

***Interview with a senior metals and trading professional***

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| SPEAKER1 | 00:03 | OK, confirmation should come up. There you go. So, your role in the investment firm. What does that entail?   |
| SPEAKER2 | 00:19 | So, I am the head of base metal sales, so my job really is to look after all sales aspects of the product line of base metals and that's geographically spread around the world. And look it up, I guess, to keep abreast of sales trends, customer interactions,   |
| SPEAKER2 | 00:50 | making sure that we've got the  |
| SPEAKER2 | 00:51 | right kind of product people and process mix.   |
| SPEAKER1 | 00:55 | And what sector specific subsectors is the firm involved in   |
| SPEAKER2 | 01:04 | the firm as a whole involving a number of areas from them equities , foreign exchange, commodities, and my real area is the subset of base metals within commodities, and that largely rotates around the use of an exchange in London on the metal exchange and the requirements for our clients to use kind of hedging strategies to mitigate their own risk within base metals markets.  |
| SPEAKER1 | 01:42 | And how would you describe the investment firms sort of goals you touched upon them there?  |
| SPEAKER2 | 01:51 | So, I think the one that firm is striving to be a provider of a number of services to the clients. It's striving to provide connectivity across a number of markets. It's striving to provide a service that allows our clients to come on and mitigate their risks where appropriate, and try to do that in an efficient manner with using the latest services and technology and with the right people and touching on the latest sort of technology.                               |
| SPEAKER1 | 02:30 | What in your awareness, what types of, if any, algorithms does the firm employ?   |
| SPEAKER2 | 02:42 | So to the area that I'm involved in, which is typically, we have a light touch in that sense. So, most of the of the algorithms that we have are part of third-party trading software. And so, you know, very basic looking at stocks and very much trading related algorithms, rather than, say, looking at any other type of sales algorithm or anything of that variety. So very basic in my area.   |
| SPEAKER1 | 03:30 | Does the firm have any sort of strategies that it employs or maybe its clients might employ and using these algorithms?   |
| SPEAKER2 | 03:41 | While the firm typically does, the client base often does. And our client base tends to like to use arbitrage by way of looking at the pricing of a particular instrument on multiple exchanges. In our case, likely to be the metal exchange and an Asian American based alternative exchange. And then you find a lot of clients like to have strategies in place to look at when the differentials between those two markets are advantageous to either buy or sell. And so, while |
| SPEAKER2 | 04:28 | we do   |
| SPEAKER2 | 04:30 | this on our side, the client is actively trying to look for value. And in that way.   |
| SPEAKER1 | 04:38 | And in your experience, does the company or maybe in the sectors that any sort of use of machine learning or artificial intelligence type algorithms?   |

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| SPEAKER2 | 04:53 | So I think, you know, if you expand to the widest what sector some of our compatriots or colleagues or other firms, you have certainly widened their use of technology in the last kind of five or six years. And indeed, some of the firms have from what I know is bought technology firms to embed within their offering. You know, there's a well, I think one of the largest banks in the United States, their CEO, a number of years ago said, you know, you should look at us like a technology firm with a balance sheet as opposed to a conventional bank. And I think if you take that kind of mindset, you'll see more and more use of technology within, obviously, as we are just the trading strategies, technology and understanding client activities. One of the largest banks, investment banks in the world, I think has been experimenting with using chat bots so that when clients come in and request various things that are of a relatively simple nature, the chat board essentially can provide one price and two simple interactions. And that means that, you know, the client, the client can get what it needs, or he or she needs it in a very fast manner and for the firm can do it in the most efficient manner. So, in a broad sense, I think technology is like mirroring wider life is ever increasingly playing a part in the firm's business process. |
| SPEAKER1 | 06:57 | And what is your awareness of the sort of design deployment and calibration processes, which, you know, at desk level, if any, you know, the desk might be involved in helping clients with those?  |
| SPEAKER2 | 07:20 | So I think generally, if I look at what we do and where my previous...had as well, where I was before, you know, the exchanges that you interact with normally have quite prescriptive conformance testing to make sure that you and your let's call it strategy, whether that mean algorithmic or otherwise are tested to the point where, you know, they're not causing or not seem to be causing any issues within the market, not misbehaving in any shape or form. So, conformance testing is a key part of, you know, the tools these days to make sure that these strategies or these implementations are working as they should do. Obviously, they said some of the exchanges, for example, very prescriptive on any algorithmic trade. So, they have quite a lot on definitions under the regulatory frameworks apply wide. You know, you don't have to do something that we would define as overly complex to come under the definition of algorithmic. And so, know people, as I said before, doing executing those trading strategies. All the trial changes do often come under that broad framework of trading. And therefore, all of those scenarios have to be put forward to the exchanges governing the underlying market. And that's become the mainstay.   |
| SPEAKER1 | 09:05 | And what is your understanding of the sort of meaning of conduct risk and. Your familiarity with any sort of internal control framework that the firm may have to mitigate that,  |
| SPEAKER2 | 09:19 | and that's in regard to the strategies. Yeah, yeah.   |
| SPEAKER1 | 09:23 | Could be general could be in the specific conduct context of algorithmic trading.   |
| SPEAKER2 | 09:29 | Yes, sir, I think,  |
| SPEAKER2 | 09:30 | you know, from the algorithmic  |

