HUMANE focus group: eVACUATE #3 – research engineers
14 October 2016

M1-2 = moderators
P1-5 = participants

< Welcome and outline of focus group >

M1: Well, thank you very much for joining. So I thought I'd start off by just saying what HUMANE is, because that's the reason why we're here. I mean, it is one of our EC funded projects in the first round of H2020 projects that started for us. Now, there's two objectives of the project that's of relevance here in terms of what we're going to be addressing as a focus group and that's the project needs to create a typology of human-machine networks. I'll say in a moment what we really mean by that. This typology is meant to help describe and analyse these human-machine networks, particularly to aid system designers when they're designing a new system or updating an existing system, as things can evolve over time. The hope is that we produce something that will add value and allow people to produce more successful human-machine networks. As part of this we're going to be talking about implications to the design and the use of design patterns. Now, as software engineers, design patterns have a specific meaning and it might differ a bit from how we talk about it in the project. So if it's useful for you, you can think of it as more talking about design solutions. A way, to let's say, help address common problems. It's one of the aims that the project has attempted to address fairly recently. Now, the other aspect of the project outcomes is a method, essentially to apply the above typology. So we're here to evaluate these two things and any feedback that you can provide to us, either through specific questions that we have or general things that come up, is meant to improve both the typology and the method for the next and final version.

P1: When you say typology do you mean taxonomy?

M1: No. It's similar. So typology is essential a study on the classification of types. It's generally a bit more abstract than what you'd have for taxonomy, at least in my mind. In this case it's a way… the type is a human-machine network. You'll see in a bit what it looks like so it'll be easier to see the distinction between a taxonomy and this. Now, in terms of what we call a human-machine network, it is a term that encompasses several things that you might have heard of in literature if you've worked on social technical systems, social machines and so on. They are networks that comprise

both humans and machines, we can call them nodes in terms of network theory language, that are interacting. The idea is that while they're interacting there are some synergistic effects that come out it. Now, a distinction that I want to make for us here is that we're quite keen on networks in which machines are active participants. So we're not just talking about a platform that mediates social activity between people necessarily. A machine node can be anything from the hardware, the services, servers, networks, the platforms that I mentioned. They are sensors, robots, various devices and so on. Now, we'll be going through the method in a lot more detail throughout because part of the evaluation is for us to go through the steps of the method that the project has proposed. But just to say at this point, the method is proposed in the context of a standard methodology, an ISO standard; I can't remember the numbers now. But it's on human-centred design. It's an iterative cyclic methodology in which you start off with doing some context analysis by the system that you're designing. Collecting user requirements, coming up with designs. That could be paper exercises, prototyping and so on and then evaluating those designs. And you might then iterative back to the context analysis, user requirements or just iterate over the design and evaluate stages.

< Introducing HMN used for the focus group >

So I've put this here on a picture so that the five steps to the HUMANE method fit in within various phases of that methodology. So we're going to go through some of that with an example network, which some of you might realise where we have the inspiration for this one from. But speaking of it in more generic terms here, it's about emergency decision support networks, for large scale venues for example. So we're talking about crowd management and evacuation. So for this kind of network we have various human actors and machine actors. The operational staff, who are responsible for the public who will be attending this venue, they have certain responsibilities to help in evacuating them, for example. Quite important. There can be other actors who get involved if some situation occurs at this venue. If an emergency occurs people need to be evacuated. Ambulance and Police are examples of emergency services that could be called in to help. The Fire Brigade as well. Special services are more if, let's say, there's a terrorist situation. That could be calling for special services to come in. Then machine actors. We have the decision support system itself, which is the innovative part of this new kind of network, that consumes information from various sensors. These could be sensors for video footage, temperature and various kinds. But we also consider that it could be signage that gives information to the public as well. And then the other machine components could be communication devices,

whether that’s smart devices, phones and so on or walky-talkies that could be used between operational staff. And then the servers, databases, network links, etc.

Now, this next slide show a high level network diagram of this, an informal way to represent it so hopefully as intuitive as possible. So we’ve got the decision support system, somewhat in the middle on the right-hand side of here, predominately being used by operational staff. And as I said, it consumes information from various kinds of sensors or feedback to sensors if you have things like smart signage at venues or user devices. And then on the far left you have the public reflected here as if a situation has occurred where they need to be evacuated. We can call them evacuees. Now, within this group of people that in itself can form a network where we can talk about them having strong connections with some people, if they’re at the venue with family or friends. Or if it’s a football stadium you can talk about people in terms of being on two different teams and there’s some rivalry between them so you wouldn’t necessarily say that the network connections between them are particularly strong. I’m introducing some terms that I will get back to in the typology, about reflecting the ties between people, if you’re familiar with that term. I’ll talk a bit more about that later on.

So before we move on, does this example network system make sense to you? Do you have any questions?

P1: What’s a seed?

M1: So if you have … within a group of people somebody who can stand out as a potential leader, let’s say. So it’s quite a specific term from network theory.

P1: So you’re showing types of people rather than instances?

M1: Yeah. So these are people who might help others evacuate. They might help communicate with emergency services to provide information about what’s going on to help them understand better the situation.

P2: Are the arcs between the groups paths of communication, or … I’m not sure?

M1: They’re more reflecting than the nature of the relationship between those types of people, if you like.

P2: So what are we saying between sensors and all the various people on the left there?

M1: Okay, so for the sensors they haven't really marked them. Because there's various things going on so it's just for simplicity. But it's to illustrate that people will be consuming information from some sensors, signage for example. But also sensors can, you know, cameras are observing, for example, the public at these venues.

P1: Couldn't you have the civil protection agencies directing people. There's no interaction. It's Police telling people what to do as well as this signage and stuff like that.

M1: Yeah, sure. I mean, operational staff will have that role as well. [P1: maybe it doesn't matter…] So, you're correct in weeding that out. The diagram, in many ways, it's to help simplify a view of the main instances that we thought was relevant for this. But you are correct, thank you.

< Step 1 of the HUMANE method – purpose and objectives >

So hopefully that's clear enough that we have a common understanding of this network and what it aims to achieve. Because the first step of our method in the project is to talk about what's the purpose and objectives of the network? Now, there's various reasons for doing that. It will help with design but also parts of what we're going to do later on. I want to write down some things because if we're going to talk about what are the implications of certain designs, it really depends on what the purpose of is the network. Because certain designs can work for certain networks and not others. It depends on what they're trying to achieve. So here are the first tasks that I would like us to do as a group, as much as you can from the understanding of this kind of network. If we were to talk about the purpose of it, one way to think about it is why the network exists or if it's something that hasn't been designed yet, why should it exist. So just think out loud if you like, but any suggestions from your understanding of the network; what would you say are the key purposes of this network would be?

P2: What hat do I have on?

M1: If you were, let's say, somebody who owns the network in quotation marks - who needs it, who tries to set it up, who will be then passing on this information. For those who are helping design the system so that they understand what they're designing for, if you like.

P1: Are you talking about the civil protection agencies or the venues which would use those agencies to be secure.

M1: Well, let’s take it from the view of the venue. I’m just trying to simplify it. So the decision support system and the technologies can be used at different venues.

P2: It might be helpful, at least for me, if we could just make this exercise a little bit more concrete. Could we actually select a venue and start thinking about it.

M1: Okay, let’s take a football stadium, which can be used for concerts as well if you like, and other events. But let’s say football matches and so on. People are paying to enter the venue. There will be operational staff around in the stadium to monitor what’s going on and help people get out safely if there’s an emergency. There will be somewhere a control room getting information from various sensors where a decision support system will assist some of the operational staff there to get information on what’s occurring and the state of play.

P2: And I’m thinking about this problem because there’s an annual review of safety? Is there a context in which this problem is being looked at?

P3: For example, is there a regulatory requirement to have such a system, which would be a reason why it existed?

