

Ocado

Tim Steiner (TS): The swarming robots, it's quite mesmerising. It's a little bit like when you stand on the beach and you watch the waves, or you stand and watch a fire burning, and the movement mesmerises you.

Lawrence Burns (LB): They're building a business where they're effectively permanently reinvesting everything they have.

TS: When we get to 80, we don't start to plan the celebration party for when we hit 100, we move the target.

LB: It's a multi-trillion-dollar market. If they get a small slice of that, that will be hugely meaningful.

TS: We can't see anyone anywhere in the world that has anything close to the suite of solutions and products that we have.

Claire Shaw (CS): Hello and welcome to Invest in Progress, a podcast brought to you by the Scottish Mortgage team. I'm Claire Shaw, a director and investment specialist. This podcast is designed to give you a behind-the-scenes look at the conversations that take place between our managers and the visionary founders, entrepreneurs and business leaders of some of the world's most exceptional growth companies.

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Today, our guest is one of the original founders of Ocado, Tim Steiner. Ocado has frequently been characterised as rather upmarket, given, in the minds of the UK consumer, it is synonymous with grocery retailers Waitrose and Marks & Spencer, but it's so much more than just an online retailer. This is one of the most exciting, innovative companies that we have in the portfolio, a company that has artificial intelligence and robotics at its core. Joining me to discuss this opportunity is Lawrence Burns. Welcome, Lawrence.

LB: Thank you for having me.

CS: So, Lawrence, it's safe to say that Ocado is a name that's going to be familiar to most of our listeners, but from our perspective we think it's probably one of the most misunderstood companies we have in the portfolio. Why is this?

LB: I think a lot of people listening are probably quite familiar with Ocado, they'll have seen the vans go through their neighbourhood, they'll hopefully have ordered a few times from it, but I think what's interesting about Ocado is that although it started as that online grocery supermarket, it's evolved to be a lot more than that.

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They've taken the technology, the robotics, the AI, the software that goes into delivering those grocery orders, world-leading economics, and they've started building what they call the Ocado smart platform to make that available to other grocers around the world that are having to deal with 'how do I profitably deliver online groceries?'. And so, for us, the Ocado that the shareholders of Scottish Mortgage see in everyday life is only really a fraction of the overall value of the business that we're looking at. The Ocado that we're looking at is one that is about technology, and is global in both its current footprint but also its continuing aspirations.

CS: And when you think about the fact that groceries are an £8 trillion market, Ocado, as you say, is a company whose opportunity is both large and global. We've got Tim Steiner coming on, we're going to be talking to him shortly, but in your opinion what is it about Tim Steiner's vision that you think he and Ocado are well-placed to capitalise on this opportunity?

LB: In terms of Ocado being well-placed, it's good to remember that they've been at this for 22 years now. That is a long time of trying to build this up, a lot of experience accumulated, and I think what they've been able to do is effectively pool the resources of their 12 grocery partners, and that gives them a scale that is quite hard to be matched by other companies wanting to start and go into this.

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But in terms of why Tim specifically, which I think is an interesting question, I think people listening are about to get a good sense of why Tim specifically. Because whenever I've talked to him, he is someone that has a very large-scale vision, as you said. His background is that of an investment banker, but you'll think you're talking to an engineer, I think.

Those robotic hives that deliver and sort those groceries, he's got one of those in his head whenever you talk to him. He knows every single process that's going on with those structures, and I think having a CEO that has a vision but is able to combine that with having a really bottom-up understanding of the actual technological product they're building is hard to do and valuable.

CS: Obviously, Lawrence, you and I will catch up afterwards, but everything I've read about Tim, everything I've read about Ocado, I'm very excited to listen, actually, to this. So with that, I will hand over to you and Tim.

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LB: Firstly, just to start off and just say thank you for doing this, but also thank you for the generous time you've given Scottish Mortgage over the years, talking to us, we really appreciate it.

TS: We appreciate your support of the business, so mutual fan club here.

LB: I think the starting point, where we begin with most of our guests, is really to ask what is the problem that Ocado are trying to solve?

TS: Sure. I think we look at this from a couple of different ways. From a consumer perspective, going to the supermarket and doing your shopping was viewed by consumers to be their second-least favourite chore of the week, after doing the ironing. You have to constantly replenish groceries once or twice a week at least, and it's not a fun experience.

Some people say, I like going to the supermarket, but they're normally people who go twice a year, not that are forced to go to feed their families. And so there's the enjoyment side of it, where we think it's a chore that can be turned into something much better, and then there's the economic side of it where we say that any means of distribution of grocery uses a combination of property and capital, people, energy and food waste.

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Some means use more of one and less of the other, but we believe, through the application of advanced technologies, whether that's AI machine learning code and stuff like that, or whether that's robotics and other forms of automation, that we can actually reduce the costs, and therefore ultimately reduce the cost of groceries. We're not there quite yet, but reduce the cost of groceries for consumers and, in doing that, groceries is large, it's 50% of retail spend in developed markets, it's obviously all of retail spend in undeveloped markets, and we can improve people's lives.

