

NTDS 032Key:**I: Interviewer****R: Respondent**

I: So basically, what I would like to talk with you... so it's obviously your work with MEDMI, including the most... you know, the values, things that that maybe you think that are more trivial but they are part of sort of the research process, so the kinds of work and roles or responsibilities you've been involved in MEDMI, people you talked to and people you worked with and this sort of... how you found working with MEDMI, with the other sort of investigators and so on.

R: Okay.

I: So maybe you want to start really in a more chronological order, just tell me about how... what were you doing when you got in and what work... what did you get in the MEDMI to do?

R: Okay. Well I was a CI on the grant that went in. This grant is a little unusual as in it's not about research, it's about... so I don't know how that sits with what you are trying to achieve here. The grant is actually about developing relationships and it was decided the way to do that was by building basically a computer platform in which data can be placed. The team went at it with a very broad approach and remit, so I think any type of data would be seen to be... that could be added. So, if anything, there was probably too broad an approach, because unless you... if you try to do everything, you sometimes end up doing nothing. So the type of data that would be put on there, I think was very much envisioned, or envisaged, that it would be a digital type of data, so not a text-free box, so it would be very much ones and zeros that would be going on, and I suppose the theme underlying all this was there's lots of datasets out there, many of these datasets are derived from research council funding and 99% of the time a million or two pounds is spent on generating data, that data then is processed usually by the people who collect it and they might get four or five papers and one high impact factor paper out of it and then that data is then put into a cupboard and never looked at again, which I suppose you are relying a lot on people to come forward with data. I think part of the learning process is that people who generate data tend to like to hang on to their data, they see the ownership very differently from what the research councils do. Research councils say, 'Oh everyone owns that data,' but the ability to access that data is practically zero even though it's not being used. Unfortunately, the way science works is it's a competitive process and due to competition you'd be a fool to give your competitor an advantage, so of course you don't, and then when you look at... Over time things progressed and the platform was built. Some data went on there, usually not research council data, usually it's data that's maybe already publicly available, maybe it's data that hadn't been linked before, so there is sort of a novel aspect to it. But as far as any actual research has been done, very little research was actually done because, as I said at the beginning, MEDMI is not about doing research; it's about building a platform that linkages can occur.

I: Yes. Okay. And thanks for this nice... it's a very clear introduction. And so as a sort of CI, what kind of area of the MEDMI were you most involved with?

R: Well, I suppose I was part of the journey right from the writing of the grant and getting the concepts together to aiding the submission of the grant through to then the management of the grant. So that was probably about a three-year period. And then towards the end we wanted to, once we'd built the platform, then I had a little project that went on to the platform as a trial run, I think they were calling them exemplar projects or something.

I: Yes, demo.

R: But the majority of the time from I suppose after we received the money, was a management type of process where I think the majority of the people who actually were on the grant had never built an IT platform before and so it was about the interaction between the people who were actually building the platform, of which I think there was someone there in a full-time position, maybe for 18 months of the three-year period. So there was that person actually building what it was. There was my role also in... So my role was to sort of get a little bit of a grasp on what they were doing. It was also interacting with people who had data because obviously if you build something you need to put something on it to see how it works, so interacting with a series of groups to see what data they were willing to part with, to put up there, and then I suppose the ethical dimension of... and governance, I think, is... I think that surprised us all a little bit. We knew that there would be issues around governance, but the governance issue I think was much larger than we had anticipated, in as much that... no data is free. There's rules about data. Unless you actually physically, as an individual, on the weekend, when you are not currently employed with the university, go out and collect some data, so I could go off and measure how many trees are around my house when I was unemployed, I would have some sort of ownership over that data, but any data collected by someone who works for the government or works for a university or is on the payroll of a research council, there will be rules around who owns that data. I'm not saying that's a bad thing. I'm saying that it exists. And that predominantly kills off the whole idea of MEDMI which is giving free access to data to people, because that data is owned and that means there's checks and balances about the release of that data, there's checks and balances around who gets access to it, there's checks and balances around releasing data that is of dubious quality, and that's fair enough. You don't want to release data out there that is maybe wrong, maybe incorrect, without the proper checks and balances before it's released. And then obviously if you are going to put work into data, so data is... there's crude data, there's raw data, then you do something to it and as soon as you start working on it it increases in value and those values assign it... it then has a worth and people tend to take ownership of things that are valuable, so then it's really matching the philosophy of MEDMI to the pragmatics of the real world of having data sharing. So we all sit in our ivory left-wing towers and say, 'Ah, wouldn't it be great if we shared this and that and this and that?' And in a perfect world, yes, that's great, but obviously the real world is a little different from that.

