

### ***Interview with a senior manager #10***

- SPEAKER1 00:09 Right, so the recording started. So first off, what were your experiences, what types of investment firm have you worked for and what were their goals?
- SPEAKER2 00:22 So, I come from a retail focused derivatives background in the spirit bank and CFD space predominantly. And my career in that space has spanned sort of 15 years covering everything from retail sales through to big ticket execution. Cross market equity focused in the first instance and then evolving into multiproduct and then latterly the last sort of five years or so in that space was spent managing a team of sales traders, execution traders and the relationship between those desks and the risk management teams to oversee the onboarding and execution of business from retail and institutional clients. So, a bit of an evolution from where I started, but certainly a retail focused environment that later went on to service other firms within the space when that was what we saw referred to as institutional business.
- SPEAKER1 01:23 And what kind of asset classes underpin those, what were the underlyings?
- SPEAKER2 01:28 So, we covered a broad range. But I suppose in terms of by volume index futures would have been the top contributor, followed by FX. But in terms of touch points with clients, equity certainly made up a big proportion of the time just because of the necessity for so high touch service in that space rather than complete reliance on electronic execution.
- SPEAKER1 01:52 And did your firm or maybe its clients, did you did they deploy algorithms in the in the trading operations?
- SPEAKER2 02:01 Yes. So, the vast majority of flow was sort of within our execution of electronic orders. But on our side of the desk internally, we would then hedge the resultant exposure using a number of different algos. And periodically we've been instructed by clients to employ algos on their behalf for larger orders of orders that they wanted. It worked over a certain time duration.
- SPEAKER1 02:26 So, were they sort of rules-based algorithms? Do they use any sort of AI functionality?
- SPEAKER2 02:33 So, I suppose algos can be considered in two ways, right? So, we would have algorithms that would attempt to mitigate the firm's risk. So, in an environment where you're trading OK with your clients, then that'd be mitigating your risk in the underlying market. You want to use algorithms that allow you to do that as passively as possible and therefore capture as much of the spread as you can without leaking that into the market. So, the intention of those types of algorithms that we were using were rules based and instructed to basically passively receive market spread. And it was a revenue maximization tool. On the other hand, we had clients instructing us to make use of algos to capture liquidity into and to attempt as best possible to capture volume in the underlying market and get their orders done as efficiently as possible. And those were less passive, typically because these

were used in instances where clients were looking to achieve volume that wasn't immediately available, that touch on the primary exchange or through OTC liquidity. So different functions, their clients would typically leave vanilla VWAP or TWAP orders to try to capture a proportion of the volume going through the market. From a trading perspective, we would use similar algos with different settings to try and maximize revenue.

- SPEAKER1 03:54 And what did..., were you familiar with that sort of design and deployment and some calibration recalibration processes? And what did they look like?
- SPEAKER2 04:03 Yes, it was a slightly different scenario to others you may speak to because we were relying on third party tools. So, we were an intermediary broker and we basically had access to the algo suites or various Tier one banks but were using their products. So, for us, it wasn't so much a tinkering process in terms of adjusting our own tools, but rather the best understanding the tools that were being made available to us by our brokers and deploying those either on behalf of clients or hedgers.
- SPEAKER1 04:34 And what advantages and disadvantages would you say that reliance on those third parties for that purpose sort of created?
- SPEAKER2 04:42 Well, I suppose in terms of advantages, there's the logistical advantage of not having to deploy a team of algo engineers to maintain and design that suite of products. I suppose we mitigate some of the risk I'll described by having access to the toolset of a few different types of investment banks. And that kind of gave us a broad enough suite of products that we were comfortable we could have access to everything we needed. The downside, I suppose, is that if you are looking for a more bespoke execution tool that specific to your requirements, that would necessarily be required by other clients of that investment bank, it makes it much more difficult to request tweaks because they're not going to design or have a team of people design and they'll go specifically to suit your needs, unless it's going to be a highly, highly used product . So, it's on the basis that we were using pretty vanilla tools and that we had access to a number of banks' products. There was no particular downside to us. But in an environment where we were exclusively executing on algos and had a business need for a broader breadth of execution tools, you could envisage that that would create its own problem and that you'd probably want to bring that function in-house.
- SPEAKER1 06:02 And what would what be your understanding of conduct rescanned and the firm sort of framework to manage or mitigate that?
- SPEAKER2 06:13 Well, I suppose, conduct risk exists with or without the use of Algos. Right. So, if you're thinking about conduct in the literal sense, how your trading team or how you trading to use those tools and whether they use them in an abusive fashion, an algo isn't really responsible for any additional risk from a pure conduct, behavioural perspective. What it allows for, of course, is rapidity and the ability for someone either by error or by malice to create a significant

