now, everything is automated. So artificial intelligence is used now to do this at a much wider scale and much more efficiently. But the results are the same, understanding change detection from one image to the next in different time periods. And when these happen, alert, law enforcement agency on the ground which can go to the area affected and make arrest or stop the illegal activity. This is a very important example of an early warning systems, one of those early warning systems we need to build at a global scale. If we aim to tackle the many sorts of illegal activity around nature exploitation, for example. These are just two examples, there are many more and I advise the listeners to download Meeting Net Zero with the Power of Place, our latest publication, where we have many case studies across different sectors to understand how location intelligence can help tackle climate change.

Geoff

I think there's no end of company data, companies reporting on their environmental and social performance against all sorts of standards. I mean, there's more standards than you can shake a stick up. If you look at all the acronyms as GRS, GRI SASB, TCFD, TNFD, I mean, it's like you've shaken up all the letters in a Scrabble box and just group them into threes and fours and if you do that, you'll pretty much hit on the sustainability reporting standard. And the challenge with that is the data isn't particularly useful, it's not calibrated around what we need to know, it's just more and more information because there's this assumption that if we have enough information, we'll be able to make sense of it. But actually, we need to cut through the noise and just give it the right information and I think geospatial data can play a really important role here because a lot of the time when we're looking at what companies say they do, they're being very selective about what they're talking about. Whereas if we can actually look at the geographical locations in which companies operate, and we can start to see, well, is the forest cover there increasing or decreasing? Is the water increasing or decreasing? We can we can start to hold people accountable with that, you know, that real timely information.

Suzie

It sounds like one of the things that we need to work on as well is not just speaking with our own, in our own disciplines and I'm guilty of this as a space scientist as well, but thinking about working with others and other sectors outside of the area where we might naturally sort of congregate. So I guess to both of you really, maybe we'll start with Luca, how can our communities, our space or geospatial communities work better with people in other sectors?

Luca

Well, I see two main issues there in a way, one is, well, geospatial communities even the word geospatial is so technical, so dry, it is not easily understood.

Dallas

I've got such a bee in my bonnet at the moment about jargony words, because I just butt up against words and you know, so much about innovation is about being able to communicate easily and I'm an advocate of the plain speaking, sorry.

Luca

The community has not yet found a better way to describe what we do. There is an attempt to use location data, but it has not yet been applied widely. But yes, there is a problem with just the word, geospatial, you know, that's created difficulty of communication from the geospatial community and other sectors. So we need to start demystifying the word that geospatial is, not just the you know, the domain of geo-informaticians, is actually the technology that allow our autonomous, connected and sustainable world, but also another issue is that because of the technology, just think of space data, when you see an image, the information that you can get from the image can be applied to a lot of different sectors. So what we have done, we have built horizontal solutions that can apply to every different sectors and that doesn't really speak well, to build those better collaboration, what we need to do really is, well we say build a vertically integrated solution. So really get this geospatial data and focus on a particular sector, in a particular vertical and build a solution just for that.

Dallas

What do you mean by vertical, vertical integrated solution?

Luca

Yes. I'm going to give you an example. For example, in financial sector, you have insurance, you have depth, you have commodity trading, asset management, and etc, there is a company that which I particularly like called Mantle Lab, they built it, they started working on agri-tech. So building a solution for farmers in developing countries, to support them to understand their yields, to understand the condition of the land and help them to grow better. But after a while, they were working to understand that the opportunity was actually in the fact that these farmers could not access finance, so they kind of pivot and start building out of space data. So looking at other other piece of farmland over a number of years, a credit score, and that credit score could be applied by insurers and banks have debt provider to support these small farmers with access to finance. And what that has created is a solution that is completely for one sector, which is the insurance sector in this case, which has helped to open up a new opportunity globally, but at the same time has helped small holders in developing country to access finance, and to de-risk their operation, which once they were not able to do. So geospatial here has an ability to do so much more than just help a

farmer to understand their crop or their field, but create a completely different, a completely new sector.