M1: There could be. In the first instance, I guess I’m thinking a little bit of a higher level than that. So if I seed one thing, one of the purposes of this network is to help people evacuate safely. Save people’s lives, if you like, that sort of thing. So starting from that level.

P1: It depends. I mean, if you’re representing the venue as the owner then you might actually take a business approach and say your objective and purpose is to comply with the regulations so you’re not shut down. To protect yourself from litigation. The side effect of that is you want to save people’s lives when they need to be evacuated from your venue.

P3: Saving people’s lives might be the objective.

P1: It might be the thing you do to make sure you achieve the business objectives.

P3: Saving the life reduces the risk of litigation.

P1: It depends which viewpoint you take really. If you’re health and safety staff you’d probably have a different viewpoint that’s much more safety <inaudible>.

M1: That’s brilliant. I think it’s good that we’ve reflected these two things already.

P1: Potentially reduce the amount of civil protection required to reduce costs. Because they charge, don't they. The Police charge for being at the stadium so if you can reduce the number of police on duty you make a saving.

P3: The jump out role. I mean, is the idea of the method that the stakeholders would be doing this? Are we basically pretending to be the stadium owners?

M1: In this case, yeah.

P3: So they would actually know whether they were concerned about litigation or whether they were concerned about operational costs of law enforcement coming in or whatever it is.

M1: Yeah. So let's take another example. It's kind of come out here already. If Joe Blogs thinks about the purpose of YouTube he might say it's a shared media and so on but for YouTube one of the purposes is to increase their revenue through advertising. So that in itself …

P3: It's their main purpose.

M1: So that will influence the technologies that they're using in order to keep people on the platform and so on, to increase the amount of ads.

P4: There purpose could also be to have an advantage over their competitors. If they can say we've got the most secure stadium then it will be used more for concerts. If I was an artist I would pick a stadium that's got more security.

P1: Would you? If I was an artist I'd pick the one that's going to fit more people.

P4: You have a choice.

P2: Yeah, or provide the best experience for your customers.

P1: I'm not quite sure your cause and effect is there. You'd hope.

P4: It depends on how many stadiums there are of course.

M2: I shouldn't be answering but I agree with you to the extent that if the user experience involves a crisis of some description then the user experience will not be good if you're burnt to death. And so if I can say upfront you can use my venue because it's safe.

P1: But there’s the question of day to day business running does not involve emergencies. By definition they’re exceptional. So the user is going to have a bad experience if an emergency happens regardless. It’s a question of what are the consequences and how can you reduce it and does it matter.

P4: Can that system only be used for emergencies? Can it be used in another way.

P1: Are we talking about, for example, you could gain revenue by directing the crowd past your fast-food stores. Are we talking about that sort of stuff?

<laughter>

M1: Well, you could consider it.

P2: Close the gate and make sure they go past the burger stand. Is that a relevance or not? Or are we talking about exceptional emergency?

M1: That could certainly be relevant. I don’t know for the actual system that we’ve been inspired by for this example.

P2: You’re talking about football grounds, you know.

M1: Yeah, indeed. You’re thinking in all the right ways. So I think we have enough to carry on. So if we were to talk about objectives, so that’s more in terms of the how. How can the purpose be achieved? It’s now we start becoming a little bit more specific. So for some of them, if you could just get a few suggestions so we have something that we can move on with. The aim here is not to exhaustively specify all these things it’s to see how you address these tasks really.

P2: So I’m already feeling like I’m a little bit lost in a sea of multiple viewpoints across cutting concerns. What are we doing? Are we focusing on saving people’s lives?

M1: Either of them. If you want to take that.

P1: Are you okay if the objectives are conflicting as a result? Because reducing costs, there’s some objective which may well directly conflict with saving people’s lives.

M1: Yeah.

P2: Reducing costs is about reducing the number of Police or emergency services that are required. Reduce the number of operational staff on the payroll.

P5: Well, that can include the people who are looking at CCTV cameras, which if they just look at it they won't be very effective. Well, if there is a reliable system, looking at those it might reduce costs and help save lives.

P1: And if we can replace the staff with machines.

M1: But then that's got other socioeconomic impacts. People lose jobs.

P3: This is a trade-off, right. If the technology makes the staff more effective then it's up to the owners, I presume, whether that means they can save their costs by reducing the number or improve safety by keeping the same number.

P5: I guess from what we saw in the stadium it wasn't the case of they were going to fire some of the people it was just that the number of cameras was so much that they were just unable. There were two of them in this control room and they were just unable to keep track of all of that.

P3: So that's an example where the trade-off was unachievable, that they wanted, you know. You want to be able to control the level of safety against the level of cost. It sounds like for the affordable cost they couldn't achieve safety.

P5: They couldn't, yeah.

P4: So in that situation you'd use the technology to improve the safety.

P5: Yeah, that's right.

P3: It is difficult though because there's the question of how this thing is supposed to work. I mean, objective usually refer to that, don't they. I'm not sure that reducing operational staff with more effective staff actually adds anything to the notion of reduce cost and saving people's lives.

P2: Yeah, I'd add to that. It sounds like it's a solution before we've got to understanding the problem. Because I'm not quite sure what the role of this graph is at the moment. Whether we've got a problem and we're trying to understand.

P1: The question is how the purpose can be achieved. I mean, you're after solutions.

P3: But these statements are not really about that they're just re-statements of purpose.

P1: Reducing staff means that you reduce the cost directly.

P3: Yeah. But I could equally well say reducing staff is a purpose of the business. It's not specific to this system, as far as I can see. And on that level there's no difference between reduced cost and reduced staff.

P1: That's why we need the operational staff. If you want a purpose maybe it's reduced business cost therefore increase shareholder returns.

P3: Can I give an example. I'm making an assumption about how the system is supposed to work here so it may be wrong. But if I want to reduce cost what I might want to do is enable each member of operational staff to monitor five times more cameras, for instance. I would argue that that's something to do with the objectives of the system.

P1: That's the same as more effective staff.

P3: No, because it relates to the function of the system. It relates to what the system will do or needs to do in order to achieve the business objective or the purpose.

P1: Change the operational staff to reduce the numbers of use required. They do charge. If you reduce the numbers that the Police say they will need then you will save money.

P3: But don't we need to say how the system would do that? I think we're still talking about why we want the system and not how it's going to do it.

M1: Well, I think that's a point. This is interesting, drawing the scope of what we're doing. Because what we're talking about there is when we get down to coming up with a design of the system. So this is bound to be a bit more abstract and unspecific at this point. So that's a bit more specific than that, sure <pointing to whiteboard>. I think this would then go forward in the exercises of coming up with the designs that will be more specific.

P1: What level of detail do you want then at this stage?

M1: What we have now. I mean, I think what you've weeded out already here are the kind of things that I would, from what we talked about in project, expect to see at this point. As I mentioned before, the context of this whole thing is cyclic as well so we might go back and refine some of these things as we're going through the process. Because this scenario that we're talking about at this stage, it should be possible to

say something about P3’s suggestion for five times more cameras to be able to analyse.

P2: So the things that comply with regulations, I’m not sure if it’s the level of detail that you finally want, but you need to typically pass a security audit or something from a probably government body, one regulatory body or something. So you need to do what it takes to get that certification. In order to do that you need to go through whatever that mandate requires you to do. That’s how we comply with regulations.

M1: Okay.

P1: It’s such a high level that you can’t be too specific.

M1: I’m just trying to structure in there. What you were saying, I was thinking of other things which may not be what you’re intending. The system, for example, may not help you in getting that certification or maybe it will give you a better certification. Is that what you’re saying?

P2: I’m thinking in terms of how will those purposes be achieved. It’s nothing to do with the system. I’m thinking regulatory authorities have, you know, typically they’ll have lots of check lists of the things and presumably health and safety staff that their job is to make sure that whatever comes round you tick all the boxes and you’ve done all the right things.