impact in a short period of time. So, the conduct aspect is around, i.e. the normal conduct checks that you would conduct on any trade or in the normal oversight patterns that you put in place to make sure that malice and intended abuse doesn't occur. And then beyond that, it was education around the nature of the products being used, safeguards being put in place to make sure the algos couldn't run wild or cause more impact beyond what was designed, and then looked for the normal risk parameters around size of trading on any trading desk to ensure that you don't end up with excessive position sizing via fat fingers or malus.

SPEAKER1 07:30 So, you wouldn't say there were any sort of specific sort of new emerging conduct risks as a result of the deployment of algorithms?

SPEAKER2 07:37 It was I think one thing that's interesting is that there's definitely potential for habitual use of algos to cause lack of care and lack of attention from execution traders, insomuch as if you were previously accustomed to using full focus and manual execution to fulfil large client orders, those orders would have required very high touch attention, regular input from the trader, and in a lot of cases, regular input from the client where those orders are now being managed by algos. There's a tendency there for execution traders to potentially take their eye off the ball. Right. Because if you're used to using tools that do the job for you and then for whatever reason, those tools aren't available or client requests that you manage the order manually kind of out of practice. And I suppose the blessing and a curse of an outcome is that it can be left to do its thing. So, I if you're for whatever reason, not able to use the algo tool to fulfil a similar order, you're out of practice about how to handle that order. But also, the important thing, obviously, is not to take your eye off the algo because these are ultimately black boxes and machines, but they're not without potential for error because they've all got human input. So if, for example, you have complete reliance on the fact that the algos working within set parameters and those parameters have been entered by a human being, failure to check those, failure to maintain manual oversight, that algo could lead to some pretty big numbers pretty quickly fact fingering of an additional zero into an order box. And then the assumption that the algo is operating within the correct parameters is obviously only as good as the assumption that the person entering those premises has made an error. So, I think complacency is an issue. And I certainly think where there was the potential for malice previously, where a trader so minded to go and trade a book that is not supposed to be trading or overhead or seek exposure that was outside of his or her remit, the ability to build up that position larger and more quickly is certainly magnified by the use of an algo.

SPEAKER1 10:07 You mentioned about the sort of the human out inputs and sort of the operation of algo, within the rules of that have been set for it. What's your perception of the likely levels of self-calibration? So algo that maybe

recalibrates itself. Based on data that's available from various sources, Twitter could be obviously trading data.

