3M Transcript for the following interview: Episode 92 Local exhaust Ventilation - Part 1

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Welcome to the 3M Science of Safety podcast presented by 3M Australia and New Zealand Personal Safety Division. This is a podcast that is curious about the science and systems of all things work, health and safety, that keep workers safe and protect their health. I am Mark Reggers, an occupational hygienist, who likes to ask the questions Why, How, and Please Explain. Whether you are a safety professional, occupational hygienist, or someone with any level of WHS responsibility in the workplace, maybe you are a user of safety equipment or maybe you are a bit of a safety nerd who finds this stuff really interesting, then this is a podcast for you.

(R) Today, we're talking with Adrian Sims from Vent-Tech from the UK. Welcome Adrian.

(S) Thank you, Mark.

(R) Now, we're going to be talking about local exhaust ventilation systems. We're going to do two parts because there's a lot to unpack here, but first of all, can you please introduce yourself? Who are you, where are you from and what do you do?

(S) So, I'm Adrian Sims. I'm a Director of Vent-Tech. We design, test, install, commission LEV systems predominantly in the UK, but also Ireland, and we're doing more and more training on LEV, teaching people, spreading the good word to try and raise the standards not just in the UK but around

the world. As part of that role, I'm vice chair of the Institute of LEV Engineers. I'm an active member of the British Occupational Hygiene Society to try and promote good practice and develop LEV so it's done right, done properly as we say.

(R) I know when I did my uni course, we learnt a little bit about ventilation, but there's so much to it and it's such an important part of the hierarchy of control. But there's a lot here to unpack, which is why I wanted to get you in and have a really good chat.

(S) That's why I'm here.

(R) So, let's start off; what is a local exhaust ventilation system and what makes up an LEV, which is the acronym for local exhaust ventilation.

(S) Yes, it is. It's made of several components. You've got the hood. The hood's the most important part of the system. If you think about it, the hood interacts with the hazardous substance, the operator and how the operator uses it and it connects onto the ducting.

It's the entry to the system for want of a better word. So, everything has to go through the hood if it's going to work correctly. From the hood, we have the ducting. Now, the ducting is sized based on the hood size and shape and the velocity of the air going through the hood. So, your ducting is going to be sized depending on the hood. The ducting's generally round. You can get square ducting. We tend not to use square ducting because the dust will gather in the corners and also because of the negative pressures we use. Square ducting bends in. It will bow in at the sides. So, round ducting is more common and also, it's readily available. From the ducting, we go through to a filter or some sort of an air cleaner to take the contaminant out of the air, and then from there, to a fan. And then the fan will blow the air to the discharge point which has to be to a safe place, usually outside, usually above the building.

(R) So, we've got the hood, the ducting, the filter, the air cleaner, a fan to move the air and a discharge point somewhere in a safe location. They're all the elements.

(S) That's correct.

(R) Now, do you find workplaces sometimes jump straight to LEV rather than maybe considering other higher order controls that we talk about in the hierarchy of controls all the time?

(S) Yes.

(R) Is that something you commonly see?

(S) All the time. We sell LEV systems and we go to places where they need LEV systems, but we're always looking at processes and problems with the hierarchy of control in mind and a lot of the time, people can improve their exposures by changing slightly the work process, how they do things, what they do, what they're using. There's a lot to be learnt from other industries who think they operate in completely different realms. So, if we take a bakery and a cement works, completely different industries. You won't get a baker going around a cement works and vice versa, but they do the same thing. They rip and tip bags of powder.

(R) So, if locally there was ventilation maybe suitable, what advice would you give workplaces to assess or determine if that may be practical for them?

(S) You've got to look at the application and the process. What is going on? We have to understand the process in detail. There's always an engineering control you can do and the engineering control should have an effect. It's not always the complete solution. You may need other controls to improve the position that the engineering control gets you into. So, you may not do away with respiratory protection altogether, but you may use lower grade masks in the future.

(S) What we like to do is be able to ensure that if you do put engineering controls in, we can tell you from the outset if your exposure levels are at a certain level, that we can bring that down to a level by putting in our controls. And if we can use the right controls, a lot of the time, we can give you an environment where you won't need respiratory protective equipment.

(R) It means as a workplace, you need to look at the airborne contaminants. It doesn't matter if it's gas or vapour. How the contaminant moves, is that the kinds of things that go into that assessment?