M1: Let’s leave it at that for now. I think we’ve done enough on this step to have something to move forward with. I’m just conscious of time as well. So the questions that we had in terms of the purpose and objectives were these things that were obvious and straightforward but difficult to come up with. If I summarise how I experienced this is that it’s actually a bit tricky. When you don’t know the network particularly well there’s some ambiguity there already. There seems to be a challenge about, at this stage already, especially when we start talking about objectives. It strays into the specific system.

P3: I think this distinction between what you want and how you’re going to do it is difficult in general. And you see that in research proposals. Many research proposals are rejected because they don’t state clearly how the proposed work will reach some objective or have some impact. Endlessly you get contributions on that which just restate what you’re trying to do. And I think that’s because, well, I think there are two problems actually. In some cases the person writing it is so familiar with what they’re trying to do and why it’s useful that they think it’s obvious how something will happen.

But it’s not. It’s just in their heads. The other problem is when they don’t really understand the system well enough to say how. I think in both cases you’re going to get a problem. You’re going from what you’re trying to do to how you’re going to do it. I think we have the problem, probably, because we’re not familiar enough with the application.

M2: There is another issue which has come up and the trade-offs there, which we’ve seen in other contexts, was to serve business. Because if we assigned ourselves a different role in the network and you ask where are we coming from? So we may be coming from a point of view of the trade union representative so they would have different sets of… well, they would certainly have a different perception as to why it’s important. And that kind of thing always makes it difficult to decide which of the objectives that we’re going to prioritise and how we’re going to do it.

< Step 2 of the method – creating HMN profile >

M1: So I suggest we move on. We’ve got some interesting things coming up through that. So thank you so far. So step two. In terms of the methodology at the bottom, we’re still talking about trying to understand what it is that we’re going to design and start to collect some requirements. Now, in order to do that there’s two things, one of which you can draw a diagram to help people, especially if you’ve got cross-disciplinary teams, to understand and come up with a common view of it to see what are the roles and responsibilities of people and so on. What should be done to achieve some of the objectives that you’ve already identified. The other thing is to create a profile of the network using the HUMANE typology, and here is where I’ll introduce that. So the typology consists of eight dimensions. They’ve been grouped into four layers to describe firstly the actors, the humans and the machines. The interactions between them in terms of the tie strength between the humans so reflecting how frequently or close the communications are between them and so on. Then we’ve got a dimension on the interactions between people and machines.

P1: What does scale mean? Say human agency?

M1: Yeah, I’ll go into some of those details in a bit. So we’ve got interaction there. On the network level this will hopefully be a bit more straightforward in terms of the size of the network and the geographical extension of it. On the behaviour, finally, we’ve got two dimensions there as well. Firstly, a more structural one. Whether it’s organised as a top-down or bottom-up or something that’s a mixture. And the way in which people interact. Whether they need to be

synchronised in the way in which they behave within the system, whatever it is. So whether they can just go along and be completely independent as well. Now, going back to your question, right at the top. So agency, this reflects several things which we've kind of condensed into defining it as the capacity of what they can do and achieve in a network. So going down into more specifics, that aren't reflected here, are what and how much can people do in a network. Some system will constrain what you can and can't do in various ways. And whether it allows what they can do, whether it allows them to be free and creative, expressing themselves. Maybe they could do things that the system designer weren't necessarily intending it for it to be used for or allowing people to be creative in their uses. You can think of Twitter. You can't do many things in Twitter but then you've got a free text type of thing that you can use to express yourself.

P1: So you're conflating all of those attributes into a single scale?

M1: Yes.

P1: And that's going to feed through to the analysis?

M1: Yeah.

P1: It looks like the level of detail is so high you might struggle to have great conclusions at the end of it.

M1: Okay, it's useful feedback.

P3: You mean one? So there's one measure of human agency?

M1: Yeah. And similarly there's one measure of machine agency, which is similar but we also here refer to how much machines might be able to enable agency in humans. So, i.e. allowing them to do things that they may not be able to do on their own without the machines.

P4: Is that something like having a sensor somewhere in a toilet in your stadium for temperature and that is low in scale whereas the decisions of the system would be much higher?

M1: Yeah. And something perhaps even higher would be a social robot that can walk around and talk or interact and be perceived as having, let's say, human-like characteristics.

P2: Probably one thing I'd add here is the issues to do with the internet is that non-modelling people, stakeholders around your table, may struggle, … quite a lot …, with some of these

terms. I mean, putting aside the fact that they're qualitative, you'd have to take a lot of care to explain this to them. I'm just thinking, for example, for PROJECT X we've got a range of stakeholders including teachers and if we started to talk about the networks in PROJECT X we'd lose people's attention quite quickly.

M1: Yeah.

P1: If I'm honest, even reading those descriptions I'm not 100 per cent sure what machine agency, human agency, would really be. You need concrete examples I think and quite a few of them.

M1: Okay. So on that, the consortium did move away from… I mean, this is a short overview as well, just to be clear. The typology comes with a richer description. But, yes, it is technical. It is conflating lots of different things into a single dimension. The way in which to arrive at low, intermediate or high and so on, one of the more recent things, which we'll do in a moment, is the notion of coming up with some statements regarding each dimension that people can say whether they agree with or not so that there's more specifics there. So you don't rely on understanding these technical terms. That's been integrated into a tool that's SINTEF has developed, who are the main responsible partner for the typology in this work. But it's great that you're picking up already on these challenges. Now, I want to go through some of these so we have some level of understanding of them. So tie strength. It is a networking term. It refers to the relationship between the people. So scales go from having no ties, latent ties, weak ties to strong ties. No ties, you can see that in networks such as reCAPTCHA in which most people don't even realise that they're part of the network. They just see it's a process to log on to a website to say that they're a human but it involves being able to see something in a picture.

P1: This is the text that comes up.

M1: Yeah. Which then helps to classify documents that otherwise hasn't been able to be done automatically through other machine components. So people just aren't aware that they're part of the network. They can do things very independently and so on. Then if you go to the other end of the scale, strong ties, you can think about Facebook and your friend networks. These are people that you have regular contact with, for example. They are there. At a football stadium, for our example, they could be a mixture. You might be going there with your football friends or your friends to

see a concert and so on, but with the general population there you probably have no ties with them.

P2: Or really negative ties.

P5: Yeah, I was going to say that. How do you classify the groups of the crowd which might be aggressive towards one another? Is that strong ties?

M1: That’s an interesting one which I don’t have an answer to. Because the project hasn’t come up with a solution to it, let’s say. M2, you might have some perspectives on that. What you’ve worked on.

M2: It comes from sociology. But you’re right, there is no variance around the strength of tie. So if there are two opposing teams which are very aggressive, like Millwall in the UK and they’re always up for a fight with everybody. So that would be a strong tie between the two groups because they will interactive and it’s negative. So tie strength is really about the level of association between members of a group or all the members.

M1: Ok, now, the next dimension is a little bit different, although we’re still talking about the relationship between certain actors. But we’ve been a bit more specific about the nature in which we’re describing this for human to machine interaction strength. To reflect whether people are dependent on the machines and nodes. I’m going to use two words here, reliance and dependence. When we talk about reliance that refers to relying on the machine to do certain activities but if the machine should fail you can still do those activities in other ways. Being dependent means that if the machine fails it will have critical issues for you. If you’re on a life support machine, for example, your life is at stake.

P1: So does reliant mean dependent?

M1: It’s kind of on a spectrum of dependency, if you like.

P1: Should it have a dependency? It’s one or the other isn’t it?