- SPEAKER2 10:35 Yes. So, my only experience of self-calibrating or self-recalibrating algos is around perception of underlying volume. So, these are black boxes that have predefined assumptions around liquidity in any given product or daily liquidity or liquidity curves throughout the day that will adjust to spikes or troughs in trading volume in the underlying market to reassume what that day's trading might look like. And in my limited experience of those products, they work pretty well in so much as that's quite a narrow dataset to interpret. So if you're trading in a stock that would typically trade a million shares a day and half an hour into the session, it's trading three million shares, the algo can reasonably assume that this is a big volume day and in my experience, successful in assuming that what I'm yet to see evidence of is the kind of human input that you might get from an experienced trader around news flow, whether it's from Twitter or Bloomberg or any other at your fingertips news source, and the ability for the algo to successfully capture and make new assumptions around that information. So those are based interpretive algos that can make decisions based on what traditionally would have been considered human factors. I haven't really got the experience to talk to...
- SPEAKER1 12:02 What's your perception of the sort of knowledge and levels of understanding of algorithms conduct risk across the business or maybe away from the front desk, maybe sort of senior management stuff? Do you think it was improving or is it sort of staying still? People don't have that much knowledge yet, or do you think it was it was getting a reasonable understanding of it across the business?
- SPEAKER2 12:25 I think that people understand what their biggest concerns are. So, in other words, they understand that an algo is an accelerant or a potential accelerant to error. And the reason for that is that all of the headlines you say specifically around the equity markets are sort of micro flash crashes in individual stocks and that index future level algos piling in on top of flash crashes and causing three percent moves and major indices like the Dow. People have seen that on the news. They understand the potential impact to their desks of such occurrence. I think what's not so well understood is the level of human input that continues to take place into the use of an algo. So this idea that once you've plugged it in it's safe is perhaps not unanimously well understood among senior management teams overseeing trading desks, because actually a lot of it makes a lot of sense to say, OK, the use of these algo tools reduces the possibility of dispute between a trader and a client because it makes it a dispassionate process where the client sets the parameters, the trader and puts them on the machine does as it's told, but actually. The trade-off for that is that once the client set the parameters, if the trader incorrectly employed slows and the machine runs wild off the back of it, there's no oversight of that process or no ability to capture that error between trading and the damage having been done because of the power of

the algo box. So I think there's a broad understanding that algos should not be used in such a way as it creates havoc in the underlying that tends to be a lot of focus on market impact, the potential for market abuse, sanctions from a regulator or an exchange, but perhaps not such a deep understanding of input methodology, how the traders are going to be using those algos and when they will and won't use them and the reasons for why they will or won't in any given circumstance. And what the potential for dispute is in a situation where the trader using the algo has as input incorrect data.

SPEAKER1 14:45 And the understanding that people did have was that more gained through experience and sort of discussions maybe with other people in the sector, or was that something which was more structured...?

SPEAKER2 14:59 So I think there's a big, there's large variance in that, so certainly amongst quants that I've dealt with who are kind of self-taught around the best applications of algo boxes and who have got into deep dive conversations with the builders of those boxes, our counterparts, there was a deep understanding and a genuine best use case scenario around how they could make best use of those tools to maximize revenue. I think that was limited to the side of the business that was going to make use of those tools for revenue generating purposes. I think we were largely reliant on education from the banks or the providers in terms of how all salespeople and traders, but to use those tools on behalf of clients. And so, if and then at the other end of the spectrum, there are people in the middle office functions who wouldn't know Will any of the acronyms stood for much less how they the mechanics of how they worked actually played out? So, there's a big breadth of understanding. And you could argue that actually from a conduct perspective, you would want to have a much deeper understanding across the business of how those tools are put to use.

SPEAKER1 16:20 Are you aware of any conduct risk incidents involving algorithms in the subsector that you were involved in in the last few years? And maybe what was learned from that?

SPEAKER2 16:32 No, not specifically, I think challenges often arise after the fact when it comes to selection, right? So, if you've decided to make use of a passive tool to maximize revenue and then you've been on the wrong side of a sharp market move that would have been better captured by a volume capturing tool, that's kind of a hindsight situation. I'm not aware of any malicious use of algos to exacerbate a market move or create a risk hole that people hadn't been signed off for. And I'm not really, I mean, that they would have been instances where a client had made an instruction for use of an algo box to try to get them product and trader error had caused a dispute, but that was arguably the same as where they are inputting the trade manually because there was no accelerated factor. And I'm not aware of any specific instance. Obviously, there's awareness within the industry of the potential for algos to exacerbate loss.

SPEAKER1 17:35 And are you aware of, any sort of plans to reduce overhead on account of, you know, algorithms being deployed, so there's fewer human beings around?