LB: That's fantastic, and I have to say I'm not one of those people that appreciates or enjoys spending my weekend going round a windowless warehouse for two hours, so I can definitely see the appeal. You co-founded Ocado in 2000 with two friends and, prior to that, were at Goldman Sachs, which would have been obviously a well-paid and successful job, thousands of people every year try to get into Goldman Sachs. Where did the idea for Ocado come from? And what was it that inspired you to leave that world of investment banking behind?

TS: I think that in 1999 in particular, it was quite heady days in terms of looking at people starting these businesses, some of which have turned out to be amazing businesses and a lot of which turned out to be completely hopeless businesses. But there was a lot of excitement, there was a lot of energy, there was a lot of

backing, and there was a view that the Internet could dramatically change our lives. Probably didn't realise quite how dramatically, and probably it ended up changing it in many different ways to the ways that were envisaged back then.

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But whilst it was a great career at Goldman Sachs and I think it's a great firm and I was making a lot of money, I had come from more of an entrepreneurial background. Both my parents and my grandparents all had run businesses, not of the scale of an Ocado but had, nevertheless, come from that business background.

And the combination of wanting to do something more meaningful than moving bonds around and earning a lot of money, combined with the background that I'd come from, combined with the heady times, it just felt the time to go out and try and do something more interesting, more meaningful, more impactful. Obviously, more personal risk, but something I felt comfortable taking at that point in my life.

LB: Must have been a very entrepreneurial background, the encouragement of what's possible. And I suppose sticking to those early days, I'm just curious where the name of Ocado came from. Presumably, there's a linkage to avocado?

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TS: Embarrassingly, when I meet a number of great entrepreneurs these days, they all claim to say that they just got out a thesaurus and chose their own names, but we, in those days, thought we needed to be professional, and so we actually worked with Interbrand. We obviously didn't pay the money that huge conglomerates pay sometimes to rebrand themselves today, but we did nevertheless probably pay a low-six-figure sum to come up with the name and the branding.

And they went away and came back with a number of ideas or suggestions, some of which are wholly inappropriate, and I can't even say on this podcast because I would get cancelled, and yet they actually came and pitched those to us. And Ocado was one of them.

And yes, some of the brief that we'd given them was we wanted a short name, because on the internet, Sainsbury's is a lot further away than Asda is in terms of having to type it. We wanted a name that didn't mean something awful in another language, if we ended up in the multinational country that we live in or if we ever went overseas with it. We were familiar with Vauxhall selling a Nova across Europe and obviously it meaning 'doesn't go' in some languages. So there was that kind of brief.

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Non-descriptive, because whilst the Carphone Warehouse was very successful for many years, somebody else can then say we're Tim's, the best car phone warehouse there is, because it's too descriptive. So non-descriptive, short, not offensive in another language, come up with something.

They came up with Ocado, and they had a nice story around how the skin protects the wonderful contents inside the avocado. And we also wanted to be able to buy it, and buy the misspellings. So if you spell it O C A R D O by mistake, or A K A D O, they all come to us, there weren't other businesses that use those names already.

And so it worked, and the strange thing was one of the things they did to show you, as they show you branding on a vehicle and branding on a website, they also wrote an article they pretended was in the FT, and we looked at that and went, kind of, ha ha, and then you didn't realise how many times you were actually going to see the world Ocado in the FT.

But I always think people always go, oh, you've got the most fabulous brand, and I always say in cars, if Enzo Ferrari had actually been called Enzo Skoda, I just think they would have been the other way round, we would have all dreamt of one day being able to buy a Skoda, not one day being able to buy a Ferrari.

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The brand I think is really the totality of people's view of what it is that you do, what your product is, what your service is, what your proposition is. People often think it's the other way round, that you start with a great name and that's what creates the great company. And I think it's completely the opposite way round.

LB: Yes, it's an output of the customer's experience of the brand, rather than what you decide to call it. And at least by outsourcing the name you could focus on making sure the customer experience in the long run was going to be good.

TS: I did, several years later, meet somebody who was on the team who claimed that they had gone away, done nothing for several weeks and then, the day before they were due to come and see us, they'd maybe played with a few illegal substances, laid on the floor and then come up with a few ideas that they then pitched to us, but whether there's any truth in that or whether they were being amusing, I'm not sure.

LB: Creativity has to come from somewhere.

TS: Yes.

LB: Obviously, we got to know Ocado when it was a public company, but you spent ten years as a private company, and actually I don't know that much about that period before you were listed, and it would just be interesting, what were some of the challenging moments in that ten years of building up privately? And also,

what were the key milestones that made you go, actually, I think this is really going to work?

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TS: I would say it was an extremely challenging ten years, in that what people, I think, fail to understand is people think execution is easy and they think it's all about, oh, you just happened to have the idea, you were right place at the right time, and a number of people are in the right place at the right time but they fail on the execution.

