



Business Unusual Podcast · Transcript: Episode 4 · 28/07/2020

## **Growing Underground - The unusual business of underground farming**

CLAUDIA:

Hello, I'm Claudia Winkleman and welcome to Business Unusual, a podcast in which I speak to inspiring entrepreneurs and discover what it takes to make waves in their industry. I want to hear all about businesses who are finding success by doing things differently. And this week is no exception; we're going to be exploring a subterranean farm that operates 33 metres below the streets of South London. Growing Underground uses hydroponic systems and LED technology to create the perfect controlled environment for their crops. It sounds like pretty futuristic stuff. Hopefully my guest can tell us how it all works. Let me introduce the co-founder of Growing Underground, Steven Dring. Steven, thank you so much for joining us.

STEVEN:

You're more than welcome, thank you. Thank you for having me.

CLAUDIA:

I'm now completely obsessed by your farm. I went online and ate everything that you produce. It's all completely delicious. So are you...are you lying? That's a genuine question. Do you have acres of field somewhere? Or is... is this really made in tunnels?

STEVEN:

It's genuinely - no lying! - it's made in tunnels.

CLAUDIA:

Where did the idea come from? Were you sitting one day having a salad going, "I don't like the fact that this has been on a plane, or four trucks. I want to do things in a different way." That's too simplistic, I know that. But how did the idea come about?

STEVEN:

It was pretty much exactly that. It was me and my business partner - we're old friends from Bristol, you may be able to detect a slight accent - I'd moved up to London about 20 years ago, Richard moved up here kind of 6, 7 years ago. And we're both passionate about sustainability, both concerned about climate change. And it's that bystander effect, you always... because of something so huge, like climate change, you expect somebody to be doing something about it. And and we were sat in a pub, as we would regularly do, and we would talk about the future of cities. We're going to have an extra 2 billion people on the planet by 2050, so... we've got to feed these people. We've got a reducing amount of agricultural land. And obviously, there's a lot of challenges when it comes to growing because of the effects of climate change. And at that time, academics were writing about what they called 'vertical farming'.

CLAUDIA: Yeah.

STEVEN:

Which was effectively growing in an office block. And that was to make sure that the food was produced where it was consumed, for exactly the reason you said - we don't want to be flying salads and driving salads all around the world. And so we kind of sat there and we were looking at the democratisation of energy and energy sources in the future. We were looking at water and water scarcity in the future. And we were looking at vertical farming, or food production in the future. And as boring as these conversations on a Friday night sound, they were actually quite intriguing and eventually came to a point where we both decided, well, actually, there isn't somebody just doing something about climate change. We all have to play our part. And this was our element of playing that part.

CLAUDIA:

How fantastic. Do you mind setting the scene? Just tell our listeners what your farm looks like. Because we have a certain vision in our head when you use the word farm, it often involves a sheep dog...what's yours like?

STEVEN:

If I can try and kind of paint a picture with words...so it's a world war two air raid shelter. They built eight of these deep level shelters underneath London between 1939 and 1941 to protect Londoners. So it's two long linear tunnels, both half a kilometre long. These have a mezzanine floor in the middle. And what they used to have was bunk beds on the upper levels, bunk beds on the lower levels, and obviously during air raids, then they would get 8000 people down there. So we were looking at controlled environment farming and I'll come onto how it all came about, but basically these tunnels provide the exact perfect environment for growing crops.

CLAUDIA:

I mean it's so extraordinary. Steven, how does an underground farm work? If you don't mind me asking how does it differ from other methods?

STEVEN:

On the lower levels, we have a lot of water tanks and filtration and pumps. And then above it, we have growing beds. So we have these benches stacked on top of each other and in between each of them we have a number of LED lights. So it's called an ebb and flood system. So what happens is it floods the benches with water and within the water, it has the nutrients that goes to the root zone of the crop. And then we have what is called a substrate. So usually people grow using soil. Well, we actually use off cuts from the carpet industry.