<inaudible>

M1: Okay. That’s just to give you a gist. Now, on network size, this is fairly subject in terms of what one might consider small, large or massive. Same thing for the geographical space. You could describe that in different ways. The approach taken at first was to talk about local and that could be local to the university, for example. With the

football stadium, well it's local to that football stadium at that point. For other networks, like Facebook, well you go global. It's worldwide. Now, on workflow inter-dependence, we've said some things about reCAPTCHA and in that sense workflow inter-dependence would be really low because people don't have to synchronise what they're doing. You don't depend on somebody else to do something yourself. You don't have to collaborate with anybody. So the other end of the spectrum, if it's high inter-dependence then we're talking about networks in which people really need to collaborate and help each other out. So you could say if there's an emergency that takes place operational staff have to really interact with emergency services and evacuees and the operational staff need to coordinate in order to help evacuate people and so on. So that would be higher.

P1: Why have you put that in a different place to the humans and machine? I would have put human to human as well underneath it.

M1: Sorry, what do you mean?

P1: Well, workflow inter-dependence is human to human, as you described it. How is that different? Isn't that just an interaction?

M1: It is but it says something more about the kind of behaviour. Whether they need to collaborate or synchronise somehow. This tie strength, it's more specific about whether… let's say it's a close-knit network but doesn't say how they use the network. That's what workflow inter-dependence tries to weed out, a bit more about the behaviour, which is why the layer is called that. But if you struggle to see the difference there.

P1: Yeah, it was just a comment, but yeah. I would have thought that the independent option of necessary reliant is more informative than low, intermediate, high.

P5: Is that more about how a series of things happen rather than just one interaction between two nodes? Is it like that? The workflow means a series of things should happen?

M1: Yeah, for example.

P5: To evaluate that series of things or between each node?

M1: Well, it's more saying whether a series of event have to occur, interactions between people, to be able to achieve some things on the network.

P5: Are we labelling the whole workflow? For example, evacuation is a high. So all these bits should work together before the evacuation happens?

M1: Yeah.

P5: While something else in the stadium like, I don't know, might be more local then it doesn't have that high dependency between the nodes. Yeah?

M1: Yeah. And what you've weeded out already is that you have parts of the network that you might put different values to and describe them differently. So same thing for agency and interaction strength at high strength and human to machine interaction strength, as we talked about before. We'll just try to move on a little bit. So some of this, especially the scales, the approach has been taken, and the consortium is kind of moving a bit away from it. So after you see that and we go through it, it will be interesting to hear from you whether that was a step in the right direction for you or if you have some other views and suggestions there. But the final one, I didn't mention earlier but network organisation, that's kind of reflecting the structure of the network in terms of whether it's top-down or bottom-up. In bottom-up you can see that as self-organising. An example of which is Wikipedia. It has a platform. Anybody can sign up and go and create and update, edit pages. While, you have a citizens' science portal called Zooniverse which started off being more top-down. They created a project and I think the first one was to get people around the world to help with classifying galaxies. So they create the project and the system distributes tasks to people. Now it's moving a little bit and so people can from a bottom-up point of view suggest new projects and so on. So it's not governed from the owners, let's say, so much. It's a bit more self-organising. So that's the kind of thing that the intermediate part of the scale tries to reflect, where you have something where there's mixture in between.

P1: So what's peer to peer then? That's not top-down or bottom-up.

P3: I think that is bottom-up. There's no top.

P1: There's no top. It's like bittorrent… sharing…

P3: Okay, I understand this in relation to emergent behaviour. If you say something is bottom-up you mean behaviour is likely to be emergent. So if you get high level scale effects there are a consequence of low level interaction behaviour. So the fact that the peer to peer network, there's nobody in charge

doesn’t mean there’s no high level structures. It just means those structures emerge from the low level interactions.

P1: Maybe it’s a random interaction between two people. Which on its own doesn’t emerge anything…

P3: It tends to be that the high level structure emerges as a consequence of the low level interactions at the scale. So if you just had five people you’re not going to get high level structure and it will be low level interactions. If you’ve got 50,000 it’s going to go up.

P1: I suppose it’s like chaos theory.

P3: No, it’s not chaos theory it’s something else.

M1: Ok. So I’ll just round it up by saying what the project has tried to do is use this typology to create a profile of the network to either reflect the kind of characteristics that you envisage you want or need or if it’s an existing network, how it is now. And then you can look at, as you’re wanting to change something, whether that increases the geographical dimension going from something local to more global. So if you rate each of the dimensions you can sort of visualise that as a spider diagram. Since there’s only eight dimensions, that’s being used at the moment. We did have feedback earlier from the focus group that there will be issues with scalability with this sort of thing. But for now this is what we mean by a profile and using this tool that I have mentioned before. We will now try to create a profile and you will see the kind of statements that I mentioned earlier that are being used as part of this. This tool is available online if you want to have a try later on. Right I’ll just set something up. <bringing up tool for profiling task> So the descriptions at the top are fairly in line with the high level short descriptions that I had in the previous slide. I won’t go too much into that now. It’s more about looking at each of these statements. If you were to try and do that now, and I appreciate that this is a network that’s a bit abstract and not one that everybody will know.

P1: For the entire network, or for individual lines in the network?

M1: No, this will be for the entire network. So for human agency there’s four statements. This starts to make it more explicit, what you pointed out earlier P1, about conflating quite a few different specific aspects into a single dimension. So the first one is about whether people can perform a diverse range of activities in this human-machine network. For each of these there is a scale that we can move

from sitting on the fence in the middle to going towards strongly disagreeing with the statement or strongly agree with it. Part of doing it together is also it's interesting because it helps bring out things compared to doing it alone. We've done this once and I think it will be interesting to do it here as well.

P1: I'd probably agree with the first one. It looks pretty diverse to me.

P3: Yeah. Lots of different types of people doing different things so certainly the activities are varied. One question I have is whether that's what you mean or do you mean one individual can engage in a lot of different things?

M1: So this is meant to end up with a profile for the entire network which will reflect…

P3: Ok, but I don't know what that means… Let me give you an example. If we had a network, say something like Facebook, where the vast majority of people have the same role, in effect. So not a huge variety of different roles but there are quite a lot of different things you can do. Here, in this example, people in the crowd don't have a great deal of variety in their activities because their role is a particular role which involves them attending an event and observing it, enjoying it, panicking and fleeing in random directions.

<laughter>

P3: And eventually being guided to the exit. So in that sense those people don't have varied activities at all but within this network there are other people who have rather different activities. [M1: yeah.] So there are two senses in which activities may vary. There's the extent to which a person or an actor has a variety of things that they can choose to do. And there's a sense in which there are actors doing different things in different roles and having a large variety of roles but within which if you've got a particular role you do the same thing. So it wasn't clear to me which you meant and actually I could imagine you'd need, you know, if you've got five roles in the system, operators and emergency service people and law enforcers and evacuees and regulators, let's say, you might need for each of those to make this judgement. So I don't understand how we can assemble those five roles into one number really. So let me put it another way. I don't necessarily believe this statement, but I strongly disagree that the activities are varied. If I'm a policeman my job is to stand there and arrest the wrong doers and that's it. I don't get a choice. If I'm an evacuee my job is to run in random directions and I don't get a choice. If I'm an operator

my job is to try and stop everybody breaking the stadium as they attempt to escape and that's it. I don't get a choice.

P1: I don't think I agree with that at all. <P2 laughing> There's lots of different people doing all sorts of different things.

P4: That's what I thought it means, that there are a lot of activities that can be done by somebody in the network.

P3: Yeah, but does that mean that the activity is varied?

< silence >

M1: I'm trying to be as much as possible hands-off and let you discuss.

P1: … and decide for ourselves what you actually mean by the question?

M1: Yes.

P1: Ok, let's take a vote. I don't agree. I actually think the opposite.

P3: This isn't a democracy. I'm going to strongly disagree with that statement regardless of what the rest of you think.