And so we spent a large part of that ten years trying to satisfy the customer demand that we were quite easily generating at that point. Designing our first warehouse, designing the software, getting it put together and functioning was immensely complex. Not losing all our money to unscrupulous software companies that were quite happy to take it, claiming they were going to deliver something that works and delivering things that didn't work or weren't fit for purpose.

And then, getting a warehouse live and realising that it didn't do what it was supposed to do. And went from somebody that had originally an economics, accounting, mathematical type background to learning about and understanding flow and conveyors and the decision tree that you want to use to make them work, and actually very quickly becoming more expert at that than the companies that sell that equipment across Europe.

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And so then starting to either rewrite the software... I don't write software but asking software people to rewrite the software, to make decisions based on different things, different attributes or different locations or different barcode readers and where you put them and when you make a decision and what you do.

Because what they did was they were creating traffic systems, effectively, and they weren't very good at it, and so we literally struggled to grow. So it was really about breaking through volume. We've done 2,000 orders, we want to do 3,000 orders, we want to do 5,000 orders a week. We wanted to get to 10,000 orders a week.

And I kind of got bored of either third parties that we work with or people internally that had come out of industry trying to fix it, and I went, okay, I'm taking the laptop home and I'm going to write an entirely new way of doing it, and I'm going to take the risk. And we went from 6,000 to 10,000 orders in about three weeks.

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And at the same time, I had a challenge from some very senior executives that work for us who'd gone to our partners at John Lewis, trying to suggest to remove us from the company, and so when I found out and my colleagues found out, they were like, we've got to remove them from the company. And I said no, no one's going anywhere until we hit 10,000 orders.

Because I don't want anyone to look like... I want to solve the problem, and then I can work out who I want to work with. But I've got to prove that I can solve the problem first. And we went from that famous 10,000 orders a week and we were up in the high-hundred-and-something thousands by the time we went public.

LB: And was it difficult doing that, in some ways, in the aftermath of the dotcom bubble but also specifically you talk about raising money, I wonder how much of an impediment, thinking back to Webvan, for example, which was one of the big delivery companies for online food that didn't work out in quite a big way.

TS: Yes, Webvan was unfortunately one of the most spectacular bankruptcies post the dotcom boom that was deemed to have through about 1.2 billion, or something like that, of cash, which, in those days, was one of the biggest numbers, and they'd reached a valuation of something like \$9 billion when they were doing \$80 million of sales or something. So they were over 100 times sales in valuation, and they failed very spectacularly.

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There were some quite good lessons there, and I went out there actually twice, once while it was failing and once after it had failed, just to see and learn a bit from it. But yes, for a number of years, there were a lot of people who believed this could never work because of Webvan.

That was a two-edged sword for us because, on the one hand, it came up time and time again when we were trying to raise money, and some people who would initially listen to us and get very excited would then go away and go, oh, someone's just explained to us this whole Webvan thing and how it never works, and therefore we can't do it. So we had that problem a number of times.

The flip side of that is the entire US market got educated into the perspective that this was well-tried by Webvan and therefore impossible, and would say that were experimenting and learning how to do this in this field for a material amount of time while no one in the US, that's normally at the forefront of innovation, and I think in your own funds you have very few companies outside of the US that you're investing in, certainly very few in the UK, because we're not normally the hotbed of innovation. Normally, somebody's done this in California successfully first. And that isn't the case in what we do. And I think one of the things that's given us this 20-plus year advantage is that Webvan blew up so spectacularly and persuaded everybody to stay out of this space.

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LB: For a lot of people in the UK, because they shop and they use Ocado retail, the online supermarket, I always feel sometimes that casts a bit of a shadow over the actual understanding of the business, its value and what it's really doing at heart. And I don't know how much you started as this is going to be an online supermarket, but today at least the business is about robotics, software, AI, how do I provide a technology platform for grocers all around the world to do something that's really challenging, complex and physical but to do it with good economics?

And certainly the way we see it is the Ocado supermarket business, it's good for validating that technology but it's a small part of the overall value. So I'd just be curious, was that part of the vision originally? And how has what you were targeting Ocado to be changed over time?

TS: It's hard to answer that question exactly because I can go back to early business plans that talked about developing it and then monetising the IP that we developed globally. At that point, the IP that we thought we were developing was how to put together third-party software, third-party automation, marketing, retailing skills and how to mix it all up in a different form of offer, as Webvan had tried to do and failed.

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Over time, we've done the most extraordinary amount of vertical integration. As you say, today we're definitely a software, AI, machine learning, robotics company, both the robots that move on the grids and move the boxes around but also the multi-axis robots that we're going to start to deploy to do things like picking tasks and stuff like that.

And when other people say we're a robotics company, that still means they buy those multi-axis robot arms and then they write the vision systems or the gripper technologies and write the control systems to use them in a certain environment to do a certain job. We are vertically integrated to the point where we have a subsidiary in Las Vegas that builds multi-axis robot arms using additive manufacturing, so 3D-printed carbon fibre, the lightest, most energy efficient and, we believe, least expensive for the accuracy and capability robot arms in the world.