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| SPEAKER2 | 09:32 | or trading perspective, I think that one, as I said, conformance testing on all trading strategies has to be approved by the relevant exchange to you know, you have to have logs of all of those type of non-vanilla trading structures or strategies. And quite often and if you think about it all the fact fingering and all the flash, you know, events that we've had well documented global over the last number of years, you know, it's all about trying to maintain an orderly market. And basically, they don't want any of these activities to be any way, you know, kind of causing disruption to the market.   |
| SPEAKER2 | 10:28 | So, I think,   |
| SPEAKER2 | 10:29 | you know, within that context, the regulator is very much, you know, keeping abreast in keeping with its wider provisions of maintaining an orderly market.  |
| SPEAKER1 | 10:42 | Do you think there are any specific sort of conduct risks associated in particular with algorithmic trading in the sort of base metal sector?  |
| SPEAKER2 | 10:53 | I think, you know, there's a wider debate right, on where algorithmic trading and, you know, we can loosely move into the kind of high frequency trading and everything. How that impacts the let's call it situational use it. I think that's a wider debate. And there's a lot of debate within regulatory formats, within the exchanges themselves on what is the best mix and the best way of allowing both sets of individual party firms to go mingle within an exchange. And both have not or did or fortunately hinder the other from participating in that market. And I think there's a lot of things in terms of speed humps and latency and various things that come about within that, you know, and making sure that the groups can live harmoniously with each other because, you know, there is a reality that some of these systems can perform or can operate much faster. And does that give the ordinary, the usual user the same opportunity or in some shape or form? So, I think there is a I think frameworks coming around to this know it's a big debate within the industry. What is that concept of fairness of all parties being able to operate equitably? |
| SPEAKER1 | 12:42 | And I mean, obviously at the moment in the news, this base metal has come up a lot because of the discussion paper that's been published about maybe the future market structural changes to the economy. And. in particular, in a possible view to attract new types of market participants and all the rest of it. With that in mind, what do you think the likely levels of sort of self-calibration are? So, for example, sort of self-reinforcement, machine learning type. Algorithmic activities in the context of the LME may be currently and where the enemy might be going in the future.   |
| SPEAKER2 | 13:30 | So I think within that context , there is a lot of debate around allowing the types of participants they're trying to attract as opposed to coexist , and that's a problem because in a sense that if you have a very if you have a very unhindered and you don't have any regulatory type frame work , you what you have is a one party that is co-mingling or echolocating . It's you know, it's software. It's hardware. It is looking for those minutiae in trading opportunities and jumping into those. And that can often be at the detriment of the traditional users of the market. Now, the LME in that  |

construct and base metals may take the view that, you know, that type of user can provide increased liquidity, increased volume, and which, of course, in exchange, you know, is whatever exchange in the world is always going to be parcelled and trying to acquire more volume in the in the field that it operates in. But, you know, the reality is where does that where's the line? Where does that cross the line and where does it impede the traditional user? Is one subset of the market being impeded at the benefit of another one? And I think that's the balancing act. And that's the bit where, you know, and that's why they talk about latency, to talk about speed humps. They're talking about allowing message signals, a reduction of message signals to allow the natural use a chance to operate and the business. So, I think it's a hot topic. It's an evolving topic. I think in some asset classes, that topic evolution is further behind than others because the underlying players have been quicker in certain asset classes than others. The equity markets probably fall far further forward in some areas than commodity markets are in terms of this type of player. The base metal market is just the beginning has its nuances, which mean that the high frequency trading and algorithmic trading has perhaps a few other speed humps to get across before it can be as prolific as it is in other markets. That the market structure, the data structure, the constantly changing three months active date does act as a natural, let's call it headwind to this. But the other exchanges and other regulators will have to kind of make sure that everyone can be involved in the market. And that's the crux of it.

SPEAKER1 16:56 Do you think it's just a matter of time or it is nothing for certain?

SPEAKER2 17:06 No, I think there is a timing, and I think, you know, the reality is that more and more of the trading will have firstly, you know, if you look at the evolution, right. And you went from voice to some type of electronic medium, whether that be a Bloomberg, a chat room, etc, then you've progressed into being highly using GUIs to achieve your self-directed pricing. And then, you know, we've got forgotten about GUIs and now we just use box the box, trading my proprietary system, talking to your proprietary system, etc. So that is an evolution and that will continue to play out. And what must happen is, you know, we have to feel that there is a fairness around there that if you want to do your business in a certain way, that could be talking to your equities. Still talk to your stockbroker if you want to do, and there has to be this element of fairness as we go along and that concept of fairness. I also appreciate evolved over time. And the reason for that is that different firms do that business in different ways as time evolves. So, what is a 50 50 today becomes very much a 90 10 in the future. And I think the natural process is what I do in the example of the LME that that problem is, is just to make sure that they maintain relevance vs. other exchanges who have adapted that quickly into other areas and make sure that they are able to still be the place of choice for most people to interact

SPEAKER2 19:02 with their

SPEAKER2 19:04 get their pricing from.

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| SPEAKER1 | 19:07 | Given the sort of direction that things sort of going in, how would you rate this with knowledge and levels of firstly algorithms and sort of the environment in which they operate and their impact on conduct risk in you know, the different parts of the firm, so senior management, front office staff, support staff, do you think that knowledge base is improving? Is it being it sort of stagnating? Is it declining or what do you think about?   |
| SPEAKER2 | 19:45 | To be honest, and I can only put this in context of, you know, the rule book is changing and it and it's changing because obviously, you know, algorithmic or HFT is coming into the markets more. But I think the knowledge base within firms sometimes is not going at the same pace. And it's not because of anything. You know, it's a problem with the firm. It's just that the regulatory framework is constantly playing catch up to the new technology that's coming in. And there is a natural lag time across the piece in that, you know, technology comes in, regulatory framework changes. People have to be trained on the new regulatory framework and what that means. And then if you're lucky, there is people who have knowledge of practical application of that regulatory framework. And that last  |
| SPEAKER2 | 20:54 | part may not  |
| SPEAKER2 | 20:55 | come some time. So, you have this kind of lag. I think it was in my opinion, you have this lag that goes on. It may change because what I find is some of the, you know, people who've come through firms who have then gone into the regulatory part and who may have come from and you see some in some firms and said my previous place is some of the guys coming in from the trading side and going into the regulatory side and coming back out again. Their knowledge of what's happening in that space is very is needed by the firm because this is, and this is engaging one way. It's only going towards digitization. It's only going towards self-direction interpenetrating. It's only going towards, you know, box to box trading. And you almost need someone who's, you know, very well versed in that. And it's a very difficult part that goes throughout the firm. Right. Because firms typically have grown up from voice. You know, they've adapted even some |
| SPEAKER2 | 22:08 | of the biggest firms in the world and   |
| SPEAKER2 | 22:10 | have come through a voice change and then built systems and processes. And that system is a change. And you tend to have a bunch of guys building those systems in certain rooms, et cetera. But the firm as a whole hasn't changed yet. You know, the firm as a whole doesn't change until it comes from unstopping until you basically say, listen, guys, you know, as my previous example, don't view us as this financial institution, the US as a tech firm and  |
| SPEAKER2 | 22:41 | with some type of   |
| SPEAKER2 | 22:42 | balance sheet along with that, then, of course, everything changes. You become a fintech in that sense and you view every technological change in that same guy as the pitfalls, the positives and negatives of that technological change and how to grasp it fully, how to control that. And I think otherwise we don't have that you were always lagging, always behind you, always trying to play catch up and say "guys we're going to be   |