I: Right. Could I ask you to... I found it very insightful, your comment about as soon as you start working on data then it increases in value. In what dimensions do you see sort of these values being increased?

R: Ah right, okay.

I: **I'm just opening this a little bit because I mean it's just an interesting reflection.**

R: Yes, yes. No. Well, value, it's a very loaded word, isn't it, could mean all sorts of things. Value as in the data has greater potential for better scientific work, so it's one value. Another one is monetary value. So if you have to pay someone for a year to process some data, that data then has a greater monetary value than what it was before. But value and price are two different things, so it's only realised once someone else wants it. So it's all that supply and demand sort of theory. So if you increase the value of something, that you think you've increased the value of something, if nobody wants it, then it's a different story and then if they can't get access to it due to some sort of rules been placed by government or otherwise, that also means that unless you realise it, i.e. the person gets hold of the data, then that value is meaningless.

I: **Yes. Sure. So if you try to recollect the sort of timeline of the project, how this and when these issues started to come across...**

R: Okay. I think it was pretty early on, because obviously... well, because the project was so broad, i.e. all data from all comers, meant that well that's impractical to try and build a platform that all data can go on because that's just ridiculous, you can't build a platform that has all data on it, so really you have to build it towards an audience. So pretty early on, I was, and I think some other people were on board with this as well, saying well you've got to think about who your customer is, who your client is, who is actually going to use this – is it a clinician sitting in the Midwest of the US is going to dial up to see what pollen forecast is for his town over the next six months, or is it a scientist sitting in Berlin who's had 30 years of working on the same dataset and who then wants to share it and see how things come back? So it's really thinking about who your audience would be. So once you've had some of those discussions, and maybe it's a lack of imagination, but you tend to go with the things that are closest to you because they are the ones you know the best. And that's sort of what happened was it was kind of built for similar types of people to us who, well, were probably also struggling getting access to data. So the people who weren't interested, obviously, were the people who have the data, because they've already got it and they are not interested in sharing it.

I: [REDACTED]

R: [REDACTED]

I: [REDACTED]

R: [REDACTED]