And the key there is to be able to build one that is customised to its use case that might be very unique to what we want to do and how we want to do it. And everything here is around the scale of the grocery market and, therefore, the benefit of cost domination in the grocery market. Because if you can do it and you can be successful at it, you can deploy it at such enormous scale.

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And so I don't think we had a vision that we were going to be anything like as exciting or as innovative or spread our wings as far as we have done, but we definitely realised, at that point in time, that if we did do clever things, we couldn't and shouldn't sit on our beautiful little island here and deploy them in a population of 60-something million on a planet with 7 billion or 8 billion people.

LB: And is it worth talking a bit about the complexities of the task you're trying to do? Because it's much more complex than a traditional warehouse or a traditional e-commerce warehouse, because you've got 40,000 SKUs, you've got people ordering 40 items at a time, you've got three different temperature control zones, you've got an unfavourable value to weight ratio, they're perishable, they're heterogenous. It'd just be helpful taking us through... You call them CFCs, customer fulfilment centres, what does a CFC look like?

TS: And you've thrown out the items that I would have mentioned just there. An average order is about 45 items. That would include an item or two from a freezer that we need to deliver at less than minus 18 degrees C, and we store at minus 28 degrees C. It will include about 45% of it coming from a 0 to 8 degrees fridge, effectively.

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The reason, as you say, that these warehouses are more complex is that if you were in a giant Amazon warehouse that shipped 1.25 million items a day, they'll ship them maybe one, two or three in each parcel, and you can pick in any sequence that you want to.

The key to your grocery order is we've got to deliver that 45-item order and we want to hand it over to somebody at the doorstep or bring it into their kitchen for them, and therefore we need to pick our 1.25 or so million items that we might do in a single warehouse in a day in an incredibly choreographed way, where we've got a five-minute window that we want to load a customer's order onto a van, and we've got to get their four boxes with an average of 12 items from those three temperature zones at that door in that moment. So the choreography is critical.

And the next challenge that you mentioned is that whilst groceries have got a margin that is reasonable, it's probably in the middle of the range as a percentage margin in retail, somewhere between 25 and 35 points, depending on where you are, how you include, how you measure, etc., the average item price is a fraction of an alternative retailing format, so in the UK grocery market, anywhere from £1.80 to £3 or something would be different retailers' average item prices.

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And so the cash margin per item, the cash margin per litre of volume, the cash margin per kilo of weight, is extremely low compared to any other retailing type of goods, clothing or sports goods or whatever else it is. And so the amount of margin that you have to play with to store the goods, to handle the goods and then to consolidate them into these 45 orders at these multiple temperature regimes and then deliver them to the customer's house is the lowest of any industry. But the volume is vast because the cash sales in a market like the UK are approximately the same as the whole of the rest of retail put together.

And then you have another complexity which is that sometimes people in clothing say, fashion is a very difficult business because we've got three seasons or four seasons that we've got to manage, and the miniskirts that we bought for the summer, we didn't sell them all in the summer and now, in the winter, they're not going to sell. Well, come and sell bananas or tuna steaks. Because we give ourselves 24 hours from the moment a banana arrives in our warehouse. If it's not shipped, it's thrown away. So we have 365 seasons of bananas a year.

And so you add it all together and what you want to do is you want to build a warehouse that can deal in large volume, because that gives you economies of scale, particularly on the way in, so you can get direct deliveries from suppliers rather than having to go through distribution centres that add more stages, more handling, more transportation and more costs.

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You need to be able to move goods around quickly and create and consolidate these orders. And you need to do it all using the minimum amount of labour. And so when we compare what we do in one of our warehouses today to what we would see as a best-in-class globally of the people who do online grocery but utilising a store network, we estimate that they use, to our best view, about 74 minutes of human labour to receive the goods in their DC to then pick them in their DC, send them to store, to then put them on the shelf on the store, to then pick them from the shelf, consolidate them and put them in a van.

We have that down at around 15 minutes in the warehouses that we've been building in the last four, five years. And warehouse that's been commissioned in the last, say, six months, by the time that warehouse goes live, we'll have that down at sub-ten-minutes. And obviously, at some point, we want to get to almost negligible human intervention, as such.

So we've already taken out 80% of the labour that you would use doing this manually, and we want to get that into the high 90s. So it's about becoming more efficient, and that enables us to reinvest that in the delivery without charging a premium on the groceries, without charging high delivery fees, and in carrying the widest ranges to give the most choice to our customers, because

we think choice is important and we're probably two or three times the amount of grocery choice that any other supermarket has in the UK.

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LB: And I think a lot of people would probably be surprised if they saw your most recent facilities, and feel like they're almost getting their groceries from something in science fiction in terms of you've got that giant, hive structure and bots that no doubt you'd describe better than me. But also, I think it's just the progress that we've seen over the years. Because your first site was Hatfield, and if you go round that, it's conveyor belts. If you go round your latest site, it's swarming robots.