SPEAKER2 17:44 Well, no, not to reduce overhead, but certainly to change the structure of what that overhead looked like. So overall, what that headcount looked like. So certainly a material change, I would say, across the firms that I'm dealing with and have dealt with in the last 10 years or so has been away from the old school broker dealer type model where manual execution and human decision making around risk decisions has been replaced by a quantitative approach and a data driven approach and a liquidity driven approach leaning on both quantitative analysis and algorithmic tools to make best use of risk and to monetize risk more efficiently. So, I've seen desks who are predominantly staffed by old school dealers of 20 years' experience, maybe a desk of 10 old school traders replaced by a desk of 10 highly skilled quants with a better grasp on big data and analysing the tools at their disposal. So not necessarily a reduction in headcount, but certainly a change in the in the shape of headcount.

SPEAKER1 19:03 In terms of managing potential issues with algorithms who did the firm use to try and spot any potential problems before or after they became an issue?

SPEAKER2 19:21 Well, I think you could kind of say that the firms that I've dealt with needed these measures in place anyway. But I suppose algos create the potential for larger loss. But we would have things like rapid fire checks to make sure we weren't trading repeatedly in the same product, in the same direction, in the same size, to try and avoid build-up of unwanted excess position. We would have total position size checks. We would have that variable by products, by liquidity, by asset class specific parameters. So, hold stocks in place so that even if a client's order was erroneous or the trader misinterpreted the client order or input their own data, those hold stops in the background would mitigate that beyond a certain risk appetite. But you could argue that those protections were and needed to be in place prior to the advent of algos. It's just that they're protecting you from a larger risk now than they were previously.

SPEAKER1 20:29 And the compliance team at the firms that you've worked up with, they're using sort of automated trades to bring themselves to spot potential issues, or was it also done manually?

SPEAKER2 20:41 There were automated tools in place. Marriage between shifts tended to be more by the risk teams, market risk and liquidity risk seems rather than compliance, who are doing a more manual oversight, but the tools that were in place, those hard stops and those metrics to prevent breaches all over the broker side or on the client side were managed by the quality resting on the market was team just to make sure that irrespective of what type of error it

was, breakdown of the black box, human error and error, whatever happens that they were hard stops in place. Automated heart stops in place.

SPEAKER1 21:27 Person of interest, um. Are you aware of any moves to sort of more sort of preventative evidence, sort of just the sort of stops that are in favour of any moves to sort of... acceptable standards of conduct. I'll give you an example, there was a thing with Google, with the driverless cars, they've had to sort of code in certain ethical standards because obviously somebody could say, right, get me to the airport in the quickest time possible. And they could take that literally take a shortcut and knock over a kid in there. So, they've sort of had to sort out the whole design process is designing certain sort of ethical standards and stuff to make sure that they don't just always take the quickest route possible. They also take the most ethical routes. Are you aware of anything like that?

SPEAKER2 22:16 You probably have to stretch the interpretation of the word ethical to put it under the same bracket. But in a practical sense, the banks and exchange members whose tools we were using are obliged by the underlying exchanges and regulators to take a hard code, a common set of principles across all of them to make sure that there were protections against breaches. Let's give you an example. Irrespective of whether you're trading with Morgan Stanley, Barclays, UBS, Goldman Sachs, they've all got parameters from the exchanges and regulators that they won't be allowed to breach irrespective of human input. So, if you're trading in a stock, for example, and you put in an order that's going to move the value of that stock by three percent, that's going to be unacceptable, irrespective of which trader which end client which PB that tool is being used by. So, there's hard coding around certain parameters defined by the exchange and by the regulator. And then within that set of hardcoded rules provided by the algorithm provider that's passed over to a user such as my former employers, then they set their own parameters to ensure that that doesn't breach internal metrics. And then you pass that out to your client in such a way as to breach them metrics. So, there's a number of different layers of rule setting. And at the top level, which is at the provider's level, they code all of the sort of necessary mutually agreed upon across the market rules that prevent running wild on an exchange because they don't want to be defined. Then the end, the intermediary broker will set rules around their own risk appetite to try and ensure no financial loss. And then the end client obviously uses the resulting tool that's had a number of layers of rules applied to.

SPEAKER1 24:15 And generally, how would you rate the ability of humans to spot events caused by algorithmic activity?