- I: [REDACTED]
- R: [REDACTED]
- I: **Right, okay. So can you then... I didn't want to break that flow, go back to that thought. So you built a platform that was built for other researchers similar to you?**
- R: Yes. I think we always had in the back of our mind that we'd be... we're already a transdisciplinary group, so we are already working with a range of people. So even people as diverse as sociologists and psychologists. These are people that are off my radar on my normal sort of day-to-day experience and there was some idea that industry could play a role here, maybe. But I think they are a little bit more fiscally aware than people sitting in universities. We were going at it in a fairly broad sense, but at the end of the day some of those other parties that I think we would have liked to... or even Citizen Science groups, they hold data as well, or even things like say Asthma UK which is a body that represents patients who have asthma. So they obviously have a lot of asthmatics on their books. We were thinking quite broadly to start with, but how to coordinate a lot of these things, I think... but at the end of the day, we weren't actually doing the research, we were building the platform to put data on, and I suppose the first port of call is you do it with something, with what you know and understand, so it was data that we were familiar with and that we understood, and you do that as a trial run to see if it works. The next stage I wasn't funded in this particular grant. Now, whether they go on and get further funding to do something similar and include a broader range of data and institutions holding that data is to be seen in the future.
- I: **Right. Yes, yes, yes, of course. So when you were saying... so you tried also... you didn't have much success in receiving interest by Asthma UK or Citizens Science groups or other kinds of actors.**
- R: I don't think we actively pursued them very hard. I think the potential is there. I don't think it's such a bad idea that they reject it outright. I think one of the biggest hurdles here to be jumped over was the fact that it was about health. If it was only environmental data we were talking about I think that would be quite different. If it was only business data, it may even be a worst-case scenario, but once you start dealing with health, a lot of people, including myself, don't like my health records being public. Now, whether you can come to some sort of compromise, and obviously this is a very turbulent time around health data. The government absolutely stuffed up with the data.com crisis happening in the middle of all this. I think in the future people won't worry so much about their health data being utilised in a more full sense, but at the moment there's a hump, probably a fair proportion of people that don't want any of their health data made public. I think in the future that we'll find ways of coding it, and in fact there are groups round the world that have worked out how to do this. MEDMI isn't one of those groups that went down that path. I think maybe naively again they thought that people would be very happy to have their entire health record put up on public display, which I don't think that was a particularly realistic...
- I: **Yes, assumption.**

R: And you talk about, ah well, we'll identify the data, but one person's identification is not another's. As soon as you've got their sex and age and location you are pretty 99% of the way towards identifying someone, especially if you've got things like date of birth. And if you are going to do health, having a person's sex and age is pretty important.

I: **Right. So I would like to understand a little bit more about this. So was the plan initially to take records from these datasets, I guess from Public Health England and other kinds of organisations and basically anonymise them through standard techniques which, as you were just saying, obviously, it's always to some extent because it could be contingent? And then putting basically these records entirely available online, was there sort of a kind of access policy that was sort of designed or thought about?**

R: Yes, well I don't think there was any design prior to receiving the funding. I think once we got the funding we realised that... there's different ways of having data release. Now, one model, for instance, is used by NHANES. I presume you know what NHANES is. It's an American national health data. So basically they have the shotgun approach, they put up the data, no geographical reference to it, so that's a bit on the downside and that's why that particular approach wouldn't work with MEDMI because all data in MEDMI is linked by time and place. But their approach is you put it out there and it's a shotgun start. So you put all the data... every six months or so a new dataset is put up there and researchers from all over the world can tap into it and use it and publish it and there's no sort of rules on that. One downside of that is untrained scientists or even, may I say, unscrupulous scientists may actually publish things that are complete nonsense and they know it's complete nonsense and stick it up there. And this debate has been going on in the New England Journal of Medicine over the last little while about how free data should be and how data should be released and how, once you lose that control over data, people can turn that round and publish absolute nonsense.

The other kind of approach which tends to be used more by cohort studies is where an individual starts to study up and they may well use government funding and sign all these waivers saying they'll release the data, when in actual fact you never... they maintain control over that data and hide behind this sort of wall of, 'Ah, well I'm protecting the data and it would be unscrupulous for me to release this data. Ooh there's consent issues.' Basically, you have to apply to them, then they look at your application and go, 'I don't know this person, I reject it, or I think their science is dodgy, I'm going to reject it,' so the control very much stays with that individual. They'll look at it and go, 'I'm competing against this person and I reject it.' They'll look at the application and say, 'We've got two groups working on this. We can't have that, that's a waste of resources,' which in some that's a pretty fair argument. The other argument is what if you got the same data, two groups working on it using two different techniques and came up with two different answers? Both answers would be correct. So those decisions have to be built into how you release your data. Who are you going to give access to? Are you going to give access to everybody in the world? Are you going to give access to the people you like in the world? How philosophically capable are you of making those decisions? Are you going to release it to people who work in universities who understand data? Well, remembering about 50% of

what you read in publications is absolute drivel, that doesn't work either, so then you just end up releasing it to your mates and the whole idea of a publicly available access kind of dies pretty rapidly.