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|          |       | the best in technology. And that means you've got to embrace it in the fullest way and understand it". And they have to come right from top to bottom. That's the only way to do it. And otherwise, you're still writing things on paper and timestamped, doing stuff  |
| SPEAKER1 | 23:31 | With that in mind, how to sort of humans in the current firm, how are they still staying abreast of these potential changes?   |
| SPEAKER2 | 23:39 | I think it's hard. I think it's you know, you obviously get the regulatory framework change and then a kind of a, you know, somehow a learning piece that goes along with that. But it's two part. It's kind of a two-part thing. It's if your firm is leading in technology   |
| SPEAKER2 | 24:04 | and  |
| SPEAKER2 | 24:05 | growing bottom up and from a technology stack perspective and evolving quickly, then it's an easier thing because then everybody is in tune with that technology change. Everyone is you know, your youngsters are often python, you know, you're up. You guys are very adept at using, you know, the various strategies, you know, and algorithms, etc. It's kind of you're using them for your day to day is not something that is something a little bit away from day to day. It's very much in your day to day. It's fact. Its people are asking you why you aren't using the technology to do something cheaper, better, faster. And then, by the way, you're doing it now. And I think that's a better way of, you know, you're harmonizing. And if you're always kind of if technology is kind of this thing that happens slowly in the background, but it's not intrinsic to your business change. You would always find then you're behind the curve and keeping up to date with that that regular part and I think tech firms who embrace that, the tech guys are being taught what the regs are as part of their day to day, it's not like an I.T. department, a front office and then a compliance perspective. It's very much holistic together. It's like you guys in tech, by the way, if you're putting this stuff in, you got to know that these are things we need to be looking for. These are things that the regulators are going to be double checking us on. These are things the exchange is going to be very adamant about. And that's baked into the tech eligible guys as well, not just the front office. It's a very much a holistic piece. All of the top and slow trickle-down piece on. |
| SPEAKER1 | 26:13 | Are you aware of any sort of plans to reduce overhead? In the firm to because of an increase of automation and trading and if so, in which areas?  |
| SPEAKER2 | 26:27 | Yeah, look, I think efficiency gains are the key here, right? In the broader sense of it, in any organization, you try and get as much efficiency gain as you can. And if I look at the firm that we have now, I'm part of and the desks that I'm part of and, you know, there is a lot of areas where you could look at it and say, can we do something even better, faster? Can we put that in there to minimize human intervention, to minimize human dual keying, to minimize the mistakes that come along with human intervention? Right. So, and then if you do that, you then go, well, can I have someone doing something slightly different? Can they adapt to a new way of doing things? And can we use their skills in a better way? Let's take the example of a salesperson. If a salesperson is sitting there   |

just improving trade, that is a waste of his talent. You should be out there talking to clients. He's also the first window or first layer in terms of knowing what clients are doing, if there's going to be any problems. The clients, you know, he's the first guy you should know all that. And if he or she is just putting in trades, then that's then that's a huge problem. And the same trade is, you know, traders use technology a little bit like a pilot. This there was a value type of activity that goes on and let the technology do that. But when markets are dislocating, when things are not performing as they should be, that's when in the same way a pilot does a landing and take-off quite often during flight. That's when the trade is kind of in their ability, earn their stripes. Trading, for example, has changed a lot over the last 10, 20 years due to regulation, due to flight behaviour, due to, you know, just what you're allowed to do when you're not and the systems and processes that you have. So, you become a risk kind of mitigator for large portions of the day and then you become a trader for other parts of the day and looking at things and the dislocations, looking at where there's opportunity. And so, let the systems look at that risk mitigation part and just sit there and doing that trade part and then let's you just give them a trader to go and find opportunities and go look for anomalies. That's a combination of taking data from obviously the systems we have, but also the naked eye and that touchy feely part... So, yeah, it's a long story. But, you know, it's natural that you as you build efficiencies, that people either do different roles than they did before, you know, more meaningful roles in that, you know, more interaction, more things that require an analysis or they or their role is no longer needed.

SPEAKER1 29:50 Do you think that will see an increase or a reduction in conduct risk?

SPEAKER2 29:57 I think there's two aspects to this, I think that, you know, if conduct risk is and some of that kind of risk in looking at things that are caused by perhaps in a broader sense, are caused by more simplistic rationale, like transposition areas, these kinds of things. You know, I think some of that will reduce what you will have been a different form of conduct. You will be looking at the conduct of the electronic market. Right. And whether that's right now, obviously, we've got the right parameters and they're hard wired and hard coded. That should come down as well. And then you're very much looking for the exceptions when there's something going wrong in the system. Outage has been a flash process that's taking place overnight, a flash crash type of scenario. So, I think the style of things that you look for will change, will evolve, just like the underlying market has evolved. And I think, you know, when I when I look at it and I look when I first started and obviously being in the role that I am supervising various people, the types of things that happened 16 years ago is the type of things that happen now as it is to be a little different, a little more, you know, as technology is taken up, some of the heavy lifting and just transportation and, you know, some of that stuff, you know, it's it becomes a little bit more exception based. You know, there's a lot of stuff that's happening on straight through processing kind of way and self-directed. You know, allowing the client to be driving his investment