SPEAKER2 24:23 Well, some dangers are very easily spotted because the markets just moved three percent for no other inexplicable reason. And so, we're very good at spotting things after the fact. I think the issue comes around spotting the potential for now go to. Not necessarily by design, but inadvertently move,

the market will have an impact that wasn't expected because in the same way that small algos will use AI to reinterpret data and make new assumptions about the way the market's trading based on volume that can only be even in the most sophisticated attack that any retrospective. Right. So, if you if you set an elbow to trade according to the normal volume and then volume is higher than expected, at the point that it realizes that it may increase its participation rate, but up until the point of realization, it would have been participating based on what it knew about previous failure. So, in the same way, if volume was significantly lower than expected, say, for example, you're trading a very well traded stock that for unforeseen reasons, suddenly has a big volume drop out or if there's major news in an FX pair, that would normally be very well traded. So, you look at something like Dollar Swiss, which is normally available and very close to infinite liquidity, and then all of a sudden on the pegging day, it's moved 20 percent on low volume. The algos only realized that after it started participating. So in that scenario, you've got the risk that a major event, news driven event was caused by liquidity impacts, that the algos basing all of this decision making off of that kind of thing is very difficult for a human to oversee and write rules around because you're telling the machine to act based on all the information and then unknown information comes to market and changes the behaviour of the machine. And then you're relying on the machine to either have a circuit breaker in place that says, OK, I'll no longer execute, which may not even be what you want it to do. You may want it to carry on executing or for a human to act in time to save it from executing a crisis that you don't want it to do. So, you can be very, very conservative in terms of the way that you write your rules-based approach to these things. And you can prevent the machine from doing things based on information, but only when information comes to market and changes the dynamic of the trading environment. Or you have a situation where the rules that you've written prevent you from participating in a market that irrespective of the new information, you still want to be participating in. Either way, there's risk there that can't really be pre-forcing.

SPEAKER1 27:07 And what about regulators? What do you think they are well equipped to deal with this kind of stuff?

SPEAKER2 27:15 Well, it's very difficult for a regulator, isn't it, because where do you draw the line? You know, if I'm a trader sitting at a bank, and my job is to buy a very large size in a liquid currency pair, and I'm sitting there manually kicking buttons for three hours, picking off the offer from various market makers across the market, I'm effectively acting as an algo. I haven't seen the market working, so I'm trying to be smart with my execution and working with various liquidity providers. I'm breaking my order up into various sizes to disguise my true volume, and everyone would mutually agree that that's a more sensible way to trade them up to one market maker asking for days off. And all of my size and moving price against me is not in my interest. It's not in the interest of my client, and it's not in the interests of good market stability

to just whack prices around that huge choice. So that trader single-mindedly trading on that product is in effect, creating his own manual box. Or you can have a machine do it for you. And at what point between those two, is the regulator supposed to step in and say, OK, well, this conduct is acceptable, but if you're using a machine to help, as you would with any other type of trading. Then we therefore consider that to be high risk. In principle, the use of the algorithm, that scenario should be more efficient and should mitigate risk for counterparties. And so, there's nothing in principle to object to that. The objection arises when someone designs an algorithm badly or sets parameters badly around it. But in the same way I try to, acting manually could very well fail to put the appropriate controls around. I could move the market around without the use of an algorithm. So, I'm not 100 percent clear that there should be additional impetus on the regulator to put rules around the use of Algos. I just think that there needs to be a broader awareness that the failure to act sensibly and properly without those accelerates risks of all kinds.

SPEAKER1 29:34 Given what you mentioned earlier about the difficulty is almost the unknown unknowns, right, sort of the type of Euro-Swiss depegging we saw a number of years ago, which is sort of maybe a good example, something that just happens almost quite quickly and catches maybe everybody by surprise. Can you foresee a situation where we might move to sort of machines, almost regulating machines, where actually almost in real time machines are almost like Star Wars and the Cold War, where they are anticipating threats that are emerging in real time and maybe blocking or constraining a rival algorithm from doing something? Or is that just way, way, way too farfetched and problematic?