(S) Exactly. How does a contaminant behave and also importantly, how does the operator behave? What is the operator doing?

(R) That's the biggest variable of all, the worker.

(S) It is, yeah, and there we say wherever you put people into the equation, you tend to have a problem, because people are unpredictable. So, we have to try and understand what are they going to do and how they're going to do it. But we also have a responsibility to educate them on the importance of these systems. These solutions are there to protect them and their colleagues and it also ensures that they go home safe to their families. And if they don't do it, then there could be problems down the line.

(R) I know when I used to go out and do assessments and go to workplaces that had an LEV system, but it wouldn't be on, or they're standing three, five feet away from it, and that's probably a common thing. Someone's invested a good amount of money to have this control, but it's not actually doing anything.

(S) We see it all the time. People turn it off because it's noisy. They can't hear the radio. They won't use it because they can't speak to their colleagues. Been there, seen it all. It's important when you're looking at LEV … and any control solution … to involve the operators at the early design stage.

(R) Of course, consultation at its heart. It's core.

(S) Get them to buy into it because if they don't buy into it, they won't use it. It's human nature, so we have to do that. That body of work early on in the development of the control solution is vital. We've been to places where management will just enforce things onto people and a lot of people don't like change.

(R) All people don't like change, you could say, human nature for most of it.

(S) Yeah, it is, and when it's enforced on people, people don't respond well.

(R) So, we use this term 'local exhaust ventilation', LEV. Are there different classes of LEV or is it one type that we're referring to?

(S) So, there's different types. The keyword in what we just said is the local aspect of it. We want to capture the emissions given off by the process at the source. If we let it get into the air, it's very difficult to control. You end up having to move much more airflow; bigger fans, bigger ducting, costs more to install, costs more to run. People don't like that, so the closer we can get to the source, the better. Control it at the source, so local is vital. There are different types of extraction. You have different types of hood which offer different levels of control. Your typical moveable capture hood, this is your welding arm, typically …

(R) You position where you're welding or as you're moving along.

(S) That's it. Yeah, people call them angle poised hoods or elephant trunks.

(R) Elephant trunks; I like that, yes.

(S) They're not great. We see them out there. We see them installed. People install them, but they give you what's called a reduction factor by how much they will reduce the hazardous substance. Typically, when it's all working well, around a factor of 10. Now, when you're looking at certain substances, these things are carcinogens, very dangerous. No one gets cured from breathing some of this stuff in.

(R) It's called irreversible lung disease for a reason, because it's irreversible.

(S) Exactly yeah, and a factor of 10 is not good enough. There are other options; small enclosures, downflow benches, partial enclosures which give a much higher reduction factor, in the realms of hundreds, 200, even up to 500. And what we are finding as a business, as an industry, we're moving away from the moveable hoods because the reduction factor just isn't good enough. As my business, over the last 10, 15, nearly 20 years, we sell more and more partial enclosures. It may start off looking like a capture hood, but by the time we start asking the end user, "Can we put some sides on it, can we

put a roof on it?" they eventually come around to becoming a partial enclosure. Now, the beauty of a partial enclosure; if you have any draughts, any other sorts of air movement.

(R) Crossflows, roller doors open, yeah.

(S) Yeah, even people moving around all causes disturbance in the airflow and when you're looking at capture velocities for things like welding fume at half a metre a second, you can barely feel that on your hand. So, if you've got a nice breeze coming in from the roller door, it will blow the fumes around the workshop. It disperses it and then potentially everyone gets exposed to it.

(R) Those secondary exposures. We're trying to avoid primary exposures as well as secondary exposures of course.

(S) Exactly. Completely innocent people who aren't aware of the safety concerns around these things.

(R) Can you get enclosures that people can walk into?

(S) Yeah, so you get full enclosures; typically, a spray booth. On those hoods, we're not trying to protect the operator as such there. The operator who goes into that environment will have suitable RPE to protect them. But what the enclosure is doing is stopping the spread of the contaminant to other areas. So, that room, that enclosed space, will be under a negative pressure. Airflow will go into the room so if you open the door, the air should go in, suck inwards. And that stops the spread of the contaminant into other offices or other local areas where people can get exposed.

(R) So, it's not a one size fits all, and in the same workplace, you could be doing different processes with different sized particles that are being generated.

(S) Yeah.