Some of these philosophical questions I suppose had to be confronted during the time of MEDMI.

I: So when did you start having these conversations?

R: Pretty early on I think because we realised that, well, the environmental data, people were quite happy to hand over swathes of it. The health data - and remembering this was a mash-up of environmental and health data - the health data wasn't so forthcoming and the only health data maybe that you could get to put up had little or no value.

I: Yes. Why didn't it have any value, the ones you could put up?

R: Ah, because once you remove any identifying features...

I: Right, okay. Those were the shotgun approach...?

R: Once you start doing that, pretty rapidly... especially if the way MEDMI was set up was it wasn't linked by an area, it was about people... to link back to environmental data you need to know where people are in time and space and once you do that you are starting to identify people and then you start having these questions around granularity. Now, if you want to build a platform that all people can access, so making it as broad as possible, that means you have to have minute granularity because you can't guess what researchers will need, so of course you go for the micro granularity and that's locating people within 30m of their house which means they are identifiable. Now, if you go to the other end of the approach which may be... an alternate, shall we call it, that people, we decide on a granularity that's, I don't know, county level, for instance, there's no way of identifying people, so you probably would be able to get access to more health data, but then you are going to limit the types of projects that can then use that data because it's like a granularity.

I: Yes. Yes. One question that I'm thinking about since you were sort of dealing with all these kinds of questions, did this delay in the process of getting access to datasets and stuff also affect or shape the development of the underlying infrastructure, in the sense that...?

R: No, I don't think so. I think because it wasn't publicly available. So we could have dropped any data in there, didn't have to be... I've got data that I could have easily dropped in there, but it's not public, so all you are doing is you are building the platform. And in theory, I think, according to the grant, all we had to do was at the last day push a button and say it's not live, but doesn't have any data on it, and we offer it to researchers to put data on. Obviously, to market it better, to sell it to our customers, quite often what you do is you have an example. So when you go to buy a used car you are allowed to drive the car round the block to see how well it runs, and by having a similar process, by having some data up there, people can come in and have a little go at it, drive it round the block and see how it works.

- I: Right. Yes. No, no, I understand these aspects and that's why I guess as part of the pilot (unclear 0:27:54.4) are these demo tools and demo datasets which give the idea what it can be used for.**
- R:** Yes. But remembering, because it had such a broad remit, we kind of went with what we know and it's quite narrow. Maybe it would have been better to have some other example of projects that were a little bit more diverse, but obviously with only a 33-month time period there's a limit to what you can do. Maybe right from the beginning we should have thought about attracting other people to put data up. But if it's health data you are always going to have these issues.
- I: Right, yes. But it was a little bit along these lines that I was thinking about in my previous question, because since you were, you know, a subset, say, of researchers that are out there and you had access to a subset of the datasets you could access potentially ideally, then in the way you design and shape and took decisions about the infrastructure in terms of granularity, in terms of other kinds of decisions, then these contingencies – that was my question – could have shaped a little bit sort of what...**
- R:** Ah yes, okay, I can see where you are coming. If someone had come along and said, 'Here, have this dataset,' at a certain level of granularity, this comes down to I suppose a fairly fundamental question about using secondary data in research. That question is almost back to a philosophy of science of do you dream up your research question and then apply it to the data or do you get a big secondary dataset, link it to another secondary dataset and then go, ah, this is a really interesting bunch of data, why don't we look at this question? Now, I think in first year university they will teach you that the former is the better way to do it and you'll have less bias and all these sorts of things going on. The latter is probably what really happens in reality, unless... especially with researchers who have moved away from the organ-based model of medicine, which I think is the trend at the moment. I think those people who are still adhere to... are either lung doctors or cardiovascular doctors will obviously target their own areas of interest and come along with their own knowledge gaps that they want to fill, but because of that sort of philosophy the temptation... and, you know, it's an interaction. Obviously, you have got some questions, you go and look at it, come up with a better question or it shapes the question that you have – 'Ah we are missing there whether they smoked or not, we'll drop the lung cancer question,' so the data will shape your question and eventually you'll come to some sort of agreement, but it's... the inherent danger is... And what I've noticed is working with people from other fields, especially who are not used to the rigidity of science and the 500 years of philosophy building on how to best answer a question, very much come saying, 'I want to show this, I will then go and find the data to prove my case,' which I've very much found with psychologists and sociologists that I've worked with, though scientists I think are much more open-minded and come along and look at the data and say, 'I think this data shows this.' Now, both are equally strong philosophical standpoints. Unfortunately, the science of psychology is only 100 years old and doesn't have that background of many years of going through all these processes and working out that the amount of bias you accumulate by taking the former philosophical approach more often led to bias than others.