CLAUDIA:

Wow

STEVEN:

So what used to be a waste product when people were making a brand new roll of carpet, they would take the off cuts from the end of that roll of carpet, they then kind of pull that apart and weave it back together and it makes this agricultural matting. So it's a standard product within agriculture. And so then the root zone throws into that matting and then the crops grow from there. And then the LED lights come on replicating the sun, and then that kind of creates the growth within the product. And then the water, then goes through the UV filtration and goes through filters back into the tanks again, it gets dosed with more nutrients, and then that water recycles. So that's how we're efficient in terms of our water usage. And that's kind of how the growing system works.

CLAUDIA:

That's fantastic. I can properly see it. And regarding yields.

STEVEN: Yes.

CLAUDIA:

How many yields can you make *underground* as opposed to *overground*... I sound like a Womble! But you know, in regular farming, how many yields might be... and compared to yours?

STEVEN:

So obviously, we grow a lot of different products, but if I use pea shoots as an example. If you were growing out in the field in the UK, you'd get two and a half to three crops every single year, let's say kind of per square metre. If you were doing that in a glass house, so a big green house, you'd get maybe 20 to 25 crops every year.

CLAUDIA: Wow. Okay.

STEVEN:

But because we are giving the crops exactly what they want in terms of the environment, all the way from the seeds being sown all the way to the point they're harvested, we get a crop every six days. So we get 62 crops a year.

CLAUDIA: What?!

STEVEN: Yeah, exactly! That's how this industry kind of stacks up and how we can be efficient and how we can be effective in terms of the...

CLAUDIA: You're speed growing!

STEVEN: Yeah, and also that brings with it...we know exactly what we're going to get. We're not affected by the vagaries of the weather. If you're growing in a field in UK, you have to grow to the highest possible levels that the retailers might order. And if they don't order them, then worst case scenario, you end up turning that back into the soil and using the crop as a nutrient. So that's how we can be effective in terms of our yields. But then, also, like I said earlier about the crops being stacked on top of each other. For every square metre, we stack it four high.

CLAUDIA: Yeah.

STEVEN: So the difference between us and a square metre in a field is something in the realm of between 3 and 400 times more efficient than a square metre.

CLAUDIA: How, how fantastic. And you've used crowdfunding, haven't you? How did that work? What was it like grabbing people's attention? And going, "look! do this! support us!"

STEVEN:

Well, we crowdfunded the first round and, very luckily, Londoners certainly are always intrigued about what's going on beneath their feet. And, certainly within the tube system, there's lots of doors that kind of head off in the tube system, you always kind of wonder what's behind them. And so it certainly grabbed the attention of the general public to invest. But it also attracted professional investors. And this is going back in kind of 2014, investment in that green sector, we just come through a recession, the only sector to grow in terms of investment during that period was the green sector. And and now it's gone from being something that formed a small part of some of this investment portfolio to literally being 100% of someone's investment portfolio. It has sustainable, and it has to have impact. And so, yes, we crowdfunded the first round. And we've got a lot of experienced investors who have formed a small cohort of investors. I have now about 15 investors that have invested in every round where we've raised funds and they will come to us via crowdfunding.

CLAUDIA:

How brilliant. So you're up and running, how difficult was it then to say, “guys, come just come down this tunnel with me?” Or, how did you get the word out if you like?

STEVEN:

As you can imagine as a new business we don't have a lot of funds in terms of marketing campaigns and all that, so press was obviously a good way to kind of get out there. We took an investment from Europe's largest fresh produce producer, and those guys worked with us in terms of all the accreditation that's required to get into retail. So we started supplying food service, which is through new Covent Garden market and then distributed to thousands of restaurants and hotels and event caterers and contract caterers every day. So we started by supplying those guys in 2015, and then over a two year period, getting the accreditation that are required to supply the retailers. And then in January 2017, we launched into Ocado and since then have them moved into pretty much most of the major retailers in the UK.

CLAUDIA: Anybody who's listening is going “have I eaten this?” All they need to do is go on your

website and go “yes! that has been in my basket, that has been in my basket!” When did you look at your business partner, maybe in the same pub and “we’ve done it, I don’t know how but we’ve done it!”

STEVEN:

Honestly, I don't think we're at the “we've done it” point yet, only because there's so many opportunities that sit there at the moment and COVID-19 and Brexit also present challenges for us and opportunities as well, sadly, for us to... well not sadly because it's to have more impact in terms of secure food production based in the UK.