(R) How do you figure out what's what when you look at these different types of LEV systems? You mentioned velocity and flow. Can you explain what that is and how important that is in achieving the reductions of exposure.

(S) It's crucial. When we're designing LEV systems, we need to look at again what is the process. People say, "We're welding." Okay, what are you welding? What type of welding? If it's stick welding, well how big a stick are you using? How much fume are you generating because there can be big differences. Obviously, if you're at the low end of that range, you need less airflow and if you're at the high end, what material are you welding? If the material you're working on is oily, if it's not particularly pure steel, you're going to have a lot more smoke coming off it, a lot more fume coming off it. So, we need to understand that process in detail. We do what's called a benchmarking, so we can look at the substances you're dealing with and how hazardous are they. That can then be related to how much airflow we need to bring in to control that. If your listeners are familiar with the HSE website in the UK, they have a document called HSG258. It's free to download.

(S) Towards the back of it, there's actually a benchmarking section where you can go through the processes and actually from understanding what your hazardous substance is, how much you're exposed to without any engineering controls in place. It will then give you a reduction factor of what you need to do to achieve control to the safe level.

(R) It sounds very similar to when we talk about respirator protection factors and obviously the higher exposure, the greater the reduction required. And as a workplace, the reliability and repeatability and confidence of the reduction in exposure as well.

(S) Yes.

(R) Do you go out to workplaces and look at the processes of what they're doing to look at where hoods need to go and where people are standing?

(S) All the time, yeah.

(R) Because that's a key critical thing.

(S) We don't always go out. With modern technology, we're trying to be greener as we all are to save the planet. So, we ask a lot of people to send in photos or videos. We all walk around with these cameras in our pockets.

(R) For better or for worse.

(S) So, but now, we can have the conversation. I even get guys send me video, Facetime me and say, "Look, I'm stood in front of this booth. What do you think it is?" They'll turn the phone around and I'll go, "Left a bit, right a bit, up," and they give me the video. It comes through. I can screenshot it. I can snapshot it. I don't have to be there to see these things nowadays.

(R) The beauty of technology helping workers.

(S) Exactly, and we've got to use it. Across industry, we have to use what's available to us.

(R) So, you mentioned at the start hoods are one of the most important parts of an LEV system.

(S) Yeah.

(R) So, the different types of hoods that people should be aware of?

(S) So, the capture hood as I said the most common. We then look at partial enclosures, small enclosures. Now, small enclosures aren't so great. They're better than a capture hood, but there's a risk with a small enclosure that the slightest bit of turbulence will cause the contaminant to come out of the hood. So, we prefer bigger enclosures where you can get your forearms into it and you can actually do the task without disturbing too much of the airflow. We really like downflow. Downflow is like a perforated table which sits below the hazardous substance, below the process, and it will pull air down away from the breathing, because that's what we're trying to protect at the end of the day.

(R) No point having a ventilation hood behind the worker and your drawing the contaminant past the breathing zone. That's not a good setup.

(S) Unfortunately, we see far too much of that and in the welding industry in particularly, because the welding industry can fabricate things themselves, they will fabricate canopy hoods, so these hoods which sit above the workpiece and it makes sense because the fume rises up into the hood and the hood takes it away. But the welder will lean over the work. It's human nature. It's the ergonomics of what we do and this is where bringing people into it causes a bit of an issue. When you lean over into that plume, you're going to expose yourself to the substance, so we really don't like canopy hoods where people can lean underneath them.

(R) It can actually increase their exposures, which is the opposite of what we're trying to do.

(S) Exactly, and if they take that canopy hood and drop it down so it's on its side, then you get what's called side draught. That works really well. Same thing. Same principles, but it just draws the air across the torso from left to right and it will take the fumes away without giving them the exposure. So, side draught works well. Downflow we like because it pulls it down away from the breathing zone and what we tend to find then if we do downflow, we can put sides on it, because it's like a bench size. Once you put sides on it, you can then go a step further and go, "Why don't we put a roof on it?" As soon as you've done that, you've got yourself a partial enclosure. Like I said earlier, we keep ending up going back to partial enclosures. Everything becomes a partial enclosure, the reason being, the more you can contain something, so the more sides on it, the more you can enclose it, the better control you have. So, more containment, better control.

(R) What is push-pull ventilation?