SPEAKER2 30:22 Well, I think there's a couple of problems with that. Right. The first is that in that specific market FX, everything's taking place off the exchange. So, you're operating in a purely OTC environment between counterparties that choosing to face each other away from a centralized exchange with no central clearing mechanism. So, it's not like there's a potential for a Big Brother type super algo to sit on top of it all and say, OK, who's taking part in this? And I'm going to set rules that say, OK, in the event of a deal or some other fracturing of normal market liquidity, I'm going to turn everything off because there's nothing to turn off. Everything's taken. It's like trying to referee a football match, which is actually one hundred different people playing one on one games at different parks in different countries. There's no way to ultimately oversee all of that, all of those relationships, all of those matches are taking place between independent OTC participants with no immediate oversight. The only way to restrict the way those games operate is to put rules in place around the types of tools they can use. So global regulators coming out and saying, OK, we ban algos that don't have the following safety mechanisms. Mechanisms in bill is forceable. Having a small computer that in the event of a market dislocation turns everything off. I couldn't foresee because so much

of the volume taking place is being done away from centralized exchanges. So, there's no mechanism for commodities like...

SPEAKER1 31:55 One of the things which the UK regulators tried to do recently is sort of move away from sort of harder rules, if you like, and moved to this emphasis on things like SMCR, where it's more on sort of general notions of how people should behave themselves and try and incentivise them to behave well. Maybe you get a higher bonus if you if you do something while you escalate an issue or obviously there's always that classic emphasis on punishment. Yeah. Do you think that that sort of approach stacks up still in a in a world where maybe algorithms are getting more sophisticated, and they may take on a degree of agency on their own. I mean, I go I draw an analogy with it was a piece of legislation that came out in the early 90s called the Dangerous Dogs Act. And it was a moral panic about dogs. The government had to show that was going to do something and they brought in potential jail sentences and fines and stuff that the owners who may have had the dog improperly, but then equally, the dog could be put down under the act. So, there was obviously a punishment actually for the dog. Sounds strange, but that there's always recognizing the dog as being an agent itself What do you think?

SPEAKER2 33:16 There's major challenges for the regulator because the FCA is not going to outspend Goldman Sachs and the sophistication of the people writing code for a major investment bank with limitless resource and the financial incentives to outperform the code written by every other player on Wall Street or in London, that incentive is much stronger and much better resourced than the incentive for the FCA to build supercomputers that can correctly oversee the behaviour of global algos, even if they were able to deploy that super committee to which they wouldn't be because of the issues we've discussed. So, a scenario where regulators are able to effectively outcompete participants in algorithmic trading markets seems borderline impossible to me. I think that is a symptom or rather another symptom of, as you say, this move to or rather the move is a symptom of that and other causes. When you talk about the FCA and other regulators moving to a principles-based approach and kind of placing the onus for oversight and regulatory compliance on firms rather than on the regulator themselves. So, this essential principle that designated people are appointed by firms, overseen by firms and ultimately self-regulated by firms, face the ultimate responsibility for when things go wrong. Because what the regulator can do is identify failures and conduct an oversight by managers at firms and punish accordingly and put restrictions around those individuals and firms accordingly. But I don't think they'll ever be able to do is to outspend and beat firms that are almost exclusively incentivized by performance to build the best machines in the business.

SPEAKER1 35:13 In the subsectors that you worked in, did you see a lot of industry wide collaboration to try and maybe address some of these issues in the futures market? You had things like the FIA, and they have sort of discussion forums and stuff, and they tried to find some common ground. Did you see much of that in this area, you working?