CLAUDIA:

What was the hardest bit? Were there ever moments when you just went...just the enormity of it the way you describe those tunnels...you know, your family and your friends didn't at one point go, “Dude, what are you doing?”

STEVEN:

Oh, absolutely. Certainly leaving a secure fairly well paid job with a decent pension working for a PLC, which is kind of what I used to do. And moving into a business where you probably didn't know if you're getting paid from month to month. Yes, certainly there was a couple of times where my mother looked at me and just shook her head, for sure. And still to this day, I'm not entirely sure she understands. But yeah, that, as with starting any business, there's going to be challenges along the way. And it's about facing into those challenges and saying, “right, how do we overcome this?” And each of those challenges and each of those problems, as you say, all of them present an opportunity. But there were certainly times when the people that rent the tunnels to us are Transport for London and we went to them and said “You have these empty tunnels, you're not doing anything with them, we'd actually like to kind of breathe life into them and build a farm. And I think they hung up the phone at that point. And then we phoned them back and...

CLAUDIA:

You said it's not April the first, we want to build a farm!

STEVEN: Exactly. And eventually they took us serious and like... Transport for London get a lot of grief for a lot of things. But absolutely the commercial...

CLAUDIA: I love them.

STEVEN: Yeah, absolutely. The commercial arm are forward thinking and we went down there, we explained what we wanted to do. And we said "Look, we're a new business. We don't even know if it's going to work. But we'd really like to kind of get in there and try and they gave us the keys."

CLAUDIA: I love stories like that.

STEVEN: Yeah.

CLAUDIA: And what is the business look like now eight years on?

STEVEN: So the idea was in kind of 2012, we launched the business in 2014, we went into kind of retail in 2017. The business now is gone from me and my business partner Richard writing a business plan in his bedroom to 35 members of staff supplying most of the retailers in the UK, supplying a number of different restaurant groups and food service restaurants through new Covent Garden market. We have signed a R&D agreement that will have us launching a range of sustainable cosmetics with a brand that I can't actually say cuz I'm under an NDA.

CLAUDIA: Fair enough.

STEVEN: But it launches next year. What we've actually noticed is it's not just food, it's anybody

with anything natural in their supply chain is under threat from the adverse weather and the vagaries of climate change and what it's doing to the environment, which means they struggle to source the product consistently, there's fluctuations in pricing. So it actually makes sense for them to buy it from someone like ourselves. So, the business what it looks like today to what it looks like going back yeah, probably kind of six, eight years is significantly different, but then also with a huge of opportunities in growth sat in front of us.

CLAUDIA: Absolutely. Talk to me about what the pandemic has done for you and how's it changed the day-to-day, if you like. I mean, did it throw everything up in the air? How did you manage it?

STEVEN: Certainly there was a 24 hour period where it was kind of "Right, okay, this is real, we need to make some changes." And so we separated our operations into two teams. So they kept completely separate from each other. So if one team was affected, we could continue to run the business. Anybody that could work from home, obviously worked from home and should we have had someone contract it or one of the shifts go down, we had the ability to kind of backfill that whole shift with people that were working from home, which would have lent itself to me harvesting and packing salads! Every time I go into the farm or into the packing area, I regularly get kicked out by the staff who tell me I slow everything down. Which is quite true, to be perfectly honest. But no, it meant some operational changes, obviously, the social distancing that we implemented, we put regular staff survey in place so the guys could feed back to us if people weren't behaving how they should behave, or we could be doing more. We highlighted and kind of reintroduced and amplified the cycle to work scheme that the government support to make sure that everyone could get to work safely. But yes, as one of these key industries producing food was one of those areas where we kind of had to keep going, and...

CLAUDIA: It sounds like you moved very fast.

STEVEN: Absolutely. And being a young, small business we communicated with our investors and told them what we were doing. And were very nimble and very quick in terms of making those changes. And that kind of kept us in a position where, since we started supplying in January '17, we've delivered product every single day into the retailers in the UK, of which were extremely proud.

CLAUDIA: You mentioned that some of your teams were separated, how did you stay connected?

STEVEN:

We stay connected a number of different ways, but certainly zoom and the online communications has allowed us to stay connected rather than just kind of speaking on the phone, having that connectivity, seeing people on a screen. It's never the same as direct human contact, but it's better than just going talking to people on our phones. So we used a number of different applications to be able to communicate in that way. And that's how we maintain that connectivity between us as well as traditional phones and messaging services.