< laughter, participants talking over each other >

P1: Do you want to aggregate or go with the medium?

P3: We've just had a referendum and I didn't agree with that.

M1: We've heard two views. One is agree and one is disagree, or strongly disagree even.

P3: Strongly, very strongly. I can't overstate the strength of my disagreement.

P1: So the feedback clearly is that text is not very good at explaining what it means if you're looking for focus group feedback. There's a lack of examples. If you had some examples then it would be more obvious.

M1: The other challenge in general to consider here as well is that we're assessing things quite subjectively on the basis of one type of network, let's say. Creating this typology, there has been this aim to try and have something that you can end up with profiles… So the idea for this tool is to get a collection of profiles and compare across different networks

to see something that’s similar. So this has been an attempt to make it slightly less subjective but as you’ve said now it’s too abstract and it’s too difficult to know exactly what’s being asked.

P2: There are a number of problems with some of the statements that have been described here. Typical questionnaire problems. I really think this is about being able to frame the problem or frame the statements more carefully to the audience that you’re aiming at. I think raising it to this level… I don’t know if there are other points where you collect data from your stakeholders but I’m not sure how…

M1: Not for creating a profile. That’s based on this series of statements.

P5: Once you have the profile what are you going to do with that?

M1: The idea is to go back to that at the end of this focus group. Hopefully we’ll have time. So once you’ve got the profile you can also say something about what kind of design patterns that have been used in the solutions.

P5: So you already have a kind of training examples in your profile space?

M1: There are some there already, for example. And the tool is trying to help people look at similar networks that might help.

P5: To suggest designs?

M1: Yeah and with that help a transfer of knowledge. So that is it in a nutshell one of the aims of the tool.

M2: We appreciate that it’s difficult to make an interpretation without context and also this is not necessarily the most collaborative of networks… Would it help if we showed a few examples of a network just to show you what other people have done?

P3: Can we just try it real quick. Because the other thing is you said that using these statements was an attempt to remove a bit some of the ambiguity by in effect getting people to make multiple statements. So the fact that I didn’t understand the first line may not have mattered very much in the end. So I’d be interested to see what happens.

M1: Sure. I would like to be able to complete this.

P1: So to move on, how do you want us to resolve it? You want a group decision? Aggregate it or come up with a majority view?

M1: I can take a majority view. So I was trying to ask earlier what are the views from others. So we've got two views on the table.

P5: I think how I would read that is that how much of the system is performed by people. So I wouldn't say like how much each individual has flexibility but how much of the system is not done by people. So I would agree.

P4: I agree for different reasons. I think there's a range of activities that can be done by a person.

P5: That's what I mean.

M1: So there are different interpretations that lead to different results. So mainly it's towards the agreement.

P2: They're both relative to what… I'm afraid I'm going to go with P3 on this one. So relative to my everyday reaction with the world, not really.

P1: So it's 3 to 2.

P3: So it's sort of mildly agreeing.

< laughter >

P1: That depends what you want. Because you might get some middle road average that might be completely misleading and it's not what we actually think.

M1: But for now let's move on so we can capture other things as we're progressing. Would you think that people are able to interact freely and influence other participants in the human-machine network? Whether they're humans or machines.

P3: I'd agree.

P1: I'd agree.

P2: No.

P3: Actually it's not sure.

P6: More on the agree side but not strongly.

P5: I'll be in the middle.

M1: Just out of curiosity, why do you disagree?

P2: I'm aware of the scope of the statement. Able to interact freely and influence other participants. All other participants? Some of the participants? All of the machines? Some of the machines? I don't think that some of these actors can influence other actors.

M1: But some of them could influence some you mean?

P2: Yeah. Not sure.

M1: So we have a similar problem in that it depends on whether you're looking at specific actors or relationships and so on.

P2: It's not clear to me that all actors have freedom to interact and influence all others, let's say.

M1: OK.

P5: I guess my problem is I can't see a system for which would be strongly agree or a system for which it would be strongly disagree. So I don't know where this fits within that context, if you see what I mean. It would be very hard to come up with examples for each of those so I'm not sure how to solve that. But that's my issue.

M1: This is useful feedback.

P1: Some people can interact freely so I agree, but some people clearly can't. If you're an evacuee you'll probably do as you're told.

P3: An evacuee can do anything. Assault a policeman <laughter>, anything.

M1: You could run in the wrong direction, which I believe some people do.

P3: True. You could indeed set fire to the place.

P4: But you can do that if you're a policeman.

P3: You can, that's true, a policeman could do as well.

P5: Operational staff might not do their job.

P1: You need some new entries.

M1: Okay, I'll leave it there. So the third one.

P3: I pretty much disagree with that.

M1: Whether they'd be able to express their personalities?

P3: Yeah.

M1: Behave diversely, freely, creatively, even do unpredictable things?

P3: I disagree. I think all of the things I mentioned before are the kind of things that the network anticipates. This network is there precisely because those sorts of things can happen. So they're not unpredictable, for sure.

P1: I would probably weakly disagree because I think the people can do all sorts but the emergency staff are highly constrained by their training. The computer bits are completely constrained by their programming.

P4: I'm not clear on the activities here.

P3: But this is about people not computers.

P1: I'm on the disagree side.

P4: So are the activities the activities that as we as creators of this system specify or are they any activities that someone can do?

P3: I think this question is about that. I think it's about whether the activities are going to be the ones we anticipate. Or whether they are other things.

P4: Because if they are the activities that we specify, then people cannot behave freely.

P5: So you want the evacuees to evacuate in a certain way but they might go another way. So that's what we want them to do.

P4: But it's still restricted. They can run this way or that way, they cannot climb up the walls.

P1: If the policeman closes a gate then the evacuee doesn't have a great choice of options. There's probably only a couple of ways to run. [P5: but they can break the door… <talking over each other] It's like fire exits, isn't it.

P5: I mean, the fact that they can do lots of different things, put that in agree.

P3: But they are things that the HMN anticipates them doing.

P5: But the most dangerous things are the ones that we hope they don’t do or can’t persuade them from doing.

P3: But the HMN is there because we know they might do those things.

P1: Sometimes they do something else and then they get a Hillsborough type disasters. They didn’t anticipate it and you get crushed and they weren’t expecting it.

P3: Again, I don’t agree. I think this kind of system for evacuation recognises that gates could be opened or closed inappropriately, or appropriately. But the opening or closing of gates is certainly an activity that people can perform which isn’t particularly creative; is certainly predicted.

P1: I agree, they’d try to but I would also say that in instances where disasters have happened the procedures that have tried to anticipate them and have the rule book of what they’re meant to do. They follow it correctly and they get an unexpected outcome.

P3: But the activities are still anticipated activities.

P1: Not the activities of the people that end up being crushed.

<P1 and P3 talking over each other in disagreement>

P3: Even if the system is … No, but they were doing the things they were supposed to do. They were heading for the exit and it wasn’t working because the exit was closed.

P1: They closed the exit because they thought the people would do something different.

P4: But they could just stop in the middle of a corridor and recite poetry but that’s pretty random.

P5: I think the fact that this is an emergency situation, it allows them to have, you know, to be more unpredictable. The fact that the whole thing that we’re discussing is an emergency.

P1: Any opinions changed after the discussion?

P3: I’m firmly convinced of my views.

P1: They haven’t changed. I think the consensus was mild disagree.

P5: Most of us agree.

M1: I think the average… Let’s leave it at that. Moving on, the fourth one on people is whether they can use the machine-human network to help them achieve goals or if they have objectives themselves, but the purpose that they come up with, there’s a reason for them to do something. Would they be able to achieve some of these things through the human-machine network via other people or the technology… system?

P1: I tend to think no because the whole system is designed to get them out of the stadium. Not in their way of choosing but any old way which the system thinks is going to work. If they decide to recite poetry the system would probably fight that.