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|          |       | decision from start to finish , you know , will naturally mean that some of the things that we look for now in the regulatory framework will have less impact because the client is doing it on his or her whim , on his or her decision making process , not on not guided by the firm , you know , obviously within parameters . But I think certain things will change in that.  |
| SPEAKER1 | 32:15 | But do you lose something there? Because, you know, the broker may have acted as a gatekeeper and made it you know, the clients come and ask him to do something which perhaps broken. You would be wrong. The broker, you know, but I think is a big on.   |
| SPEAKER2 | 32:32 | I'll give you there is an argument that, you know, you talk about the first line defence, right, being that sales team and normally is in any organization, you lose one set of eyes. Now, that'll be replicated by algorithmic. This is a, you know, an algorithmic set of eyes, if  |
| SPEAKER2 | 32:52 | you want to call it that,   |
| SPEAKER2 | 32:55 | that we'll be looking for different patterns. But the sniff test, which, you know, that we we've all relied on a little bit over the years where you kind of go, that's interesting. Yes. It's in the parameters of everything you can do. It's not out of ordinary. But why would he do it or she do it at this moment in time? That part, I think, is quite hard to replicate.  |
| SPEAKER2 | 33:22 | Without thinking that   |
| SPEAKER2 | 33:27 | it's not easy to replicate for them, for the majority of people. There will be systems and processes that can go really far into that replication, but that won't be accessible to the majority. So, you have this 70 percent or 80 percent of people who used to rely on this little bit of sniff test. That would will be using basic algorithms to replicate that, and that won't do that in the same way. So, there is a danger that I do. I do agree with you that that first line of defence is so paramount. And so we're going to have to do is making sure that the sales guys are constantly seeing the data and constantly talking to the clients, talking to their own clients and, you know, trying to stay as ahead of the game as they can in terms of, you know, how things are going with the clients, everything else. But the problem with that is quite often technology is being used to lessen that. And you you're trying to balance this out. You're trying to not use technology in a way that you are losing your data points or your touch points to a point where you can no longer kind of go in, then hand on heart, say, I did this. I knew as much as I could. If you take it to the nth degree and even deepen so much you know, all this stuff happens in the background and you lose total sight of what that client is, is doing. And that's a danger, I think. |
| SPEAKER1 | 34:59 | And are you aware of any sort of conduct risk sort of incidents that have come from related to the use of algorithms in this sort of specific subsector in the last few years?  |
| SPEAKER2 | 35:13 | Not us in that regard, but I know over the years we've had in my previous places, we've had incidents where clients have  |
| SPEAKER2 | 35:22 | suddenly gone   |
| SPEAKER2 | 35:24 | from algorithmic trading to back to voice overnight because they've had a problem and, you know,  |



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| SPEAKER2 | 35:33 | without  |
| SPEAKER2 | 35:35 | kind of going without knowing too much what the client faced and their problem statement. But you look at you know; you look at the markets trading at a regular time period and that's odd. And then you have try ringing up and saying, listen, by the way, we're not going to be using electronics, is going to go back-to-back to fighting for a while, OK? Something's already happened. So, you know, I think there has been.  |
| SPEAKER2 | 36:01 | Through this process of  |
| SPEAKER2 | 36:04 | changing behaviour,  |
| SPEAKER2 | 36:05 | and I think there's obviously been at  |
| SPEAKER2 | 36:07 | times where there's been incidents in terms of the systems and processes to go, those may not perform in the way that they perhaps thought they would. And you if you break the glass and go back to the emergency aspect. But in general, from my side of that and again, I must say that metal is further behind the curve in terms of the latest advances in machine reading and everything else than some other markets are. But so, I think for the most part, with the things that we  |
| SPEAKER2 | 36:56 | have,  |
| SPEAKER2 | 36:59 | we've seen very slight aberrations, I think, of what could go on. And I suppose another way of looking at it, as well as the times when the machine is seemingly no longer participate in the market. And that can be for a variety of reasons. And that intense volatility or something's happened out of the ordinary and that that in the last few years, I think we've have seen little periods where, you know, the machines that were tended to be on before, seemingly no longer on for a while due to the market conditions or aberrations.  |
| SPEAKER1 | 37:42 | And do you is that you think that approach or possibly do you think in the future where if not now, where the firms may be looking at? Using machines.   |
| SPEAKER1 | 37:58 | Two police machines,   |
| SPEAKER1 | 38:01 | if you like, where instead of relying on humans, the human first line?   |
| SPEAKER2 | 38:09 | I mean, it already happens on it already happens in some ways on know, I take it, example of DMA where your clients have direct market access to get and using third parties quite often, perhaps situations will put another layer that is essentially watching   |
| SPEAKER2 | 38:34 | what it is going   |
| SPEAKER2 | 38:35 | through the first layer. And it has two functions. One is to in real time watch it and look for anomalies. And two is in real time to provide or post time to provide reports on that. So even in my previous place, you know, having a layer on top of a layer was quite common. So, I think there will be scaling this up even further and say, where does it end? She means what? The machines, watching machines. But there is an element that there is the element of policing going on already. And the exchanges must deploy technology to what, high frequency trading, et cetera. Their machines have to be up to the speed and faster than the machines or you slow down the playing field if you don't have a fast machine for the for automatic traders who are using the exchange. Otherwise, you're going to be caught out, you know, doing or exercising your fiduciary duty. So, I |

think, yes, there will be machines watching machines to certain extent in the naked eye. And again, back to that stiff test in that example of a machine-watching machine, but then producing a report that goes back to the naked eye activity again, which like, oh, that's interesting. Why is X, Y or Z on that? Do they understand? Do they know? And are their business models changing? And I think that's the understanding that we'll still rely on people for. You know, is the underlying business changing a mind about what's been put through the systems? But does that allude to something happening behind the scenes that's going to be different? And should we be should we have a view on that?

SPEAKER1 40:37 And. What about this sort of idea of embedding? In machines that are using things like reinforcement learning or machine learning or however you want to describe it. About seeking to design in ethical standard into the actual code of those systems because it's been tried in other sectors where, for example, I think in the States, there's been cases where machine learning algorithms are being used to take data in about. Situations involving, say. Low level criminal trials. And they were finding that some of these so-called robo judges were making mistakes because they were they had some sort of inbuilt biases where they were taking data in and they were looking at specific zip codes and things like this and making almost all human judgments about what those people might be like and whether it's arriving at a decision as to whether a crime had been committed . And so, then they had to sort of reverse engineer and try to design in some sort of ethical code for which those robo sort of judges would follow to try and steer them away from some of those biases. Do you see any move towards that kind of thinking in in your subsector to try and design an ethical standard to prevent poor behaviour to start with?