MUSIC FADES IN

CLAUDIA:

Let's take a quick break now, so I can tell you about how Vodafone are using the power of technology to help protect businesses and their staff from phishing attacks that target mobile devices.

During an already stressful time, there have been worrying reports that cyber attacks have increased significantly during the covid-19 pandemic. And with a huge number of people suddenly working from home, being able to feel secure in your systems is vital to keeping as many businesses running as smoothly as possible.

To help everyone feel safe, Vodafone has partnered with leading mobile security experts Lookout, to launch 'Lookout Mobile Security'.

Lookout Mobile Security protects users from application, network, device and phishing attacks that might be trying to steal business or personal data.

Your privacy is fully protected, as Lookout's privacy control feature ensures your data and employee privacy is upheld.

Vodafone are passionate about keeping the UK connected during this difficult time, and now, you and your business can feel more secure than ever whilst working online. Search Vodafone Lookout to find out more about Lookout Mobile Security.

And keep connecting, with Vodafone.

MUSIC FADES OUT

CLAUDIA:

I've seen that you're recruiting at the moment and growing the team. How do you find your people? And do you have a perfect person? When somebody comes into the room and goes, "I am passionate about this". Do you think, "yes you're you're one of us!" Or what is it that you're looking for?

STEVEN:

There's a number of different websites out there, if I just kind of highlight one which is called Escape the City. That's advertising roles in there which are, basically, people who have done jobs in corporate roles and gained a lot of experience but actually now want to work in an industry where they're giving something back and moving the dial in the right direction. So we get a lot of applications bizarrely from people that have worked in the oil and gas industry?

Who want to move into something that's sustainable. And so we attract a lot of high calibre candidates through that process. We also use our kind of social media network. But it's different to farming. You look at farming, it's one of those industries that's kind of called 'stoop labour', where it's literally back-breaking work, bending down harvesting products. And we're now seeing technology is taking that away. But that's certainly what we do. We're attracting data scientists to understand exactly how all of the variables within the growing chamber that I was mentioning earlier, how we provide that optimum environment and analysing all of the data that says well actually, with this product, if the humidity is 1%, higher or the temperatures 1 degree less, that actually increases our yield or speeds up our growing time without affecting quality. And so we've worked with some of the finest minds in the country; the Civil Engineering Institute at Cambridge University, we work with the Alan Turing Institute in terms of data analysis, and then the guys at Nottingham Trent University, who are pretty much the UK's leaders in terms of bio-science and plant-science. And so we now kind of bring in a lot of those roles in house. But yeah, it's been an absolute journey with those guys really understanding how to produce the best product at the right quality at the right flavour but in the quickest time and in the largest yields.

CLAUDIA:

You must be fascinated by all of it. I am! Just by the science and the use of technology. I mean, could you have done this 20 years ago?

STEVEN:

You couldn't have done it 5 years ago, maybe 8 years ago.

CLAUDIA:

Wow, extraordinary.

STEVEN: Because what, what actually changed...the significant game changer in this was the

LED lighting technology. And I usually get shot down by our growers and some of our science guys around this. But if I kind of say it simply, it's the light spectrum that our LEDs produce is pretty much the same light spectrum that we get from the sun, and if not enhancing some of the, kind of, best bits of the light spectrum. So that's all the way from far red or infrared all the way through to ultraviolet. Along that light spectrum, the plants require different elements of the light spectrum whether that's a little bit of blue, a little bit of green, whatever it may be. So our LED lights, because of the movement in that technology within that industry, we have LED lights that don't produce, or produce very little heat. So if we were to try and do this with growers in glass houses in the past, to extend the season would have used what were called high pressure sodium lights, and they are extremely inefficient, but then at the same time, produce a lot of heat. So if we were trying to do this in a tunnel or in a growing chamber or some people are doing it in a warehouse, then you wouldn't be able to do it because of the heat. So the movement in that technology which continues to move forward almost daily, the movement in the LED technology allowed us to really kind of do this at scale. Plus, it was that almost Moore's law; at the same time as we saw the productivity and output and quality of the LEDs increasing, the price of each light was decreasing. So that's when it starts to make it economically viable.