P4: People could abuse the system. So, for example, they see where people go and they steal from some of the people while they’re fleeing in another direction.

P5: Yeah, if the goal is to beat up the visiting crowd, if the Police go somewhere else to evacuate some people that’s a good chance.

P3: You’re not a Millwall fan are you?

P5: No. I didn’t know that they do that.

P3: They’re famous.

M1: Okay, there’s some disagreement and some agreement here, as per usual. Moving on, we have similar questions for machines hopefully that we’ve gone through all the issues already on the humans, well some of them.

P2: Machines don’t ever act freely though, M1.

M1: Let’s do the first one before we get to that.

P4: I’d slightly agree.

M1: Can they do a diverse range of activities?

P5: Yeah.

< moderator setting value and adjusting according to non-verbal responses from participants >

M1: Can machines interact freely with and may anticipate other participants in the human-machine network and can they help humans achieve goals?

P5: It’s a different question, isn’t it.

P3: Slightly agree on that one. Is there anything you don’t strongly disagree with? <looking to P2>

P2: I’m just confused.

P1: I was looking at the types of sentences and none of them look interactive to me. So I completely disagree.

P3: They are. There are signs.

P1: Which are not interactive.

< P5 tries to comment, but inaudible due to P1 and P3 talking >

P1: Presumably it would just be go this way.

P3: You could have signs with help buttons.

P1: Maybe but that looks like non-interactive to me.

<P2 inaudible>

P5: But there are active signs that turn on to show which way to go.

P1: Well… Yeah… OK… I’d say not quite strongly disagree, a touch higher for me. I think that’s a grey interaction. It’s not like a conversation is it.

P1: So what are you going to do, leave it where it is? Do we have some agrees in the room?

P5: Yeah. We agree. I’m still in the middle.

P4: It can be interpreted in many different ways.

P1: Some weakly agrees, some strong disagrees and some in the middle.

P5: Also how we consider the decision support which supports the operational staff which makes decisions.

P1: That could be quite interactive which is just one of 10 different things on your diagram.

M1: Let’s leave it there. Would we say the activities are of an open nature?

P3: No.

M1: Can they do something that’s dynamic and unpredictable perhaps?

P5: You don’t want them to.

P3: Doesn’t seem likely.

P2: Let’s disagree. That’s the easiest one.

M1: Excellent. Would you say that machines behave intelligently, autonomously? Maybe they’ve got a human-like appearance.

P5: No.

P2: They might have a human-like appearance, some of them. You could put a face on them or something.

P5: But we don’t have them here.

P3: No…

P1: This doesn’t look likely does it, not in a football stadium.

M1: Right, let’s move on then. So the next part is about interactions.

P1: <laughing when discovering there are more sections with questions> How long are we going to be here? You haven’t got to 1, 2, 3. We’re going to have to speed up aren’t we.

M1: Okay, there’s fewer questions now, before the four on each dimension there’s “only” three. Would you say that people in a network are typically connected to one another by friendship or some other close affiliation?

P3: Slightly agree.

P5: Yeah.

P4: If there’s a football match, yes. If it’s a concert, not necessarily.

P3: People tend to go with friends and they have a common interest, even if they don’t know each other.

M1: Slight agree?

P5: Yeah.

P3: And the Police probably know each other and are mates.

<laughter>

M2: Are you implying something?

P3: No. Why would you think that?

M1: Again, in the spirit of moving swiftly along. Would you say the relationships between the people in an HMN typically lasts a long time?

P3: No.

M1: You mean they die in the evacuation?

P5: It depends on the timescale.

P1: If you’re talking about friendship it’s going to last for a while you’d think. All the ones you just cited are long term relationships.

P5: They’ll probably last for the duration of whatever this is going to achieve. Like one workflow. If it’s evacuation their relationship is going to stay.

P1: I would agree. Strongly agree.

P5: Yeah, I strongly agree.

M1: Any other views?

P3: I strongly disagree.

<laughter>

M1: So it’s two against one so far.

P2: In the context of the HMN I disagree.

P4: Well, it depends what you mean by typically and a long time. So I’m more on the disagree side but only slightly.

P1: Let’s aggregate. A simple aggregation.

M1: People in the human-machine network are typically mutually supportive? Let’s take football as a scenario.

P3: Agree.

P5: Yeah.

P3: Is that a yes or no from P2?

P2: It’s a mumble. Yeah.

P1: Somewhere in the middle, right?

M1: Some agree, some in the middle. So a bit up towards … <selects value on tool> Would you say that people trust the machines; the sensors, the decision support?

P5: I would slightly disagree.

P4: They are not expert users. They’re a crowd.

P1: So do they trust the signs, the cameras, the devices? I would say probably.

P5: Well, it depends. We have lots of people in the crowd but we have very few of the other actors but their roles are very important. So I’m not sure which one to give more weight to.

P1: But it’s not that they trust the Police it’s do they trust the machines not the people.

P5: No, but the operational staff might trust the machine the crowd, working as a crowd, might not. Say there is a sign pointing that way and people run that way, you’re more likely to go that way, if you see the crowd.

P2: It’s not necessarily a situation where trust can influence what decisions or options you have is it?

P5: You might be forced to go that way but you also might make that decision.

P2: You might not know what to do. You might be deeply mistrustful of what’s happening, of the people around you or the Police, I’m not sure how much influence that would have.

P1: And it’s only about the machines not about people.

M1: So again a mixture. I’ve lost track of where we’d got to.

P3: I think there was two disagrees and two agrees so far.

P5: I’ll be in the middle.

M1: Okay, we’re in the middle as an average. Would you say people tend to accept what the machines in the HMN do and would only rarely intervene?

P1: Quite likely.

P5: Yeah.

P1: It’s in the middle if the question is completely confusing. Because everyone has a different opinion.

M1: Would you say they depend on the machines to achieve their goals?

P3: Slightly agree.

P5: Slightly agree.

M1: OK. So there is one more but the last one should be fairly quick actually. Would you say that activities need to be coordinated?

P5: Yeah.

M1: So there’s a yes, some nodding and some puffing.

P1: I’m confused by the questions to what it really means. Activities? What activity of a crowd running for their lives? That’s not coordinated. Activity of the Police? Yeah, that’s highly coordinated. It depends which bit of the diagram.

P5: Well, the Police are trying to coordinate the running away crowd.

P1: I guess I would fall in the middle with this. I can see both.

M1: So there were some agreements, some in the middle. I’ll put it there… Would you say that the actions and communication between people would depend on the actions and communication of others? Are they dependent or independent?

P3: Not especially.

P5: Yes.

P1: I would say so. A lot of crowds, it’s a sheep mentality isn’t it.

P5: Yeah, being a crowd.

P1: And the Police follow their rule book. So I'd say, yeah.

M1: So averaging out towards agree so far. Would you say that there's extensive collaboration between people in the network?

P3: Yes.

P5: Yes.

P6: I wouldn't call it extensive.

P1: There's extensive interaction, is it collaborative?

P3: Yes.

P5: They will trample down people who are too slow.

P1: It is on the emergency services.

P3: Yes.

P1: Is it on the evacuees?

P3: Yes.

P5: As long as the system doesn't break there should be collaboration.

P1: I guess I mildly agree.

P3: I'm just agreeing with everything everyone says.

M1: Then, I'll leave it at that? Do you have other views? P4, P2?

P4: I mildly agree.

P2: Hmmm… Yes, I agree.

M1: Would you say that this network is a top-down, i.e. it's a centralised sort of structure?

P3: I'm right in the middle on that one.

P4: I'd agree. Because there's very few trying to steer things and make decisions for all the others. People in the crowd only decide for themselves.

P1: Yeah. It’s motivated by the big command and control structure going on so I’d say yes.

P2: Agreed.