- I: Mmm. Yes. I see. So I think you were also trying to link these back to our conversation to the more sort of situated comments of MEDMI. So you were saying this is also simply a way in which MEDMI can be useful, is basically the... I mean, you haven't figured out all the questions you can ask.**
- R:** Ah for sure. I mean, if you take, for example, we've come from very much a fairly basic science sort of approach where you have an exposure, and maybe it's an epidemiological approach, maybe that's something I'm familiar with, where you look at exposure and you see what the health outcome is. Now, we never really discussed very much replication. A big part of science is being able to replicate your results, so that means you repeat the experience. Now, in epidemiology it doesn't happen very often because populations differ, but MEDMI may be one of those facilities where someone has their own dataset, they have an outcome and they find chemical x causes cancer y, they think they are on to a winner, it's looking like it's a reality, then they go on to MEDMI to replicate that experiment in a different data group that they didn't have to spend 2 million pounds to go and collect but that data is freely available. Another one might be natural experiments where, say, government policy in a certain area comes in. The government thinks it's a good idea to close down the number of pubs in a certain region to increase health. Okay, ten years later you can go back and look what happened in that region, did health increase in that region? So there's different uses for data rather than that sort of... the first model that I was sort of talking about. And I think some of those other models are certainly applicable to a platform like MEDMI, but the MEDMI project wasn't really about that, that was more about building the platform and then trying to think about, I suppose, what other uses... that's really for the scientific and wider public to come along and see what it can be... what this tool can be used for. So I suppose I see it very much as a tool rather than an actual collection of datasets.
- I: Yes. So the most important legacies in the techniques and the ways you can link or analyse the data that you have embedded in the infrastructure.**
- R:** Yes.
- I: Mmm. One thing that I would like to ask you, that I'm trying to understand a little bit is... so I've been told by multiple people obviously that there were delays in accessing some datasets and this became a major story for the project and then in the while, however, there were also the teams that were doing the demo projects, demo in the sense of the web application, but then also demo in terms of doing some research publishing, and so my question is like what was the relationship between what these projects were trying to sort of study or ended up studying and the story about what datasets were made accessible and not, in the sense that I understood that there's the demo projects, some demo projects started very quickly, as soon as the MEDMI was on, sort of there were already some research initiatives that were starting, so I wonder would they have developed...**
- R:** Okay. I'll sort of answer your question. I think it's a question. I personally don't think waiting for data was much of an issue, even if other people have said so. MEDMI is a platform which any data can be put on, so it's really just a matter of getting hold of data. Now, where that data comes from I don't think