TS: Yes, and I think the swarming robots, it's quite mesmerising. It's a little bit like when you stand on the beach and you watch the waves, or you stand and watch a fire burning, and the movement mesmerises you. We can have over 1,000 robots on a grid and they're moving in the X and Y axis, and if they move parallel to each other, they are less than the width of my pinkie, 5mm or something like that, apart, and when they stop on a space, having been travelling at 4m a second, they have to stop in less than 1mm tolerance of where we want them to stop, because if one overshoot by 2mm one way and other one overshoot by 2mm the other way, we could end up with a collision.

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And just watching how closely they work and they move, you can't tell what they're doing. That's the funny thing, you just see these robots whizzing around on the top of, as you call it, this hive, which is the metal structure with the boxes and what we call peripherals, the places that we do an activity to those boxes underneath.

You can just see them all moving around, and some of them are grabbing stock from inventory and taking it to a pick-station because a customer wants that good. Some of them are then taking those boxes back and storing them. Some of them are moving those customer boxes from that pick-station after they've got all their orders there and moving them to store them temporarily and then consolidate them with other customers' and then send them out of the building.

But you can't tell. But when you watch them, it's absolutely fascinating, yes. To get them to do that, we have a proprietary communication system because Wi-Fi and 4G and anything that was industrial in the communications space was incapable of the amount of messaging to the amount of independent devices with the frequency that we wanted to do. Nobody was capable of delivering to us a system to do that.

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So we went off and worked with some scientists here in the UK and we own all the IP, and we created this communication system to allow us to communicate with the robots frequently enough to know where they all are ten times a second. And therefore, if one of them's not where it's suppose to be, to make the others react to that and it reacts to that before you might get a collision.

LB: And am I right in saying that that's the most dense communication system that's been developed anywhere in the world that's based on 4G that you've developed in-house?

TS: We believe it's the most dense wireless communication system in the world, yes. And all so that we can pick groceries cheaply, enable our clients to pick groceries cheaply, so they can deliver an outstanding customer proposition to buy groceries. But that's what you have to do to be able to achieve the end goal.

LB: There was someone, he's worked at other supermarkets in CEO positions in automation, I think he worked for you for a number of years, who, I was reading, recently described what Ocado had built and what other people might be building in the robotic warehouse space, and just said they might sometimes look similar but it's a bit like a Lamborghini might look similar to a Ford Focus in terms of some of the technology that you've put in, with Ocado obviously being the Lamborghini in this example.

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So I think it is really easy to underestimate the technological sophistication that's going into getting you a fresh bunch of bananas. And as you said, the opportunity is huge. Groceries are a large part of retail globally, and globally only 5% of groceries are sold online. I think that number is 15% still in the UK, so I think that shows the scale of the opportunity.

But you've already got 12 of the world's largest grocers signed up across four different continents. How powerful do you think the competitive advantage is that you're offering your partners, both the current and the future ones that you might sign?

TS: I think it's massive, because again it's not just these automated warehouses. What we provide to them is a cloud-based, effectively a SaaS system, for running their online grocery business, so it extends through the mobile apps, the web, the search engines, the recommendation engines, the order management, the supply chain systems as well as everything in the warehouse, the despatch stuff and the in-vehicle navigation and software for handing the goods over to the clients and stuff.

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And because we develop it all, A, it's all focused around this one industry, and, B, it's incredibly interactive as such. So if something happens in the warehouse, the instantaneous reaction on the website to not sell it to someone else is streets ahead of trying to build all this stuff out of different systems and create them and integrate them.

And people often talk about legacy systems. I think what people should talk about how is how legacy? I'm running a 20-year-old legacy system. But when they then go and replace that by buying software from three or four different vendors within an enormous amount of customisation as well as a lot of configuration in it, the new thing they run the next day is a new legacy system, it's just a legacy system that's only one day old.

And the way that we work is that everybody that's using our front end, everybody that's using our supply chain and everybody that's using the warehouse software is running the same software. Everybody's in the same live version, and the version is updating.

And when we've signed on a new retailer as a client, and if, in their market, either because of their customer practice or because of their competition or because of their regulatory environment or whatever it might be, there's something that we don't have that they really want, we build it into the platform. Everybody has the advantage of using it.

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And so, A, everybody's software is just constantly getting new features that they didn't ask for because somebody else did ask for them. That's very powerful. B, there's something very powerful in these multiple retailers running slightly similar, they're all slightly different but very similar, businesses using this platform, because we can provide a lot of comparison data to see how they're performing.

So we've got 19 of these warehouses live at the moment, whereas if you're a retailer in a country and you'd built just one, you wouldn't know whether you were really doing well in it or not, because against what benchmark? And so the difference here is we can look and say this warehouse in Purfleet, they achieved this in outbound or in inbound in a certain area.

We can take into account differences in consumer behaviour, like in the United States more of the basket is frozen than it is in the UK, we can adjust for that and say your warehouse is performing at only 70% of this one, and the difference is, in this area. And therefore everybody wants to run one that's in the top quartile, and so we're creating this club and this network between our clients where everybody wants to improve what they're doing to be in the top quartile, which will help all of them to drive up their overall efficiency.