SPEAKER2 42:30 I think if we can do that, if we look at the some of the exchange regulation, I think it would be and I haven't seen it embedded into anything apart from the fact that certain structures or certain strategies etc are disallowed by the exchange, so therefore cannot be embedded into a strategy. But I do think that that would be you almost want to have a set of criteria that can operate within a certain market. So, in a money market, the market, you know, to have a machine that says this is the LME or the LME says, "look, this is the criteria that we believe needs to be in built into. These are the rules that your box needs to play with or play within, say, for playing on this exchange. And if you if your box plays within this realm, then therefore that is fine." And at the moment, it's not you. It's very much based on conformance testing. It worked, it didn't do anything untoward with markets, mood, etc, etc. It's sending the right codes down and back. But there is no inbuilt kind of rulebook that is then forced upon and let's call it rubber stamped into the box, I think. And I think there's room for that right? There is like because there'll be a lot of people who would like to have. A system then given that stamp of approval and we would call it ethics, whether you want to call it rules of engagement, whether you want to call it whatever I think that you would have, then, you know, it'd be better for that system, that ecosystem to

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|          |       | have systems within that that are only or that are only allowed to participate if they are in with that rulebook.  |
| SPEAKER2 | 44:57 | But there is   |
| SPEAKER2 | 44:58 | I think there probably some way away, certainly in   |
| SPEAKER2 | 45:02 | the exchange that I operate in   |
| SPEAKER2 | 45:03 | the ecosystem that operated from that, I think where there is still a lag in that everything is about latency, everything is about messages per second, everything is about your what happens in price movements. And if you conform to those type of instant messaging and turnarounds, if you conform to those, you can participate. And that doesn't necessarily tell you, you know, what is the underlying aim of the strategy at all? And if that strategy doesn't go through and a classical member of the exchange, which is the job, is to ask those questions, even verbally, what is the underlying strategy as part of what we do in the first line, then now. One asks those questions. Then, you know, then you have effectively this box that is able to operate within the exchange norms that may not be ethics laws. So, I think it would be something good to, uh, to come on to these markets in terms of sort of detective controls rather than that kind of preventative control. |
| SPEAKER1 | 46:19 | What kind of surveillance to the firm currently you have?  |
| SPEAKER2 | 46:29 | That's a good question, because that's just my previous place. You know, we had a bunch of off the shelf, third party procured systems that were looking at things like messaging. We're looking at this is in respect of who I want to question in respect to possible activities. But we had a bunch of systems that were looking at what messaging number of messaging per second was that within our broad scope effect? Know, what happens quite often is firms to used to dial down the permitted messaging allowances compared to what the exchanges allowed so they can, you know, they can kind of give themselves away. The other thing is it's not just what's going on electronically is why it's going on electronically and what is the reason for it and understanding what the client is trying to do. And we understand that. I believe if you take it back to the first example, we use in arbitrage trading and you   |
| SPEAKER2 | 47:49 | can kind of understand what  |
| SPEAKER2 | 47:50 | they're why decisions are being hit. And it was a buy or sell of the time. I think those type of things is very important, just as you know, the systems that you buy and there's quite a few off the shelf that go and buy and take away and watch each underlying trade go through. And unfortunately, having just joined and then all of the data, then all of the off the shelf platforms that probably been purchased to monitor DMA systems beyond the DMA devices themselves. But there's a lot out there and it depends on what you want to watch for.   |
| SPEAKER1 | 48:28 | Do you think the human eye would be able to spot some types of bad behaviour by machines? Or do you think it's a task which is step beyond the average person I mean, what do you think to that?   |
| SPEAKER2 | 48:48 | I think actually you need the systems watching, combining the data and producing that into a meaningful format so that the human eye can cast its look over that and decide whether that is whether that is, you know,   |

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|          |       | basically whether the activity is what you expect that type of player to be doing one to is whether activity, you know, because presumably, as the system has let it happen, it's in its conforming to the market norms, that's fine. But whether you think it's something outside what that particular client should be getting up to. I think there's no point trying to get a human to be sitting there watching that tick by tick. You know, that's just not a good use of their time, a good use of this kind of go up, walk away, look away, miss something, miss a trade, miss an order, miss spoof. You just can't. It's very difficult to do so. That technically, I think is the way forward. But I do think there is that is, you know, there's a difference between the quantitative data   |
| SPEAKER2 | 50:06 | and the qualitative data.   |
| SPEAKER2 | 50:07 | And you need to then do the qualitative aspect on top of the client, the sales team as a whole or the first you know, the first layers basically that going well, that looks old. Yes, it's all permissible stuff, but, you know, it is buying into within the norms. He hasn't said to the messages,   |
| SPEAKER2 | 50:29 | but it's very odd for that  |
| SPEAKER2 | 50:30 | for him to do that at that price level. Is there something else going on? So, I think it's too late.  |
| SPEAKER1 | 50:36 | OK, and what about the regulators and markets? How do you think I mean, obviously a level up from the firm How do you rate their ability to try and identify?   |
| SPEAKER2 | 50:53 | It's hugely difficult in that they have to look at the firm but also the exchanges themselves where they operate and look at their data sets. Right. So, they were  |
| SPEAKER2 | 51:03 | reliant on two other aspects.   |
| SPEAKER2 | 51:05 | They're reliant on the firm doing its part in this process. So, you know, and then they have to be certainly in it to a certain extent, prescriptive on what they view as the most important parts for the firm to be looking at and making sure the relevant firms are looking at that data or looking have the systems and processes in place to allow that type of activity. And if they don't, then that that that firms shouldn't allow that activity, but then, of course, do sample sets and, you know, the usual audits, etcetera, etcetera, to make sure that that's happening. But it's very difficult know it's a very on a real time basis, it's hugely difficult and different regulators will want to see different things we've seen before to do position limits with ESMA and, you know, the FCA's stance on that and which way, you know, who's going to be governing what and then went a different direction. And so, each regulator will have its part of the market that it's going to focus on. And often these firms will transition between different parts of it. And so, I think the regulator has to like it does |
| SPEAKER2 | 52:29 | it generally with   |
| SPEAKER2 | 52:30 | many other regulations. These areas are regulating the firm, try the firm to do certain things and let the firm and do that in the right way and then double check to see what the firm's   |
| SPEAKER2 | 52:41 | stance on things and different firms will   |
| SPEAKER2 | 52:44 | take different views and allow because of that tax, let's be more comfortable to do certain things. You know, if your firm, it doesn't have a   |