is really important in the MEDMI story in as much that you are wanting to link datasets that haven't been linked before. But I could link [laughs] the colour of rocks on the moon with how many children are born in Adelaide, South Australia. That's still a linkage and, you know, now it might be a bit harebrained to do something like that, but MEDMI isn't about research, it's about linking datasets and we might find something amazing. The projects that were the demo projects I think were very much projects that were already happening outside of MEDMI and people have gone, well, no point in waiting round for data, let's dump this data onto this platform seeing I own it and I have signoff on being able to make it public, although I don't even know if MEDMI has gone public yet, has it, and any data, way, shape or form has gone public? I think it's very much the data has been put up there to say well this works. Some people have access to it. I think the general public would have access to a limited amount, probably just a very minor demographic sort of summary tables. And in fact, the project that I was on wasn't even about putting data live onto MEDMI, it was about putting an application in to get data that could potentially be put on to MEDMI in the future. But the chances of all of that data going live would be minimal at best.

I: Yes. So there was no particular expectation that people could have done research about other kinds of subjects as well, other kinds of topics as well, or there could be more...?

R: I don't know about... it would be very hard for me to tell you the expectations of people. I think the expectation at the beginning would be that people with data would donate their data to MEDMI. And some organisations did, especially those who held environmental data, but even that... I think the project was built on the idea that there is public data already, but I think once you go and scratch that publicly available data you very quickly learn that even though it's available to the public, there's certain licensing that has to occur before you get access to it and in no way, shape or form are they relinquishing their ownership of it. They are letting the public use it, but it doesn't mean you can then take that data and put it somewhere else. They still maintain control over it.

I: Yes.

R: So when you come down to ticky-tacks, even though there's all this data around, none of it is actually publicly available... well, we say publicly available. It's not available for ownership by other people. There's a subtle difference there that I think we learnt along the way, was publicly available data is still owned by someone else.

I: Mmm, yes. Yes. I've understood that in particular the issue of accessing was different from the issue of republishing.

R: Yes, yes, exactly. And that's probably very wise that these groups do maintain ownership because what if in three years they find the data is wrong in some way, there's an error? I mean, datasets always have errors in them. They then maintain control, they can go and fix that data and then they've main control. If you put it into the public domain, then you have like three datasets floating around. Which is the right one to use? And probably most of the time it doesn't matter, but sure, you know, once we start getting down to the nitty-gritty of whether your colon cancer was in the first third of your digestive tract or was it in the jejunum or duodenum, once you start getting...

what was your Glasgow score when you were admitted to A&E, was it 5 or was it 10? Once you start getting down to the nitty-gritty, which data is all about, obviously maintaining control is very important.

The other thing is what happens if you put data out there and people change it? There is nothing to stop someone coming along, downloading a dataset, doesn't suit their philosophy, they change that data. I mean, it's hard to believe I know, but there are some unscrupulous people out there and fraud in science is a reality.

I: Yes, yes. Thank you very much for all these insightful comments. I'm going to ask you the conclusive questions.

R: Okay.

I: Basically, these questions are more related to possible future initiatives or sort of, yes, thinking again about the experience. So the question is: what would you have done differently? I don't mean you, Nick, in person, but as a project overall. Would you have had more resources in particular aspects or managed the process differently? What would you like to do if you had no constraints of a particular way? These kind of...

R: Yes, yes, no, that's a pretty fair question. Well, I mean, every project has its hurdles along the way. You don't do science because it's easy. I'll put that in as a caveat to start with. I think when you look at the project and you go back to the original grant on the idea and what you wanted to do, I think part of the process... I think people have forgotten what the process is. I think people are thinking, well, we really should have some research papers at the end of this and probably a couple of... I think there's a couple of methodology papers coming out and I think that's all you could expect for the type of funding that this is. So part of it is... it was to be a learning process. I think the actual team that was built was quite good. Unfortunately, it didn't reflect... I think private enterprise could have played a bigger role and I think maybe having a part of the team that would potentially be more IT savvy. So I think you had a lot of people who have used data in the past, but they actually hadn't built from the bottom up a platform and I think the model that was used (ph: 0:45:29.0) **that will ship** people in to do that, and I think that worked to a certain extent, i.e. a platform was built, but I think some more guidance with that along the way would have been better. If I had my time again, I think getting hold of some datasets to use as exemplars prior to submission might have been good. Having some pilot data even before, although you can't have pilot... I think having your own data is very important, is one thing that I've noticed, and if you are going to be successful in the UK research landscape, you can only be so successful borrowing other people's data. It's much better to have your own data because then you control it and when people come to you you can make that decision of whether you hand over your data or whether you are allowed to hand over your data. But having no data is a very sad place to be.