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The scale of what we're doing also means that it justifies the investment that we make. As you know with tech, the biggest cost is in creating the software, and so we can create more reliable software, we can create more higher functionality software, because we're deploying this across 12, and hopefully more, retailers, that are large retailers in large markets, and at scale, and therefore we can justify an investment in software or robotics that no individual retailer could justify on their own. And that, of course, is just a virtuous cycle.

LB: And I suppose the other key point of it as well is that because it's based on robotics, AI and software, it keeps getting better, cheaper potentially and better, or some combination of that. And certainly, we've talked to different technology companies, I won't name them, that have looked at the Ocado software, looked at the platform, they've said, we looked three years ago and we thought it was interesting, doesn't make sense for the labour economics in our market, but then we looked at it a year ago and it had got better, and we're going to look at it again in three years because we're quite confident it'll be better then.

And at some point, it's going to make sense in terms of our economics because it keeps improving. How much further do you think you can go in terms of improving that offer? Is there a risk that the improvements at this point plateau? Or do you still see them as not low-hanging fruit but the ability to improve from here?

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TS: I think there are two main cost parts of the business. One is in the warehouses, and we're doing a phenomenal job as part of Re:Imagined and beyond in saying how can we get the same volume out of smaller buildings or more volume out of the same size building, so how do we make the client-side building cost per order lower? And we've taken out over 20% of the size of a building.

So if you asked us to build a building now versus a year ago, to do a certain volume, we would now ask you to find a space that's 20% less. So you've got 20% less rent, presumably, rates, your utility bills will be lower. And I don't know how much further we can go, but we'll keep trying to do that.

And then there's how much effort has to go into producing this 45, or whatever the size is, order. And as I said, that's where we've gone from 74 minutes in the manual version to 15 in the version we have today, to just less than 10 in the version we're selling now. Do I believe we'll go to 5 and below? Yes, we will. It's only a matter of time and focus and effort. So there's a lot of scope there.

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Then, there's the delivery side where we're doing some other clever things that are largely, at the moment, around improving the customer proposition. More immediacy, more same-day, the ability to add items at a later date to an order that's arriving later today or tomorrow or whatever it is.

Taking the human effort out of that obviously is a much bigger step, so you're then into autonomous vehicles. Autonomous vehicles ought to come to the grocery market for these deliveries before we actually can get in a taxi that hasn't got a driver in it.

Two reasons for that. One is that you can speed-restrict the vehicle that's delivering your groceries and the groceries aren't getting frustrated. And secondly, the autonomous car dilemma of I have an old passenger in the back of the car and I have a little kid who runs out with the ball, and software says, in a matter of milliseconds, one of them's got to die and the software has to decide who, is incredibly difficult, it's the big dilemma of the industry.

LB: The 'trolley dilemma' I think they call it, in philosophy.

TS: Is it? Okay. But here it's a really easy one because I'm just going to drive the customer's shopping into the wall and kill it and little Johnny can safely get his ball and go back to the sidewalk kind of thing. That would be a very big step in the cost structure of groceries delivered to your home. I think it will come but I don't know when. The automation of the warehouses is a bit more of a linear, kind of, we can keep making improvements. The delivery side is a bigger leap to get to the first step.

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LB: And the key of having so many options of the things you could go into, it's an output of what you've built, what you've created and what the innovative culture of Ocado has created. How have you been able to maintain that innovative culture as you grow? Because it's one of the things that's always struck me. I remember, seven years ago, going to an Ocado event for suppliers, and you had Paul Clark as CTO talking about the tsunamis of technology that would change the landscape, big data, IoT, AI.

So you've been working on a lot of the things that have become buzzwords before they were the buzzwords, but how have you been able to foster that sort of culture and continually-improving ability?

TS: I think it's a few things. The first one is we love innovation and we are never satisfied. We set ourselves a goal to get to 100, and we're at 20. When we get to 80, we don't start to plan the celebration party for when we hit 100, we move the target. And as we've learned what it takes to get there, we've probably got a few ideas that take us to 120, so let's set a target to go to 120 or 140 or 160.

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We've also got ourselves much more comfortable, I think, than most corporates do in terms of risk taking. We're very supportive of our teams experimenting and sometimes we acknowledge that they won't always succeed and that they will sometimes fail, but they will just keep trying and we'll move on. I think we're good at that.

I think we've been good at deciding where to place bets. There aren't a lot of things that we spent money on and we did succeed but actually the thing was useless. And so I think it is a culture and it is something that we've built up over a number of years, and it's something that we work very hard on maintaining.

LB: What are lessons or things that you've found out along the way of the 20-year journey that, as you look back, you go... Is there a key thing that you wish you'd known at the outset that would have helped you?

TS: Lawrence, I think if we'd been much smarter at the outset and we'd realised how complex and difficult this was, we probably wouldn't have started it. People often say what was the skill that enabled you to start your business, and I sometimes say naivety. But at the same time, I guess persistence and thick-skinned and a never-give-up type attitude is what's enabled us to then take that very difficult reality and continue trying to create a great business to come out the other side.