P5: Agreed.

M1: Ok. Would you say that, and I’m going to rephrase this a little bit… whether it has a rigid organisation rather than stable?

P1: I would strongly agree. I think regardless of what’s happening they’ll do what their procedures say they’re going to do.

P5: I disagree. That would be a rubbish network, wouldn’t it?

P1: Maybe it is rubbish. They follow the rules and then they learn their lessons once people die.

P5: But that’s more what the decision support is there for, to look at the system as the situation is developing and try to coordinate…

P1: Based on previously learnt experiences… So that’s why I think what I do.

M1: Okay, so different views. But, I haven’t heard from everybody.

P3: P4, what do you think?

P4: Mildly agree. With their rules and regulations they might not be completely rigid, but they’re there.

P2: I don’t know what the variance of the conditions are but I’m going to say that I would disagree.

M1: Okay, so we end up in the middle really. Would you say that the network is regulated through detailed policies?

P1: Yes, I would.

P5: Yes.

P1: Probably.

P5: Strongly agree.

M1: Right, last one. Would you say that the network includes a broad range of users?

P5: Yeah.

P3: Yeah.

P1: Yeah.

M1: P2?

P2: Yes…

<laughter>

P1: Say the words and sign up to the process.

M1: I'll reduce it a bit as it's clear P2 doesn't entirely agree. And the number of users, would you say it's a large number?

P1: Yes.

P3: Yes.

P5: No.

<inaudible, looking at definition of the entire statement>

P1: I'd say no.

P3: Strongly disagree with growth.

M1: So if we take it's a football stadium. Culture and diversity, would you mention that?

P5: Yeah. It depends on the match.

P2: Don't know. Millwall versus Arsenal.

P3: It should be Millwall versus Chelsea. That's the classic one.

M1: It could be concerts and all sorts of things. So a limit on agreement. So for now I'm just going to hit profile and here is the spider diagram that we get. And there will be other networks which will have spider diagrams. There is some description here. I don't really have time to go into it now, about what the tool suggests that these scores that have been calculated from all the statements mean and so on. And then it tries to match up with other similar networks, statements.

P2: That’s reassuring isn’t it <seeing a match with eVACUATE>. Is there anything that’s high or strong? Any good matches?

M1: I think fair is the highest.

P2: You probably should have something which is the average answer for everything. I think a lot of people gravitate to that.

P3: Wow. That’s quite interesting because that shape doesn’t look anything like what it is.

M1: So this is a result of five people trying to agree and aggregate a score amongst them.

P1: This is a feature of averaging everything. Because we didn’t agree at all we just aggregated it.

M2: And you’re averaging between people yourselves but also across the statements.

P1: So you’re going to get a circle more often than not I would have thought, if you go for this process, regardless. It’s flawed unfortunately. Can we have a look at REVEAL. What’s REVEAL look like? Are these example profiles created by a single person?

M1: Yes.

P3: Somebody who knew something about it, in contrast to us?

M1: Yes, it should have been somebody who knew something about it.

P5: And how many examples have you got?

M1: It’s only a handful that’s in a tool. There was some profiling done before that’s not imported yet, a list of about 60 different networks, including popular things like Facebook and Reddit.

P5: I was wondering how many this tool was searching on.

M1: It’s something like 8 I think.

P5: Too low.

P1: If you’ve got a match what does it then help you do? Does it show you a diagram like this or something <referring to network diagram used in the focus group>?

M1: Not a diagram.

P1: An archetypical network?

M1: So this is limited to the profiling of the typology and design patterns. So, let’s say, this is now on REVEAL and that came up as being quite closely matched you can access the design patterns that REVEAL used to see whether some of these might be useful.

P1: Can I… I’m just interested what they look like.

M1: Okay, let’s take the first one, addressing information overload when there’s huge volumes of data. So each of them… SINTEF got some designer to create some illustrations to try and depict what these patterns mean. Defining what the problem is, you know, information overload. Some background - kind of the context of the pattern. The proposed solution. It kind of picks up words like filtering, using algorithms and when to use it. Any sources where the pattern comes from. So here we’ve got references to Twitter and Facebook that apply filtering in slightly different ways. So due to time, if you want to explore that tool you’ll have to do that outside of this group if you’re interested to look more. I’d like to handover to another piece that’s really important.

P2: Do you want feedback?

M1: Yes, I was going to say any challenges in creating the profile, I think that was a yes. Which you summarised a moment ago. Different views on it and different levels in which you might interpret… Because there’s different agents, different relationships. But doing this, would this profile tell you something that you may not have thought about before?

P1: I have some general feedback. A lot of it is based on the very high level nature of it. The first is how many design patterns do you end up having? Would it be quicker just to read the design patterns and make your own mind up rather than going through the process. So there’s a cost/reward thing. Because you’re ultimately recommending a design plan, unless there’s something else you’re doing with these profiles. The second is, how useful are the actual design patterns? They’re super high level and as an architect that’s useless almost. It’s designed for a specific system. But maybe lessons learnt from other systems that have those similar attributes. Lessons learnt I think might be more valuable than the actual design pattern.

M1: Okay, thank you. Any other thoughts and feedback from others on this?

P1: Actually, a last thing while I think about it… If you were to run this over a period of time in a lab you could add projects and then you would have what is essentially a recommended system and you could actually start learning over time. You'd get a project goes through the process and once it's finished it actually fills out a template and adds itself to it. You could build that up and people who use it could then seed it with more information. If you got hundreds using it, which might be unlikely.

M1: Yeah, we've got some challenges to address I think just from having done this exercise now, to make this process a bit easier I think. <paused for any more input, but none> I'm going to handover to M2. So M2 is going to talk to you about this third step which is about implication analysis.

< Step 3 of HUMANE method – implication analysis >

M2: Okay, moving on to implications. So once we have our profile, once we have some understanding of the networks, what its purpose is, what the objective are. And then we come back to look at the interactions between different variants in the network like human to machine, machine to machine. Then we have to identify if there are any particular concerns or issues in which in HUMANE we call implications. We grouped implications into five different areas, they're not entirely arbitrary. So a user's motivational experience is really about enabling us to use a system and how it works for them. Obviously if you go back to the HMN that we were looking at before, a lot of the difficulty was working with different perspectives. So, again, here we're thinking about the experience and the motivation of all the different players being engaged and involved. Another implication area might be the behaviour changes, whether behaviour is affected by collaboration. Obviously one of the goals for an evacuation system is to encourage collaboration and to encourage ordered behaviour as opposed to misconception of panic in crisis situations. Innovation and improvement is really about does the network give them the ability to be able to be creative. Privacy and trust is obvious. If you think back to Facebook, for example, Facebook started off on the university campus and so it was very limited and on a consensual basis. As that moves out, first of all there's a general social network and then further out into something which is exploited for commercial activity. Then the privacy angle to that obviously becomes very important. The trust side of it, the possible effect is the ongoing acceptability of the network. And then finally there are issues around the infrastructure itself. And so, again, Facebook, one of the implications of the network as it expands is that you have to divide multiple sites which can

mirror each other and takeover for load balancing purposes. So that's what we mean by implications. Once we're actually looking at the network what do we have to consider when we're designing. So if we look at the implications for a network. So, on the one hand we can look at the profile and say if we've got high human agency and low machine agency, what would that necessarily mean for the network. Or alternatively simply looking at geographical spread, what does that do to the network and does that mean that I have to do things like a guaranteed 24/7 operation. Or with a network diagram like this. So where we've identified interactions between different nodes in the network are there specific issues which we need to think about. And the red arrows on the schematic there identify areas of trust issues. If we look at some of these, and actually this came out of the conversation as you were talking about various issues like machine dependence, etc. So we've got… from the human actors towards the emergency services, will they trust the emergency services? It's one thing looking at a paramedic or a fireman and they know what they're doing but it's another thing if you're a Millwall fan and it's a guy in a police uniform. So these are the kinds of things which in the network and the designer of the network needs to take into account. So if we look at trust as one of the areas of implication and specifically for the network that we've been looking at, we're looking at two particular areas. I think that actually we made reference to this before, the operational staff need to be able to rely on the decision support system but is there a trust point as much as they will think, well, actually all you're trying to do is automate my job and get rid of me. Because you want it to be more cost effective, etc., etc. In the case of the evacuees themselves, how will they respond to the signage? How will they feel about the fact that everything is being monitored by CCTV cameras? If, for example, I suddenly start getting alerts on my telephone whilst I'm being evacuated how will it affect my behaviour? So we have a set of questions that we might want to ask when we're designing a network and when we're thinking about the implementation of the network. Some of these go back to the objectives and purpose of the network which you identified at the beginning, you know, a very high level. And so really what would be nice in five minutes, and I appreciate everybody is in lunchtime, but just to brainstorm a few of the implications that you think are for this network as we're discussing it. Concentrate if you like on trust only and concentrate if you like just on these introductions.