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|          |       | and you're not relying on the naked eye, you're going to have to dial down your cuss words activity to suit and set format if you've got the right technology, allows you to utilise data and other things. And so, I think that's, you know, that appreciation is sort of one size fits all. It's going to be governed by, you know, if you've got this technology, you can allow your clients to do this. If you haven't, you can't. And take that view.  |
| SPEAKER1 | 53:22 | And in terms of sort of horizon sort of firms trying to prepare themselves for future developments in capability. Do you think they're likely to opt for sort of in this sector? Do you think they're more like they like to opt for a builder, partner or buy? Which type of option do you think the most likely to go for   |
| SPEAKER1 | 53:50 | in third party provider or a build  |
| SPEAKER1 | 53:54 | also, or maybe they partner with somebody to do it, some sort of joint venture?   |
| SPEAKER2 | 54:00 | You know, typically not in this sector. There's a lot of wastage that goes on. Right. A lot of inefficiency that takes place because various groups build different things while trying to do the same thing. And the reality is it would be lovely if people put their heads together that actually, you know, but we're all trying to do this. And one of these boxes, let's all put ourselves together. But that's kind of a utopian type thing. So, what tends to happen is, you know, the third-party software is the easiest to buy in. And there's a lot out there. As I said before, you know, there's a lot of groups building not only pipework, but monitored pipework so that you could plug in and get your just like it, as in the view of what's happened in things like the review of emails and voice communications and things like that, the evolution of that, you know,    |
| SPEAKER2 | 55:03 | Bloomberg being involved,   |
| SPEAKER2 | 55:05 | plugging in all your voice into Bloomberg, these things have massively changed. You could even do it in multiple languages now. So, monitoring per se has evolved over the last ten years in a monumental way. And I think that same thing will be attributable in in this space, you know, in the high frequency space and the algorithmic space where, you know, your pipework, you'll be able to   |
| SPEAKER2 | 55:34 | put onto  |
| SPEAKER2 | 55:35 | your pipework a certain amount of monitoring activities that will give you the , you know , let's call it the standard that you need in that, you know , most these most things conform to a certain amount of protocols, whether that through fixed protocols, lifesaver, what kind of things they tend to go in two or three types of different protocols for most things. And if you are able then to go. "Right, what is your protocol? That's right. We've got our box for that." And you can plug that on and anything data that goes through that you can monitor. I think that involvement will take place that allow firms to who perhaps didn't want to go down that route because of all of the regulatory oversight perspective and making sure that they're doing everything because they've now got a system that is able to do that. So, yeah, I think it's a natural evolution. |
| SPEAKER1 | 56:46 | You probably have heard of the Senior Management and Certification Regime which has entered into force in the U.K. with a particular sort of  |

aim to improve the conduct of the people that work in financial firms. A lot of the emphasis is on sort of incentivise, deterring and punishing people. What is your view on, for example, incentivising and why not talk about incentives? People are obviously most motivated by the remuneration to the variable remuneration and using that as a tool to try and encourage people to behave in a better way or to be more considerate of the risk that they're taking. Do you think there's any possibility in sort of helping to design similar incentives for machines? That may be used to trade in this market, so they if they do recalibrate themselves, they do so in such a way, which is.... Can it be in line with the norms and the customs and the rules of the market?

SPEAKER2 57:59 Oh, I think it's a tricky one, that one, because I think it's two parts to that. Right. The first is, how do you incentivize the people who make the machines to do that? Right. To make sure that they are within the norm. So high frequency trading, you know, their participation on the market, their ability to influence the market, know, on all the things that it you know, if it's within the control, comfortably within the confines of the other or of that particular market, then that's a good thing. And therefore, it's a positive reinforcement and positive incentivization. Obviously, if things the flash crash happens, there's market disruption, there's things of a disorderly nature or a worse then, of course, in this incentivisation and clawbacks and various things that happen to other people, that should be sort of thing. But in the actual Blackbox space itself, you know, I think it's you could go down a path where the blatancy and messaging are used as that incentive. Right. So, you know, if you're perhaps a little bit overly messaging in the market, you get or you the system gets slowed down and that's just incentivisation process. And if you run , you know , if you're running an orderly market , providing liquidity at times where it would be easy to turn liquidity off if you're doing one of those playing a good citizen role within the market , even perhaps at the disservice of your normal way that you would operate , then you are allowed to have high messaging , high messages per second . Your latency is reduced as it was thought of that. So, there's this kind of buffering that takes place by the exchange looking for what I would call good practice and looking for bad practice within that. And that payback is done in an ironic fashion through messaging ability and then latency ability. I think that's probably a little bit something in that, you know, because otherwise you have blanket roadblocks, which are fine but doesn't help don't help you with

SPEAKER2 01:00:57 some of those

SPEAKER2 01:00:58 people who are playing nicely, who are playing well and actually say, OK, you're playing really nicely. We're going to we're going to reduce the roadblock a little bit for you because you're demonstrating good market behaviour and all of that happening in real time, electronically watching. I think that that this would be something like that that could happen.