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We've learnt so many lessons along the way, it'd be hard to say there's one lesson. We learnt that what was available in the software industry was far more limited than we expected and didn't suit grocery. That was something we didn't expect when we went into it. Grocery is very, very high-volume, very transactional, and a lot of the stuff that had been built to do ecommerce was really focused around non-grocery, and when you tried to put grocery volumes through it, it just didn't work. And so we realised that we needed to create our own.

If I look back at most of the decisions we've made, most of them are good decisions. I just sometimes wish we'd make them a bit quicker. The key stuff is we never want to be arrogant, we never want to be complacent. We always need to believe that we can do better. And we never want to believe that we only want to do better than the next person. We actually want to do the best that's possible. We're not judging ourselves, if someone else is at 100, we're at 110, we're fine. We're trying to get to 1,000.

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LB: You say each CFC you set up it requires upfront capital that will pay out cash eventually in a very different financial much better financial profile than what you'd get from a physical supermarket. But that that takes time. But as we think

out to the future, you said earlier, you've got 19, CFCs that are live today, those fulfilment warehouse centres, you've got 64 committed worldwide. How do you think about how big that could be in the very long term? If we were coming back and doing another podcast in 10 years from now?

TS: I mean, if we get this right, which is absolutely what we're trying to do, then, you know, the numbers should be hundreds, because I think the average of the ones that we've either built already or clients have committed to doing with us. They are kind of 400, 500 million pounds of capacity run rate capacity.

The global grocery market is, you know, is trillions of dollars. It's 190, or 90 something billion pounds just in the UK. So when you say well, okay, but what if 20% of it goes online. And why would we actually believe that only 20% ultimately goes online because ultimately, if online is the cheapest way of distributing groceries, then kind of three quarters of it that's in the developed and developing world, and now you're talking about a couple of trillion. And then if people using our platform took a quarter market share, you'd be talking about half a trillion. And so you're talking about 1000 sheds, then.

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Now, is that what we're trying to do? Or are we trying to get the 64 done and maybe double it to 128? That's the big question, if you see what I mean, and that kind of informed some of the investment decisions around, I'm trying to automate a process, and I can automate it at what capital cost, or at what operating costs, where am I trying to get to? Because if I can get over a tipping point that makes this the method that uses the least property and capital, the least people, the least energy and the least food waste, then this should become the majority distribution, as opposed to something that is a niche for people who are happy to pay a delivery fee and don't want to go to a supermarket. That in itself is an interesting opportunity globally. But can we take it to the next level where actually it's a cheaper way of distributing groceries and hypermarket. That's really what we want to achieve. But we want to make sure that if we don't quite get there, and we say we think we will get there and we are getting there, but if it is a 10 or 20% market share globally, that that still becomes a very big and successful business.

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LB: The final question we ask is what does the world look like if Ocado succeeds?

TS: I'd like to think that Ocado could succeed in helping this industry to be better. What does better look like? Better looks like more productive. And if you think about the labour challenges in the developed markets today, it's quite clear that it needs to become more productive over time. People want to do different things with their time, and so we need to become more productive.

It looks like better service, better choice, better range, better freshness, better usability. Just basically easier, less time invested by the end customers themselves. Delivering them healthier, fresher, more choice, etc. It looks like something that is better for the environment, that uses less buildings, less energy, less CO₂, less plastics, etc.

And so if we can help the global industry to use less property and capital, to use less space, to use less environmental impact, to use less people and to generate less food waste, both us as the retailer... Ocado UK has the lowest food waste in the global food industry as a percentage of sales.

But if we can help the global industry to save food and we can help our clients' customers to lower their own food waste with some of the innovative things we do in terms of guaranteeing life in the customer's fridge and showing their receipts ordered by life and stuff like that, then we can help the industry to become much, much, much more efficient.

It's an industry that's measured in the trillions, and it's an industry that spends probably about a third of its sales on handling and distributing its products. And so there are hundreds of billions of dollars a year of efficiencies that could come out to benefit consumers and communities.

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And we can't see anyone anywhere in the world that has had the experience, had done the amount of experimentation or has anything close to the suite of solutions and products that we have that can help someone in our industry to be a world leader.

LB: Great, that's fantastic. I'm conscious, as ever, of your time, Tim, but it's been really great. I think one of the things that it always inspires me to do, after we've been talking, is to go onto YouTube and look up the videos of those hives, to see those robots, just to remind yourself how advanced this is and how far it's come. But really, really appreciate your time.

TS: Thanks very much for inviting me.

LB: And at the bottom of the episode description, we have a link to the Ocado customer fulfilment centres where you can see one of the latest videos of the robotic hives in action.

CS: So, Lawrence, I think at the end of series one of this podcast, if we have an award for best use of analogies, I think Tim Steiner might win it with comparing miniskirts to bananas. He's definitely a visual thinker in how he communicates, it's safe to say.

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LB: Yes, you would have thought more engineer than Goldman Sachs bond trader, but I think, in some ways, that probably links to what he was saying about it being an incredibly hard project that he's been the founder and CEO of, and the need to vertically integrate.