CLAUDIA: Absolutely fascinating, your use of technology in growing the plants. And how important is technology for you in other ways? I mean, how else does the business use it and rely on it?

STEVEN:

We've linked together a lot of different technologies. And we're actually developing an operating system now, literally, to allow people... we would supply them with the software and they could literally go and plug in and run the farm. But all the way from using the technology for modelling the environment within the tunnel, so working with Cambridge University, understanding what the composition of the structure of the building was, and therefore, say it rains outside a few days later that water's passed through the water table and it has an effect

on our tunnels. We then have all of the different technologies, whether it's the work scheduling, whether it's planning and all of those pieces of software, but then there's the communications piece as well. And how the guides communicate with each other. And whether that's via a number of different platforms or even as basic as kind of WhatsApp, so, but the main ones for us is kind of sensor technology for the data capture. and then it's the data analysis from there as well. So, and then we get into kind of areas of artificial intelligence and machine learning, which gets us to a stage where we can literally... if we can see that it's going to rain in a number of days time, and we can literally see what effect that's going to have on the growing chamber that can tell us what increase in energy we may use, in terms of say, leaving the LEDs on longer and extending the day or having more ventilation or whatever it may be. But we can also plan what effect that may have on the amount of crops that we've got coming out, which can ensure that we're matching what we produce with what our customers require, and therefore ensuring that we don't have any waste and again, addressing that food waste problem. So we're looking at every element of the business to make sure that we are as sustainable as we can possibly be whilst continuing to always move forward in that area.

CLAUDIA:

Do you think your farming methods, which I'm now in love with, will inspire other producers? Has it happened already? And is that what you'd love? For everyone to go "Oh! This is genius that nothing needs to get on a plane, or like you say, a massive truck, this is the answer!"

STEVEN:

We're certainly...around salads and herbes and products like that, absolutely. We are now seeing an adoption of this technology, to the extent that a lot of growers in the UK are now either working with us already, or approaching us, or taking their own route to actually deploy this technology. So instead of relying on glass house in the UK, where you may get 5 or 6 months worth of growth, because obviously, there's not sunshine all year round in the UK. But also just growing outdoors in places like Spain, for example. Spain have had 3 100-year weather events in the last 5 years. So the whole of Murcia, or a big chunk of Murcia, where a lot of

growing is taking place, that supplies the UK market, was flooded a few years back, and it washed away all the seeds that have just been sown and it wiped out all of the crop that was ready to be harvested. And if you look at Spain, 80% of fresh water in Spain goes into agriculture.

CLAUDIA: Yeah.

STEVEN: Now, that's, that's not sustainable.

CLAUDIA: No.

STEVEN: That's like... we are going to need that freshwater for humans in the future. And so, we need to make sure that we're conserving every input into our farming. So we control it, we put as little water into the process. So we have a circulating water system; we're constantly reusing the water, we go through UV filtration, and through different filters to make sure that we have clean water that then gets pumped around the farm again. So we're constantly reusing things like that. We put the smallest amount of nutrients into the product as possible. But again, because it's a recirculating system, those nutrients are used again and again, so it's about making sure...and like I said, like using the least amount of energy as possible. But we're starting to get to the stage of...we're playing around with things like... there's academic papers out there where you can literally mimic sunrise and sunset.

CLAUDIA:

Have you got a cockerel? I feel like that might be quite important.

STEVEN:

Sadly not, no. But we literally mimic the sunrise coming up. And that affects the plant.

CLAUDIA: Yeah.

STEVEN: The plants actually grow better, because instead of just flicking the lights on and flicking the lights off, mimicking that natural sunrise and sunset increases the yield and the growth of the plants, which is most bizarre.

CLAUDIA: So bizarre! So maybe every city will have an underground farm soon? I hope so.

STEVEN: We're certainly seeing it being adopted and, whether it's Singapore, as you can imagine a very small amount of land there, especially for agriculture. They want food security. So they've adopted this technology quite rapidly. We've seen exactly the same in a number of different geographies. In the US, we've had a startup out there actually built their own underground farm. It's a little bit smaller than ours. But again, that's supplying kind of the high-end restaurants in New York. Effectively, what it's doing is making sure that in 25-50 years time, we have a secure supply chain for food that isn't affected by climate change. And so all of the challenges that we have facing us with climate change, that we've overcome them in terms of food production, and food security.