SPEAKER2 35:35 Well, I mean, to a point, yes. I mean, there's this kind of commonality around what people agree is a normal market conduct and what's sensible in terms of what these execution models are allowed to do in terms of pushing price around. I think everyone agrees that an individual guy moving the value of the top 30 companies in the States by three percent in 10 seconds is not favourable I guess there's two issues. The first is that it doesn't actually require one algo going broke to achieve the same effect because all of the algos chasing each other into a tailspin as markets fall can have a similar impact. And it's understanding at a macro level what can be done to prevent selling, breathing, selling and momentum out guys breathing further momentum. And that's a difficulty that the market faces. But I think there's a general acceptance that sensible rules around exchange circuit breakers and the prevention of single algos going rogue are desirable. I suppose that the conflicting issue and the one that's difficult to overcome is that ultimately these algos, by design and by necessity, are competing with each other. If X, Y, Z Bank has substandard algo that's trading in the same market as ABC Bank, which has written a brilliant piece of code that can outperform the trading performance of X, Y, Z, then that bank is going to make significant inroads into X,Y,Z revenue. So, whilst they can come up with common rules, the discussion of proprietary technology and the inputs that they give it in an attempt to outperform is unlikely because if you give away that IP, then what's in it for you in having the algo in the first place?

SPEAKER1 37:27 And what do you think of the merits of industry led versus legislative solutions?

SPEAKER2 37:33 I think industry leaders is challenged by what I've just described, which is that there will be some common ground that people want to avoid, namely adverse market impacts and market dislocation. But beyond that, there's going to be some natural secret keeping and courts held close to chests for reasons of outperformance. And I think that the challenges with the industry led us, the regulators led approach, or as we've discussed, that the regulator is going to really struggle to even comprehend some of the coding that goes into some of these black boxes by the really sophisticated, concerned algo traders that are building them. So, there's definitely, you know, risks associated with both approaches, which is why you ultimately end up with this hybrid model that we've got a moment where regulators can take action on misconduct either by malice or by complacency and can request or insist upon certain parameters being put around black boxes and all other forms of trading. And then you kind of rely on the individuals at those firms either who are directly responsible for the behaviour of the algos or for the oversight of

the users to behave in the correct, ethical and practical way on threat of sanction from the regulator. That's kind of where we ended up. And you can see what it really is.

SPEAKER1 38:55 How do you write the sort of the approach that's been taken in the U.K., maybe with things like SMCR, but maybe other initiatives as well? What does it do to any other jurisdictions you might be familiar with, maybe the US?

SPEAKER2 39:13 Well, I think in about half an hour to put myself into a position of taking the view that their oversight of things like algorithmic trading makes sense. And in that context, SMCR is a sensible approach, I think, in things like general market conduct, away from algo trading, market abuse, insider trading, more sort of old school traditional types of market abuse that you would have read about 30 years ago, pre advent of algorithmic trading and all the things that come with it. I think the sensible approach is an attempt by the regulator to move away from taking responsibility for the regulation of those markets, having failed to properly enforce their own rules historically. So, there have been a number of very high-profile cases where the FCA have sought charges against individuals for insider trading or for equity market abuse. And after a great bit of time and money being spent on those charges, they've eventually been dropped. Or that individual in question has walked away with a slap on the wrist. Even with the SEC and the states, typically the vast majority of market abuse sanctions have ended up in fines rather than any significant jail time or criminal sanctions. So, I think these regulators are slowly but surely coming to the realization that the burden of proof being on them for criminal sanctions makes it very difficult to achieve what they want to, which is a genuine punishment for people who have been behaving in a way they consider to be misconduct. And so rather than having that burden of proof placed upon them, they can move that burden to the financial services firms to have proper oversight. And they can say that this is no longer a burden of proof issue. We don't have to go after this individual who is behaving in an improper way or your client who was behaving in a proper way. We can just sanction the firm for what we consider to be a lack of oversight. And so, it's kind of some people would call that a bit of a copout. And so much as they are moving the onus from themselves, the regulator, onto the firms to conduct their oversight for them. On the other hand, it's a practical approach, isn't it? And so much as the firm has to take a much closer hand, not just in their own conduct, the conduct of their clients, the clients who are using the tools that they put out to them to say no, actually, irrespective of whether or not the regulator takes any action against you, if you misuse our platform, if you misuse our liquidity, if you use our algorithmic tools, whatever it might be, we're ultimately going to be on the hook for that, for failure to oversee your conduct. So, I think that's what's driving this whole global regulatory change.