And because they're doing something that no one else is really doing, how do you make these bots move, how do you make them move around, how do you build the structure that they travel along? And obviously some of that's innate, but he's been building a very, very physical project over these years.

And I think as I said at the beginning, whenever I talk to him it's like he's got the hive in his head. And when we do investment meetings with him, I'm desperately trying to scribble down what he's saying because he's taking you, step by step, how it actually works at each bit, with really dense knowledge, some of which I think our audience probably got a flavour of.

CS: I know, and he used this phrase about the choreography, he articulated it so eloquently in terms of all the different components working in sync together. And when we're thinking about the opportunity, I think it was incredibly apparent the technological edge that Ocado have, but there's also another, I guess, competitive advantage that came through, for me, in the podcast.

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By having all these international partners, they're essentially pooling the R&D budgets of some of the biggest grocery companies in the world, and that's enabling this scale of investment that few others can match. How do you think about that competitive advantage in terms of how far ahead they are of the competition?

LB: I think it is quite strong. And there's the scale aspect of those 12 players, and I think there's also what Tim rightly mentioned – 'we're also learning from our 12 partners and what they're encountering'. And so you're learning on steroids, effectively, versus anyone doing this on their own.

I think that scale and those accumulated learnings gives them the ability not just to have a bit of clear water versus anyone else, but also to be moving faster than others can move. And that's, I think, both really interesting and really important.

I think we should, much as Tim was saying, never be completely complacent. This is also a technology business, you have the ability for things to come out of leftfield, new and different ways of doing this, and I think they have some of their own challenges as well, in terms of, if people want to have small order sizes, so it's not just that big weekly shop, I want five or ten items on the Tuesday evening and then another 10, 15 times on the Thursday, that hurts the economics, because big baskets for the automation is what works best.

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So I think there's that permanent need to adapt, and what you'll probably see, within grocery, is you'll see a range of different use cases. We invest in Scottish Mortgage in Nuro, for example, autonomous delivery, so you might have those coming round and doing some of the work of the immediacy. Obviously, Ocado would say that they're working on their own immediacy offering, but you don't have to do everything.

And I think it goes back to grocery is a multi-trillion-dollar market, if they get a relatively small slice of that, that will be hugely meaningful, but we shouldn't assume that there's only one model that works. And I think Ocado, again, they know that they're coming out with their Zoom facilities, their smaller facilities to address immediacy as well.

CS: And then thinking about the competition maybe from a slightly different angle, Lawrence, what I was thinking about during the podcast was is the competition more indirect for Ocado?

And what I mean by that is the meal kit delivery companies that we have now, restaurant deliveries are getting faster and cheaper, these alternative models of food consumption which are, I guess, competing for yours and my food spend, are they reducing the weekly grocery basket size? Does that affect Ocado? Is that where the real competition lies for Ocado?

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LB: A lot of what you mentioned, also, ironically, we're invested in in Scottish Mortgage, so Delivery Hero in terms of if you want restaurant food delivered, and the more that that happens, the less you're going to be spending on groceries, that's totally correct. If you're ordering meal kits with HelloFresh, then you're either not using, or using less, Ocado or Morrisons. So those are both challenges to what that total TAM is, but I'd probably make a couple of points, and it's the ones we thought through in our research process.

The first is to make sure we see the wood for the trees. This is a multi-trillion-dollar market, grocery is a huge retail category, there is enough room there for all of those companies to be successful. And to give context, we're at 5% global online grocery penetration, we're at 15% in the UK. And as Tim was quite rightly saying, why shouldn't that be 50%, why should that be 70%? Who's going to go, I desperately want to go round a shop and spend my time picking out my own groceries, particularly if they can do that fresher?

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So I think one is just the sheer scale of the market, but again I think it matters for the economics, and it does make it more challenging if people have smaller

basket sizes. How do you deal with that? If you're Ocado, you're also not standing still, your technology is permanently improving, and so I think that helps offset some of those economic benefits.

And maybe you could do something where you encourage people's habits, saying we'll offer you a small discount or a better delivery time if you're willing to do a larger order. So I think there are lots of different dynamics you can do. It's something that we know we need to monitor in the long run, it's not something that really keeps us up tonight.

CS: And then, Lawrence, just a final question from me, I know you've covered Ocado for a long time, you've known Tim for a long time, you've probably written countless research notes on Ocado, so the question I have for you is did you know that Ocado was named after an avocado?

LB: I'll give you the straightforward... I had a suspicion, but I certainly didn't know the background that Tim very candidly gave of them coming up with that. So that was a new one. I was tempted to ask, were there other fruits or vegetable or legumes in the running, but I think we've got a good story behind that one.

CS: A huge thank you to our guest today, Tim Steiner from Ocado, as well as to our investment manager, Lawrence Burns. In the next episode, we will be talking to Chris Gibson who's the co-founder and CEO of Recursion Pharmaceuticals, a company using machine learning to revolutionise the pharma industry by developing a faster, cheaper and more successful approach to drug discovery.

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