Suzie

That's so interesting. Luca. Geoff, you talk a lot about sort of system level techniques or system level science, I guess. Maybe you can tell us a little bit about what you mean by that and what Systems Thinking is?

Geoff

Yeah, so if we look back to even as far as the enlightenment, okay, so when Newton was coming up with all these amazing things, and so on, our early successes in science, were around looking at smaller and smaller things, right, looking at cells in a body, splitting molecules into atoms, splitting up light into its constituent colours, and so forth. That really became the dominant way of thinking what we might call a reductionist view, about how the world works. But, you miss something with that, you can get a long way in understanding how fundamental particles work, for example, but when you actually need to understand how a complex system works, like an ecosystem with multiple species interacting, and weather and water, and so forth, then you can't understand that system, by just looking at one piece of it.

An example I would give is, if you watch how one person moves around, you can't learn all there is to know about what that one person does, and then suddenly understand how crowds move around, right? Because it's the interaction between the pieces that matter. So Systems Thinking is really about not just understanding the pieces, but the patterns, the interaction between all the pieces. And what we find with complex systems, whether it's the economy, or a group of people, or an ecosystem in the natural world, what we find is the behaviour of that system overall emerges from those interactions of all those pieces. So it doesn't matter how much you chop it into individual things and understand those things. If you're not looking at the whole as well, you will never quite understand how it works and therefore how to change it.

Suzie

Great and this kind of brings us back to sort of the beginning about collaboration, about working across disciplines, about bringing people together to have conversations and to work. So we're running out of time, Dallas, I think.

Dallas

We are. How interesting, so innovation, collaboration, trial and error experimentation, holistic culture, holistic thinking, team sports, better communication and diversity. We've covered everything. I've got one more question actually, for both of you, this is quite interesting. If you could wave a magic wand, and predict let's sort of project ourselves sort of five years into the future, maybe 10 years into the future. What would success look like for you? What would you like to do, that would propel you to something successful? And what would that success look like?

Geoff

How magic is this wand?

Suzie

Pretty magic.

Geoff

I think the thing we most need to do is, or two things, we need to absolutely transform our energy system to be electrified in every way and to have as much of that energy system powered by renewables as possible, that's one thing, to completely get ourselves off fossil fuels. The second thing we need to do is look very closely at how we use energy today, because even with all the renewables you could possibly build, there's a challenge in fact, the amount of energy we would need to build all of that renewable infrastructure would actually blow through the Global Carbon Budget, we would actually use up our remaining carbon we can have in the atmosphere, if we were to create all those wind turbines and solar panels and so forth, right. So it's an illusion, to think that we can just carry on living exactly as we are, and just switch our oil for solar pumps right. So what we need to do in addition, is we need to vastly reduce the amount of energy we use and that's why innovation is so important and it can be done.

Dallas

That's really interesting, but we just don't think about that, we just think, Oh, it's a really simple switch, we just switch to renewables. And actually, there is a cost to that. Luca, you've got the magic wand. Thank you Geoff.

Luca

Well, I would probably like to see our digital twin of planet Earth emerging. We didn't discuss much about digital twins.

Dallas

We will talk about that in another episode, don't worry.

Luca

Most likely, but yes, building a digital representation of the physical world and in this case, bringing together data to manage to build up physical or digital representation of the entire Planet Earth, so that we can monitor and create simulations, and predict and being able to make better decisions on the system we want to affect.

Dallas

Okay, that's it. Thank you very, very much to Geoff and to Luca for joining us. Hope you've been enjoying the series by the way, hope it's been inspiring you, giving you lots of food for thought. Hope you enjoyed that episode.

Suzie

Don't forget, you can get in touch with Luca Budello or Andy Bennett at KTN if you'd like to collaborate or chat more about anything that we've been talking about today, and of course, there's a publication that goes alongside this podcast series called Net Zero and the Power of Place and you can find a link to that in the podcast description.

Dallas

We'll see you next time. Bye.