SPEAKER1 42:07 Are you aware of anything, too, outside the trading industry, maybe another highly regulated industry, which also uses a lot of technology? For example, I

think in a previous interview, people mentioned about aviation. Are you aware of anything which the financial industry can learn from any of those other industries insofar as managing sort of algorithms and AI stuff is concerned?

SPEAKER2 42:37 No, not in terms of any specific knowledge of an industry that's implemented rules that would be useful on similar practices that might be useful in financial services. But the big comparison that gets made in the part of the SEC that I work in is with the big data approach to marketing, because what ultimately these marketing firms and firms that you wouldn't necessarily consider to be traditional marketing firms but actually are in the background are doing is just assessing billions of data points to decide what the best course of action is and allowing an ALGO to make that decision for them . And things like GDPR have been put in place to try and protect people's data on how it's used at a government or regulatory level for general safeguarding. But ultimately, in a similar way, it comes down to individual firms, to police, how they best use that data and how it's used to generate revenue, whether it's through packaging up and selling the data itself or just targeting your services and products based on the interpretation of that big data by your algo. So that that comes up in conversation. And financial services around these financial services firms are themselves looking for new customers and looking to target their products at their existing customers. And how can that best be deployed using the lessons that been learned by big tech and, in terms of putting those learning experiences to use on an actual trading tool like an Algo black box? How could we do that? But I'm not specifically familiar with any oversight practices that are used outside of financial services that could be brought in.

SPEAKER1 44:23 And finally, what would your principal concerns be for the future?

SPEAKER2 44:28 Well, I think there's a couple of things right. The first is that if you found yourself in a situation where all of the human elements of trading and all of the news flow capture and all of the smart decision making and customer interaction and all of the things not currently held by the black box were internalized then by part of that systemic Decision-Making process by a machine that has two effects. It reduces the headcount of financial services, and it reduces the oversight because theoretically at that point, you then only need middle office oversight tools, and you don't need to trade to it. And I think that is a negative outcome from a customer perspective, I think with a retail client or a hedge fund. It's reassuring to know that there's a relationship set behind the technology. And when that relationship ceases to be required from the just perspective, I hope that the market doesn't assume that it's no longer required for the maintenance of relationship and good service perspective, because otherwise, whether it's with your retail bank or whether it's with your broker or whether it's with a hedge fund trading with a vote bracket bank , those relationships will cease to exist and they become ever more valuable because those relationship management services, those sales

practices, et cetera, come into their at the peak when there's a problem and a machine by definition, is acting on the set parameters. And if there's a problem with those parameters and something's gone wrong, you desperately need human interaction to make sure that things can be put right and that relationships can be rebuilt and repaired. So, I hope that as machine intelligence evolves, it doesn't act as a replacement for human input, because I think that's important. And of course, if you've got machines intelligent enough to make decision. Make decisions on your behalf, and that intelligence has evolved to the point of it being able to interact with its inputs and override those inputs and make what it thinks are not more intelligent decisions than the ones that you've asked it to make within the parameters. Most likely you're then at the point where the machine is going to do what it wants, irrespective of what parameters you've put around it, because the machine has decided that actually you as the human don't know what's good for you. So, I'm going to do this instead. So that's kind of the ultimate concern, irrespective of whether in financial markets or any other sector is that the machines decide actually this whole process would be better without human input. So, I'm going to do what I want to do, irrespective of what the human says. And if he doesn't like it, I'm smarter than him anyway. So that's kind of the archetypal I'll go concern about robots taking over the world. But obviously it exists in financial services like it does everywhere else. But the more immediate concern for me would be know, does this increasing reliance on machines to make small decisions for a start to erode the human impact of the human element of financial services, which I think is really important?

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| SPEAKER1 | 47:39 | I'm sorry, did you...   |
| SPEAKER2 | 47:42 | they are just going to caveat that by saying that obviously my livelihood is dependent on humans being called financial services. So, I have ever so slightly talked about the... |
| SPEAKER1 | 47:53 | That concludes the interview once that I just switch off the...   |