SPEAKER1 01:01:22 I mean, in terms of I suppose it comes back down to this sort of point of agency and. Obviously, regulations always look to holding a human being accountable for poor behaviour. But as things evolve and you get more

and more sophisticated algorithms with more reinforcement learning and all the rest of it, at what stage can you say that even if you want to punish the designer of the algorithm, how effective does not become? Because they because the algorithm is taken on a degree of agency itself and it's almost like I don't know, there is a famous thing in the U.K. in the early 90s with dangerous dogs and breeds of dangerous dogs. And people were arguing, OK, well, to what extent is the owner responsible for the dog's behaviour? And it was about this. And there was a consequence for the owner because they might get fined or sent to prison, but in some unfortunate circumstances, also consequences for the dog because the dog might get you know, there might be an order to put the dog down. Sort of a similar sort of situation. What I mean, can you see a situation where. Authorities, the regulators, the exchanges look to actually punish the actual machine, the machine, the algorithm itself, and not just look towards the individual. Do you think that's just too farfetched and it's not really going

SPEAKER2 01:02:51 to be going to happen? Yeah, I think know I think in my previous example, you that is punishing the algorithm essentially by turning it off its ability to interact. So, in that example, the exchange is turning off its ability to take messages from the algorithm. So, the algorithm is now losing importance in its system. So, I think that that's definitely, I think, something that should be looked at and everything else as well as, you know, the actual what you call this the builder who built it. So, I think there is room for a bit of both in that exchange or the place that that algorithm is operating can help regulate that the algorithm through messaging and everything else. And rather than, for example, someone who's not connected with the exchange or that ecosystem for someone very much plugged into the data ecosystem has to be the ecosystem itself, you know, making those calls as to who is playing the right way.

SPEAKER2 01:04:16 So, in that

SPEAKER2 01:04:17 in that example, I think there is an element of Redgate framework that could be used for the box itself. And then, of course, as we discussed earlier, for the producer...

SPEAKER1 01:04:30 Are you aware of any sort of industry sector wide initiatives looking at this type of stuff in your subsector? And if so, one of the how do you view the calibration levels, the collaboration level?

SPEAKER2 01:04:43 So, I actually I'm not at the moment aware of any of that. The so far what I've seen in terms of conformance and various things has been very kind of basic in that regard. So, you know, this would be the next stage we have seen. From a point of view of what is happening, how many messages are you sending to the exchange and things like that, but no such thing as OK, yes, I think a lot of messages we're going to turn you down automatically through some systematic process. I haven't seen that.

SPEAKER1 01:05:26 Do you think? I mean, what about sort of third-party vendors and, you know, are you seeing any drives by them to sort of get into this space and offer any solutions? Or is it. And most of all,

SPEAKER2 01:05:38 I mean, they're evolving quite a lot. I mean, when a few years ago, a lot of the staff, the basics even were built in throttling and all these kinds of

things. You know, a lot of them were upgrade packs and, you know, just coming in. It was just a building them. They weren't part of the previous builds. So, I think a lot's happened in the last couple of years where, you know, the simplest off the shelf packs now you can have in built things like, you know, throttling and messaging restrictions and latency. But that's all happened in the last couple of years. And like anything in life, you know, this evolution takes place. Right? And it just takes time. It is one of those things that I write for the office that want to be in this conversation. We said, you know, this is a lag times. They get lost in the financial services or the regulator may publish a paper. What's coming next. But the reality is, if you give six-month lead time for one to catch up. The reality is the underlying technology has evolved so much in that six months that you are now putting your regulator in regulation that you're not putting in place is actually now 12 months behind. So, you know, I think there's a lot of you know, there's a lot of things that need to happen much faster in this space. And I think the appreciation for the box and everything else, you know, and I think for the regulators themselves, they also they need to be watching all that technology changes and then and then saying to arrive, you know, guys, you know, if you can't keep up with that, then you can only go to a certain level in your service offering. What do you like? The big guys were at the top who have the checks or have the controls or how the latest software have the ability to perform the functions that we want them to form from a market perspective to do that. And if you can't, then you can offer it to your lot. You have to stay at this level.

SPEAKER1 01:07:59 And what do you think of the marriage between the sort of legislative or regulatory versus industry led solutions? Do you think it should be top down or sort of bottom up or what do you think to that?

SPEAKER2 01:08:09 Well, the industry evolves at its own pace and the direction evolves another pace. Right. So quite often and you know the industry in terms of what can happen and what can and what you know, how many take a how many messages can a box send is probably well advanced compared to, you know, the framework of that, that it's operating within. The regulator says, OK, you have a cap on 50 because that's all we can kind of get up to at the moment. But the boxes themselves could run a thousand measures, just like, for example. So, there is this difference between the two and some of that's needed because, you know, not all of the market is catching up. But, you know, and you're trying to not let the market become too bifurcated in that you just have this really top-heavy technology-based stuff. And it's so far ahead of these guys who are not you can't get in this. You're trying to hold this line that is somewhere between the two constantly bringing it up, constantly bringing up the lowest common denominator. But it's hard because you know how many of the regulators themselves are tuned in to what's going on, how many of them would know what it is, you know, in and how to you know, and how Musk could inspire it. So, you know, Bitcoin. No, whatever it is, you had it, you know, so you need it almost a different framework within that. Derivatives need a whole different way of challenging things. If you look



at that in the vaccine rollout and the vaccine rollout is going to you in the military, again, finding out, taking employing those guys to come in and look at what is going on the Internet in terms of social media and taking away some of those false projections or claims involved in emotional media, but using the military to do that, using what the military have learned in, let's call it social warfare, you know, and we all try to learn from each other in that right. You know, how these things can evolve. And I think the evolve is the word right. It is a constant evolution. It is a constant process. And the evolution of new fintech, the addition of new technology and who knew what a non-refundable token was until a few months ago, right. And that is that these things are part of the next journey that we're on. And, you know, the people at the top of in technology, whether that be a CTO, whether that be, you know, they have a really

SPEAKER2 01:11:05 hard

SPEAKER2 01:11:06 job because they're trying to stay ahead. They're trying to stay ahead enough to be able to guide the firm. And then the regulatory people within the firm have their job to try and stay ahead of the regulations that govern that technology. And it's a race.

SPEAKER1 01:11:24 Do you do I mean, just on that point about learning from and all this kind of stuff, are you seeing many instances of, you know, the sector or the financial industry, particularly where you are not learning lessons from other highly regulated sectors that might use high levels of automation or algorithms?