P2: Just expanding a little bit on the operational staffs' attitudes towards the systems. They're unlikely to be discretionary users so they have a system they're required to use. So I don't know if they necessarily think it's something that's going to take their place, take their role entirely,

but they may have trust issues to do with the performance of the system that impacts their performance to do their job, or its reliability or its accuracy. So those are the sorts of things I would be concentrating on.

M2: And so what would that do to your designing process?

P2: So that would make me concentrate on how information is delivered in and out of the system for those operational staff. Making sure that they understand the system. Have a good sense of the state of the system and it matches the problem.

P3: The two things are related there actually. It’s one observation. Breakdown of trust in either place will affect, probably, the effectiveness of the other relationship.

M2: So what would you do to mitigate against it?

P3: I don’t think there’s anything you can do. I mean, you have to stop the breakdown occurring in the first place. I don’t think there’s anything you can do to depluck the two things.

P5: You need different things for different arrows on the picture. For example, you can make it more transparent to users what is played on the signs or something like that. Make them more likely to trust it. If it just says go right you don’t know if it says go right, left is blocked.

M2: OK. So more information.

P5: They rely on… they go towards the other sign don’t they. They even do things like turn off the light on the left tunnel so they are less likely to go towards darkness. So they seem to give less information. I don’t know why. Is too much information too confusing?

M2: So that’s a design solution, if you like, based on a particular view. Could it be done better?

P1: It does seem very design time focused whereas you could also do an emergent real time thing. So your evacuees, if you identify an emergent movement you could actually focus your attention as a civil protection agency and guide them then because everyone is following. That’s not something you could identify at design time other than a generic type of person. And there’s very little feedback in these diagrams. I don’t know if that’s deliberate. Improving trust is sometimes if you have feedback where you show the evidence you can come up with

a good decision and improve the trust of the person because they understand it.

M2: Fantastic. I can't tell you how useful that's been. You may not think it but you've just actually justified eVACUATE.

M1: If there are other thoughts, we have a few minutes still. The other thing is just if you have any other implications that you had in mind about any of the other groups, if you like. It's just if there was anything else you thought of.

P1: What about … having constructed your network, what about what-if scenarios? What if a terrorist decided to run a lorry bomb in? How would it be resilient to that? Could you use this type of approach?

M1: When you talk about objectives, it should be resilient to terrorist attacks or something like that. Those kind of scenarios might start to unfold when you're designing so you're designing towards them.

P1: But think about things you might have forgotten or things you add in afterwards. Would this be useful or does it need to be completely redone? Is there an approach which might have some value in that?

M2: Sorry, what is the question?

P1: In going through this process where you design diagrams and improve various interactions… If you then say, okay, let's try some unexpected situations, is it going to be resilient to these sort of things?

M2: So you're basically saying does this give you anything over a traditional design approach that would help you out in development?

P1: Yeah. You might give it to some outsourced company to stress test it, the design.

P4: There's always the question how much do you model. You can model terrorists in that, if you want a focus on it but that hasn't been done.

P1: They might have done that in the planning process. They might have thought it through and at least want to say are these stadiums resilient to this type of threat.

M1: I'm just going to bring up the next slide just to show you. We're not going to have time for it now but step five is to evaluate the design. It's been specifically linked towards

the profile. But I think what you're saying, M1, probably makes sense at this stage to include such things as well. If you have scenarios that you want to evaluate against, whether we're actually addressing them or not.

P3: I don't think that's the point P1 was making. I mean, I think your point was if you add something later either because you didn't think of it before or you thought of it but decided to not worry about it…

P1: And then it becomes a high priority. Because you cannot anticipate everything. You will miss something.

P3: So your question is does the process give you information that you can build on when you extend the scenarios or do you have to start again and think about every question afresh? That is a good point. In PROJECT Y, when we were looking at threat analysis, one reason we want to automate that is precisely because people have to iterate. They have to make small changes and run it again and automation makes that reasonable. Manual analysis, you have to start from the beginning. So I think you certainly want an additive process in some sense that the effort you put in isn't wasted.

M1: Sure, yeah. I understand. But in terms of giving a conclusive answer, I don't think I can't at this stage.

P1: No, that's ok. It's just an observation. Is it interesting to go a bit lower level. Surely to be useful you need to go a lot lower level than this if you did it for real. Is it really going to work? Have you got any evidence that it's going to work?

P3: If you did this for real, if we were really the stakeholders, if we really had a policeman, a fireman and a member of the Millwall Supporters' Club, God forbid, round the table is this something that you'd expect would take us an hour, day or a week?

M1: That's a good question. The things that we're doing now is actually helping us understand that really. Because we've gone through a second iteration with this and this is the first time we're sitting together with a group of people, which I think is a scenario that you would probably have. Not just the researchers in HUMANE who are familiar with the typology and so on doing something in isolation. And it's already pointing out to us various challenges and hurdles to make it practical to do. But in terms of how long? Well, it's taken longer than at first anticipated because now we don't have time for the last bit.

P3: I think we sat down hoping to do something in a couple of hours but of course we're not familiar with this football stadium. We don't really, you know, we probably don't even know about all the stakeholders. We were trying to put ourselves into their shoes and what we've got on the board here is just scratching the surface really isn't it. Now, if we were real representatives of a football stadium we'd be intimately familiar with these things so you might think it would be a lot quicker. On the other hand, as P1 has pointed out, this is an incredibly superficial representation. So is the idea that if you've got real experts they would take probably longer than we had and really get into the detail. Or are you thinking this is something you do at this relatively superficial level just to give them an initial steer as to what kind of architecture or technology or techniques you should use?

M2: Part of the… This is just my take on this. Irrespective of what HUMANE is actually doing at the moment, part of it is to try and look at how you can put across to people, communicate with people. So you've got all your stakeholders, your Millwall supporters, managers and things like that, so you've got to have a common language to help them understand what the issues are. If those people get to the stage where they can understand and they understand the network diagram or they understand the profile then they would go away, as P1 said before, and hopefully there will be a huge stock of all of these things (network profiles) which would have a lot of implications mapped out and so here are some of the issues that you're going to hit with this network. And if we really got down to the proper level of design plans to say here are the ways that people have resolved this in the past. It wouldn't give you, for this specific question, okay we have a new scenario, how do we deal with that, unless somehow you can identify all the other solutions that have been done in the past and see how that relates to your network.

P1: I guess one larger question is I'm struggling to see the value you would get going through this process. If you could tangible identify that towards the end of the project you might actually have something that is valued and be able to then target the people who are going to gain from it. Then they might adopt it. If it's vague it's going to be, you know, left at the end of the project.

M1: Thank you very much for your time and you have said loads of things that are very useful to us.