I: Right. Why is that specific about the UK?

R: Ah, I don't think it's specific to the UK; I think it's anywhere. If you've got data you've got power. It means when you go to negotiate with someone about their data you can put something on the table. If you have nothing and you go to negotiate, you are not going to get anything.

I: **Yes.**

R: If you rely too much on good will it doesn't work.

I: **Right, yes. But what would have been the benefit of holding more datasets prior to submission, was that to attract more a diverse sort of audience? What do you think would be the difference?**

R: Yes. I think it's fantastic that the approach was a mash-up, so you'd expect wanting to get a range of data, but I think quite quickly we fell back into the rut of doing what we know. I think by having a range of datasets to start off with, you could have really shown the diversity of what you could have done with a platform like this. So if you had, I don't know, the Devon school children's away-from-school data, get some really different data sources not just the run-of-the-mill stuff that's getting pumped out at the moment.

I: **Yes, okay.**

R: And why not have Sainsbury's tissue sales data up there?

I: **Yes. Yes, sure. That makes sense. Okay. Do you have any other comment or thought that you would like me to record as part of these exercises of reflection?**

R: Yes, I think the one thing that I've learnt from this is really you have to come at this with a certain attitude of if you are running something like this and you want it to be used, which is sort of the whole philosophy behind MRC, NERC funding, is that it's used, is you really have to think very carefully about who your client, who your customer is going to be for something like this. It's very difficult, especially being an academic where you might be very sort of linear kind of closed ivory tower type of sense, but you are only going to attract a diversity of people if you build it for a diversity of people. If you build it for yourself and people like you, well more than likely only those people who are like you are going to come and use it. If you want a wide range of people to come and use a resource like this you really have to step out of the box and think, well, why isn't Google coming to me to ask for this data? Why isn't the, I don't know, Yorkshire County Council coming to ask me about this data? Why isn't that preschool in Bournemouth coming to ask me about what I can... what data can I use for them?

I: **Yes.**

R: But saying that, it's very easy to say, especially when you've got such a broad breadth. The problem is it's very hard to build something that's for everybody. So you are between these two places. So do you build it very niche or do you go extremely wide and no one uses it? So it's catch-22. What the right recipe is I don't know. I think we've learnt a lot along the way and my sort of philosophy would be you'd actually build it with 15 silos that are targeted at 15 different groups, and don't try and do everything for everybody because you'll fail, but on the flipside you need to do some things for a diverse bunch of people, so making a number of niche applications, certain niches that you've already seen would like to access it. So I think that's what I've sort of found from this.

I: **Yes.**

R: I said 15. That could quite easily be 5 or 500.

I: **Yes.**

R: That number isn't based on anything; it's a gut feeling.

I: **Yes. I get the concept. It's the number; it's not like everybody.**

R: Yes, yes, yes.

I: **So it's like, yes, more than one and less than infinite.**

R: Yes, yes.

I: **Something along... I take... Okay, yes. Thank you very much, it was very, very insightful, it was very, very helpful.**

R: Great. I hope I've helped along the way.

I: **Yes. No, thanks very, very much and thanks a lot also for your time.**

R: No problem. You enjoy your evening.

I: **Okay. Thanks. Thanks a lot. Have a good day.**

R: Okay. Cheers. Bye.

I: **Okay. Thanks. Bye-bye. Bye.**

(End of recording)