(S) Push-pull has its usage or it must come with a health warning. The idea of push-pull is if you've got a wide space you're trying to control a substance into, a lot of the time, push-pull would be used on an open surface tank containing acids or something like that. So, the fumes will evaporate off and you can suck from one side and that will have a control zone of probably up to 600 millimetres. So, you could put extraction down both sides if your tank was up to 1,200 millimetres wide. But if your tanks are wider than that and they are in big industry, the suction down both sides won't give you enough coverage to cover the whole tank. So, what you can do, you can blow the air across on one side and then you can suck it on the other side, so you push, and then pull.

(R) That makes sense with what it's called.

(S) You'll end up with a pipe with a series of very small holes blowing across, or six mm diameter holes blowing the air across. That will then entrain the fumes coming off the tank and then it gets captured on the far side.

(R) Directly into an area that can be sucked, essentially.

(S) Exactly, you're blowing it into the capture hood and the problem comes when you lower the workpiece into the tank. When you do that, the air you're blowing hits the workpiece and then disperses around the workshop and then the other side of the workpiece, you have no suction. So, you have this dead space which can then really fume. So, push-pull, whilst it's out there and we do see it on older systems, it needs to come with a bit of health warning. What we are seeing is a lot of push-pull in the welding industry. There's a lot of myths in the welding industry. People say the fumes rise up, and they do because they're hot and they're buoyant and you see the blue haze up in the ceiling.

(R) Even when they've finished welding, you still see it floating throughout the workshop.

(S) Yeah, but you've got to ask yourself what is that fume? It's a metallic dust and whilst it's warm and it's hot, it will rise, but when it cools, it will come back down. So, you'll get push-pull systems installed either side of a workshop at high level, one blowing and the other side of the workshop sucking. And the idea is you blow the fumes across from one side to the next and then it takes it away. The trouble with this blowing is difficult. You start to lose control when you blow. If you put some flour dust in your hand and you blow it, what does it do? Does it travel in a straight line or does it disperse into a cloud?

(R) That's what a cloud is. It goes in all directions.

(S) Exactly, so as soon as you blow, you can potentially lose control unless you've got something very close to suck, and it has to suck very hard. You're not going to get that in these types of applications. So, what your push-pull in the welding situation will be doing, it will be giving what's called dilution ventilation. So, it will capture some of the fume …

(S) But dilution takes time and when you start looking at the curves for dilution, you'll never ever get to zero. Again, I'm talking about things like welding fume. It's a carcinogen. It's dangerous stuff.

(R) It's like any system with the hood. There's limitations and advantages and it's understanding what they are and what's suitable. There's all kinds of controls, not just ventilation, but understanding that is just so critical than the one size fits all, out of the box solution is going to be perfect for everyone, which is not going to be the case.

(S) Exactly, and we need people who are responsible for putting these systems in to do their homework, to understand, "What are we buying here?" Yes, this has some benefits, but it has some negatives as well and as long as you're happy with those negatives and you're aware of those negatives … because you can do stuff about it. It may not be your sole source of controls. There may be other areas of control as well. You have to be aware and a lot of the time, I've always advised people to get that independent advice if they can.

(R) So, capture velocity; what is that?

(S) So, capture velocity; if you want to suck something into a hood, you need to get some airflow around it. Depending on the processes, if they're quite energetic or quite violent, you need more energy. So, the example of welding fume; welding fumes are a relatively gentle process. The smoke is going to rise up. It's warm. It's buoyant. It doesn't take an awful lot of velocity to pull that in. So, there's a range published of half a metre a second to one metre a second. Now, when you think about it, half a metre a second, that's a draught. The human skin can feel half a metre a second. It can't feel anything below that, so this is the limitations of what we can feel on our skin. One metre a second; well, that's twice as much. That's double, so that's quite a big range. So, what should we be using? Personally, I think for welding fume a capture velocity of one metre a second. Now, that one metre a second has to be not at the source of where the welding is but the point furthest away from the hood where the contaminant may exist. So, welding fume, it doesn't just rise up in a single wisp of smoke. It plumes out.

(R) So, it's the V; as it gets higher up, it spreads.