CLAUDIA:

You must be, with your business partner, incredibly proud of what you've done. Are you?

STEVEN: I think, as much as I hate the word, as an entrepreneur, that you always set yourself the next set of goals. And you set yourself the next challenges and, and for us, it's taking it from the size of the farm, that it is at the moment and the product that we've been supplying. But the next step for us, working with our academic partners, is actually producing a product...you can actually change the LED light spectrum and it affects the nutritional composition of the product. So literally, developing a product that's higher in nutritional value for people that eat it. But then for us, it's making sure that within products that are coming out in the next 12, 18 months, we're going to have a higher, completely carbon-neutral, completely closed-loop product that's ready to eat, which is high in nutritional value.

CLAUDIA: Yeah.

STEVEN: But it comes out at a price point that is competitive with what's on the shelves today. So we don't end up with this nutritional poverty gap that only wealthy people can afford nutritious products.

CLAUDIA: Yes.

STEVEN: Because we don't want to create high-end nutritious salads, just for posh people

CLAUDIA: No.

STEVEN: It's about making sure that it's available and accessible to everybody, and that we focus on nutrition being affordable for all. And I think, when we get to that stage, then I may allow myself to kind of look back and be a little bit proud.

CLAUDIA:

Steven, you mentioned you hated the word 'entrepreneur.' I've just got to ask why? I love that! Because I don't know how to tell you this... you are one! I don't want to offend you.

STEVEN:

I struggle with saying it! That's the only reason, and I usually fumble over it!

CLAUDIA: That's fine, we'll call you businessman.

STEVEN: Exactly.

CLAUDIA: It's a weird question, but I've got to ask it, of all the things you grow, which is your

favourite? Is it the pea shoot? I mean, I love a pea shoot but, you know, everything you produce is beautiful. But is there one thing that you always go “I'm just gonna go and check on this little leaf.”

STEVEN:

Without doubt, there's actually three if you don't mind indulging me. So there's our fennel.

CLAUDIA: Yeah?

STEVEN: Because we're based where we are. We get a number of high-end chefs and we've had kind of most of the Michelin star chefs in London come and visit and and we had Raymond Blanc come down and he's absolute force of nature and an amazing chef, but at the same time he tasted this product and he kind of highlighted that it's sweet... so you get this, this fennel flavour but there's all like... so you get this French Pastis kind of aniseed flavour, but there's also a sweetness to it. So it's an absolutely beautiful product. There's then red mustard, which is a long flavour you kind of eat it and it takes 10, 15 seconds but then suddenly you get this nasal heat, exactly the same as Coleman's English mustard.

CLAUDIA: Yeah!

STEVEN: So it's an amazing product. And then for me, the other one that's just always a fave is Wasabi Mustard. So we grow this wasabi where it's just, just a small few shoots and you taste it and it's exactly the same...you get that nasal heat and intense taste that you get when you get when you're eating sushi, for example, and those three...as well as peas because I'm always astounded by the freshness, they give like an a punchy pea flavour. But those three products are the ones that, yeah, if I need to go test some products in the farm, those are my go-to products each time.

CLAUDIA:

Steven, thank you so much for talking to us, I wish you enormous luck! I mean, it sounds utterly brilliant and we'll continue to buy and eat your delicious products. Thank you so much for joining us today.

STEVEN:

Thank you Claudia. And thanks to Vodafone for having me on!

CLAUDIA:

It was great to chat to Steven about Growing Underground – it's so wonderful to hear that Steve and his team have been inspiring others to address issues of sustainability in their businesses too.

Thanks so much for listening to Business Unusual. Please do rate and review the podcast and make sure you subscribe so you don't miss an episode.

In the next episode I'll be talking to Chris Sheldrick, co-founder and CEO of what3words, an organisation that are pioneering a totally different way of describing locations. If you've ever had difficulties finding a delivery location, or spent hours searching for your colleague at a conference – this is the app for you. My current location, in case you're interested is soft drink, pen, window. See you next time.