SPEAKER2 01:11:45 I think there's within asset classes, there's that natural learning process. Right. So, you know, as I said earlier on, I think certain asset classes are further ahead than others. You know, equities have always been further ahead than commodities and within commodities set oil is a bigger market, precious to a certain degree, is different debates because of the relative notional values that are incorporated. And that's what tends to drive the market change. Right. How much instead of notional activity and how that equates to a notional value is going through those markets will drive certain change and behavioural changes. Right. So, base metals is a very small subset of commodities, which is a very small subset of the asset classes when you start getting fixed income and rates, anything else. But so, we sit at this at the end, and I think for the regulator and everything else, that it's easier to look at what's happened in other markets and make an inference of how much of that will come our way. Right. And I think that's that is, you know, that you can pretty much say, you know, certain things that have a high likelihood of coming our way just by looking at those markets. So, if you take that view, then there is this natural exchange of information between now, the exchange of information between the financial world and other parts I think are happening in very loose fashions. Yet in a box, a box loading. And I, of course, it is an area of intense collaboration between technology and financial world. But I think it's still slightly nuanced and very few firms have that full embracing of that. You know, I talked about earlier about the chat box and one of the big financial firms as been looking that for a

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|          |          | long time, so that clients feel that they're interacting with someone, but they've actually, on the other side, cheapened and deepen the relationship between cheapen the relationship by just having a chat, do most of the activity, you know, those type of things are a product of cover as a consequence of groups working together from inside and outside. And we're all used to using chat box of websites and chat box and financial services, something a little bit different, but that's that cooperation. And so, it can happen. I just don't think it's necessarily fully embedded, certainly in the space.   |
| SPEAKER1 | 01:14:44 | OK. And ultimately, how do you rate the likely effectiveness of the UK's approach here, what you've seen in. And so, trying to regulate conduct risk in this, using algorithms in this space versus maybe what you may have seen in Europe or in the United States or something like this?  |
| SPEAKER2 | 01:15:11 | Well, it's a difficult one, really, to kind of get to make a kind of a judgment call on various regulators. But what I would say is that, you know, the U.K. is principle-based approach in most things, you know, lends itself to when you have fast moved technology kind of lends itself to you trying to keep certain principles covered by whatever theology you'll ever fully use. So, I think that helps in certain senses, gives you a little bit of protection in that you're trying to maintain whatever form you do it in. You're trying to maintain the basic core principles that that are part of, you know, part of that market governance in terms of, you know, in the minutia of what I look at, the minutia to do with algorithms that normally govern, or certainly my experience has been governed by the exchange itself and then the sum of the regulation around the exchange. So, whether that's regulatory and then that's it. So, if has been privy to that interpretation by the exchange. So, you have two aspects is like, you know, what you have to do under the regulatory framework, the DMA or whatever it may be, what do you have to do? What you have to ask the client. And then this a bit about from the exchange itself and says, right. You know, hey, if you're going to try to do this that wants to interact within our ecosystem, then it needs to do this. So quite often you are governed in two kinds of places, you know, the exchange or the ecosystem that you're trying to play |
| SPEAKER2 | 01:17:05 | a part on.  |
| SPEAKER2 | 01:17:07 | And then there's other parts. So, you know, you're at the mercy of two regulatory pieces, you know, and that has it's both of those must move. To a certain extent, with a degree of uniformity   |
| SPEAKER2 | 01:17:28 | to, you know, to  |
| SPEAKER2 | 01:17:30 | make it all work, if not one very distorted from the other one's light years ahead and the other one's not. But from what I've seen, you know that it's a little bit disjointed. It's a little bit you know, they both have the ability to move their own pace. So, know that's something to watch for. Certainly, I think in a situation where, you know, we have exchanges governed by in one land and certain things and governing in another land.  |
| SPEAKER1 | 01:18:03 | And finally, what are your principal concerns for the future in terms of how this may develop?  |

SPEAKER2 01:18:12 In general, I say that technology can be you know, it's huge. Powerful and allows you to compete sometimes you know the right technology, you can compete much bigger than you are, it allows you to compete in a different way. But I think there's a danger that if we when we go down this road, we go down this road too far. Certain parts, certainly for a period of time, certain parts of our ecosystem won't be able to have their say in markets because those that are more technology advanced will have their voice heard. It's an irony that because it won't be a voice, but it will have a signal heard more than others. I think they'll be at this point where they maybe there's a little dislocation

SPEAKER2 01:19:20 that takes place.

SPEAKER2 01:19:21 And that's a danger because you don't want to disenfranchise people within a market. You want to make sure that they are able to conform and move in the right way themselves, are going to be able to make sure that they have the ability to interact, because that's what makes the market so strong, is that as diverse groups participating in a liquid market, bringing their liquidity to the market, and if you can go to one sided, you actually create dangers within that market. You actually create a problem that you are so one sided that you if one of those things were to go wrong, there is no other natural spot to take the LME, for example. The algorithms play with it in that market that the typical liquidity providers, market making firms that will play their part, the likes of the new breed of providers have come in and but they operate alongside the older, you know, the kind of actually use of the market which often provide a bit of a sponge. At times in these market movements, they provide this a natural kind of shock absorber where if you had all just this wild type of like one way, then you would lose that. And so that's the danger. And one, too, is I think all three is the aspect of not being able to regulate and regulate is the word , but I think regulated in the fullest sense of the word, not being able to guide the market because it's moving too quickly and therefore you don't get the best of what's coming in as well as, you know, not trying to protect from the worst off because the certain things that will allow to evolve, bring new aspects, new learning, new machines, and some of that may have more positive effects. But, you know, if your regulatory framework and your governance process is kind of at that point can't keep up, you may be two or three versions behind. And actually, you're not benefiting from some of that going through. And lastly, I think, you know, for firms in this space

SPEAKER2 01:22:05 that they've got to grow, adapt quickly

SPEAKER2 01:22:07 to new thinking that you are technology partner and you've got to provide the right methodology for clients, interact in the market and be able to see that technology. If you're not, you will lose relevance in that market quickly. That's a challenge for firms to maintain their relevance because there is a certain amount of cost embedded in technology and you've got to be able to be nimble and smart and be as close to the cutting edge as you can. Otherwise, you slip beyond.

SPEAKER1 01:22:47 OK, that concludes the interview. Thank you very much for your time. So, I just end the recording.