(S) Yeah, and this happens with all fumes. If you have a pan of boiling water on the stove, you'll see the steam come off it and it will billow out as it goes up. Where the furthest point of that steam is going to be your capture velocity. And that has to be enough airflow to draw that contaminant into the hood against all the other forces acting on it and if you think about what's happening, it's trying to rise up because it's hot so you've got the buoyancy effect. You've got draughts in the rooms from people moving, doors and windows and forklift trucks driving past and whatever else. So, it's the amount you need to suck to pull that in and it's quite a high rate. It's quite a lot.

(R) The bigger of what you're trying to capture … you mentioned wood dust before. You've got shavings versus the fine dust.

(S) Yeah.

(R) Obviously, wood shavings are much bigger, so …

(S) Exactly. They've got more energy through them and you've really got to … it's almost impossible to suck a curly wood shaving into the hood once it's gone outside that control zone. The big one in the industry is grinding and a lot of fabrication shops where you're welding, you're going to be grinding as well, in preparation or cleaning up the weld.

(R) It goes hand in hand.

(S) It really does, so when you're looking at capture velocities, so for welding fumes we say 0.5, ideally one metre a second. For grinding, you're looking at a minimum of 2.5, probably nearer 10, and the guidance says a number greater than 10. It's a huge number. On your typical capture hood, 10 metres a second at the capture point is vast when it gets to the hood because with all these things, the further away you move from the hood, the lower the velocity becomes, so if you want one metre a second at a point away from the hood, at the actual face of the hood, that's going to be something like 10 metres a second. So, if you need 10 at the source, at the hood itself, you're probably looking at numbers like 100 metres a second plus.

(R) It's a wind tunnel type amount.

(S) Exactly. Well, it will collapse the ducting, the suction, the negative pressure. It will be such that the flexible ducting will collapse and even possibly the galvanised steel ducting will collapse. So, it has other issues and that's when we see these flexible arm capture hood on grinding dust. That's just not right. It's just not going to work.

(R) That leads onto my next question; what are some of the common things you see in your travel, not to call people out, but what are those common things people think they're achieving something but not, that our listeners can probably take something away from little things, and look at what they're doing in their workplace?

(S) Well, we have a bit of a saying and people who have met me would've heard me say it; we quite often see people buy things off the internet or unfortunately, are sold things from a catalogue. Install it, turn it on, it moves the airflow, it maybe fine. And our engineers will go in and test it and they'll say, "That's the wrong type of hood for the application," or it's not being used quite right.

(R) Position, hood type.

(S) Positioning, yeah and the guys will go, "It sucks," and they'll get a piece of paper and they put the piece of paper over the end of the hood and it'll hold the paper there. It doesn't take an awful lot of airflow to hold a piece of paper to a hood. And they go, "Look, it sucks," and you go, "Yeah, it sucks all right." A bit of an in-joke. But unfortunately, we see an awful lot of that.

(R) Is that with smoke tubes?

(S) Yeah.

(R) I used to use a smoke tube as a really quick visual indicator as a hygienist or a safety professional just to … an easy subjective test to see what may be happening.

(S) It is. We like numbers. As engineers, we like numbers. We find purity in numbers.

(R) And hygienists do as well, no question about that.

(S) Yeah, but we've got to remember who's our audience, who are we working for here? Smoke is a great indicator of what is happening with the air. How is the air moving? How is it behaving? What other factors are affecting the airflow? You'll see if there's any draughts or any other cross currents, but it's also good to be able to show the end users, because they're the ones who need to know how to use this. They need to understand what's going on. So, if you can release the smoke, they will see the airflow patterns. You can take pictures of it, and video …

(R) Training, yeah.

(S) Exactly, yeah. I don't know how you'd test an LEV system without smoke.

(R) Anything that's just an easy visual tool.

(S) Exactly and the same's true for dust lamps. We're talking about smoke. Smoke's good for fumes and stuff like that. If we're looking at grinding and dust, you want to start using dust lamps and a dust lamp is just a high-powered torch at the end of the day, but again, you can get some really good effects if you set them up right. Again, there's free information on the internet or the HSE site where you can see how a dust lamp arrangement is set up. Dead simple to do. Not particularly an expensive bit of kit to buy; probably 20 Australian dollars will get you a decent torch that's good enough to do a dust lamp check and you will see the dust particles in the air. Now, it's not going to tell you how much dust in the air. That's best for the hygienist to deal with. But it will show you the movement of the dust cloud and the density of the dust cloud. And what you're going to be looking for is that dust is moving away from the breathing zone and it's going ideally into the hood.

(R) I know quite often for training when I talk about respirators and the dust that you can't see, just think about that sunny day, it coming through your lounge room window, and that's a dust lamp, a natural dust lamp. So, you're trying to show those particles of dust floating in the air and that they are moving to where you hopefully want them to.

(S) Exactly, yeah.

(R) So, to sum up the chat that we've had this morning, what would you want to leave with our listeners today as far as just a couple of takeaway points?

(S) So, when you're looking at systems, if you're out testing systems, you've got to look at it and see what you see. We get a lot of people who go and test systems, dive straight in, and start looking for numbers, start taking velocity readings and pressure readings and stuff like that. Take your time. Don't rush into it. Step back. Just observe. Watch the operator. Watch what they do. Speak to them. "Is this how you do this? How do you do that? What do you do there? How do you do this?" Understand their role and a lot of the time, they're more than happy to talk to you.

(R) They're invested in protecting their own health, for most of them.

(S) Exactly and you get them engaged and a lot of people like talking about their jobs and telling people what they do for their jobs. So, there's lot of value to be had there. Spend five minutes understanding that. Walk through the system. Look at the system. If you see things that don't look right, they're probably not right. If you see a dent in the ducting, if you see something missing, if you see holes where there should be bolts, you go, "Well, why is that?" Question that. If you see what looks like scorch marks coming out of filter plants, it's probably a dust leak. If you can see fine layers of dust around the factory, well why is that there? If you get dust on high ledges, how does it get there? If it gets up to a high level, it's because it's in the air. It's in the air so we can breathe it in. If that's the case, you've got to ask the question do we have adequate control? So, just observe. Don't go rushing in taking numbers. See what you've got there. Do some observations. Do your smoke test. Do your dust lamp … if everything looks fine, and everything looks good, then go and do your numbers. But just take your time first. Observe. When we're training our young engineers at Vent-Tech, we always try and say to them, "You go in with a blank sheet of paper approach. If you go in with a form, you start ticking boxes." It's not that. We're not here to tick boxes. We're here to assess a system and decide whether it's providing control or not.

(R) So, those that want to do a bit more research, because like I said, we're only touching on a couple of these key elements and we could probably talk for many hours and I'm sure you'd love that, and I would as well. Where could you maybe direct a few people online?

(S) So, clearly, I'm aware of the HSE in the UK because that's where we go for our information. That's a great resource. It's free.

(R) Free for the world, not just those in the UK, yeah.

(S) Anyone can download it. They've got PDFs. Have it on your iPad, on your phone, our laptop. You can refer to it. You can copy and paste from it. It's really useful. It's a good document and well worth the read. There's the Institute of LEV Engineers, ILEVE.org. That's a good website. Again, free information on there. There are organisations out there which are very good, lots of useful information, like SHAPA, which is Solid Handling Association in the UK. There are certain trade associations out there which provide information. I would say be wary sometimes of trade associations. Is there information up to date? Things are moving on in the industry. Things are changing, so the number one source is the HSE.

(R) I know for Australia, SafeWork Australia do some information with our state and territory regulators as well, so do check your local resources. Wherever you are in the world, and you are listening to this, do check your local regulators and search of local contacts as well. But if people want to get in contact with yourself, what would be the best way to do that?

(S) So, the company is called Vent-Tech. Our website is www.vent-tech.co.uk. You can contact me through that. The email address is enquiries@vent-tech.co.uk or look me up on LinkedIn. More than happy to talk to people. I regularly post and happy to talk about anything relating with LEV.

(R) Well, thanks for being here, Adrian. We really appreciate your time today.

(S) No, my pleasure. Thank you for inviting me.

(R) Well, thanks for listening, everyone. You can get into contact with the show by sending an email to scienceofsafetyanz@mmm.com if you have any questions, topic suggestions or guests you think would be great to get in the studio, or if you need any help around the selection, use and maintenance of PPE that 3M manufacture, 3M are certainly here to help. You can also visit our website

3m.com.au/sospodcasts for further resources on local exhaust ventilation, as well as the transcript of the chat that Adrian and I have just had, as well as further resources on all the other episodes we have recorded so far. Be sure to subscribe, rate, review and share through Apple Podcasts, Spotify, Google Podcasts or wherever you get this podcast from. And as J K Rowling says, "It is our choices that show what we truly are, far more than our abilities." Thanks for listening and have a safe day.