

illness. I would imagine of that seafood that made up those numbers I would be willing to bet that none of them even if there were raw oysters, none of them are pressure treated oysters because that destroys the pathogen. That is a kill step. It is very small availability. Very limited but it is done. There are new technologies -- a variety of them being used that can reduce to pathogen. When you are looking at the total step, you need to know where the problem came so you can identify if it is possible to reduce illness further by an intervention and then work toward policy, legislation, whatever sources are necessary to urge the industry to use those. Maybe it is tax breaks or tax incentives.

Although I am still speaking against the cube, I am adding an additional variable in and that is the possibility of reducing -- where you can make a difference. What is possible?

DR. DEHONT: I wanted to go back to the cube and something that Kara said that sort of struck me before. If I heard you correctly, one of the objectives of the cube was to get the three agencies talking at the same level and one of the benefits was identifying where the inadequacies were where you had no data, where you had no information, where you had no direction, no plan or anything like that and using that to chart future work. Is that correct? I

think that is one of the very important things. Again, I wrote down here many times. We are doing outbreak data which is 5 percent. There is 95 percent we don't know. Again, I agree that is phenomenally difficult to know what you don't know. But if the cube helps the three agencies I guess find the direction and maybe allocate some resources to find out what we don't know then that is a huge positive because right now we are just guessing.

DR. HUNTLEY-FENNER: I just wanted to echo Andrew's remarks. This is where I was going with my point. I think that scientists tend to approach these kinds of problems differently than administrators might. And as an administrator, you are partly looking to understand the problem, but you are really also looking for a way to allocate limited resources. And sometimes the information you have is just good enough to help in the allocation. The percentages aren't going to make a huge difference if it is three points off or so. You may understand some of the problem well enough to know this is where we need to spend our money and that is good enough to go on. I think it is a really important perspective.

DR. FISCHHOFF: And perhaps even to combine that with Christine's point to say we don't know a whole lot about what goes on in the kitchen, but FDA doesn't regulate the kitchen and doesn't regulate the process of medicine

and doesn't regulate the process of cooking. But that it just turns out to be -- we think that a lot of the action may be in the kitchen, but as Christine says it is very difficult to do anything in the kitchen so we are going to focus on where we both have the regulatory authority and because we are dealing with institutions that are much more capable of changing than us ordinary individuals mired in our habits.

DR. MORGAN: I think it would be interesting if we did say this cube was filled in with numbers. We knew all these numbers. Ideally of course our plan is over time for FSIS to be marching down the numbers on the growing and processing side. Those numbers all keep getting smaller which would mean that the proportion of illnesses that are attributed to later food service consumption parts of the supply chain would get more attention. The problem now is we don't have good data of that whole story of what proportion is different by different foods and has all these complications. That would be a success. If eventually you had this cube and all these numbers started getting really tiny because everything was in control and there were no risks being generated there and there would just be things that would exacerbate at the service level. You can picture that as kind of the long-term purpose of the cube is to make sure everything is moving in the

direction that the regulatory agencies and areas that we are influencing.

DR. FISCHHOFF: Let me suggest now that we go to our questions and see what more we have to say about this. Let me just read them aloud. I don't know if everybody has -- the first one. How to communicate clearly to multiple audiences (industry, media, public) evolving methodology that producing quantitative conclusions and simultaneously project a message of confidence and assurance that the estimates we are using now are the best science-based data driven estimates that are available to inform decision making at the time.

DR. BRUHN: My response to this is that one size does not fit all. That messages need to be targeted to the audience and the purpose of the message also needs to be considered in developing the words. You don't have one message. You don't have one cube.

DR. SCHWITZER: Just again biting off my one limited area of expertise. I think that it is really important to hit journalists consistently and clearly about the uncertainties because they live in a world of certainties and that doesn't cut it in this field. There is a tremendous opportunity it seems to me to educate them to then educate the audiences that they serve. To explain in some of these fellowships and the boot camps that I have

talked about and other opportunities the -- why you even went in the direction of the cube and why it may fall short and the complexities embedded in it can be done. I think it is crucial. You get through to a few thought leaders in journalism, but again this is just in my little sphere here. But I think that that is potentially low hanging fruit. A lot of good could be done for a little bit of effort.

DR. BROWN: Just to build on Gary's idea, a different channel to do that would be online whether it would be a white paper explaining the rationale for the cube or I keep going back to science literacy for the public. The public really doesn't understand uncertainty in science. It might be very useful to have a little primer or something about uncertainty or about some of these problems that make it complex and explain that. And of course you can't completely do -- you can't cover everything, but those aspects that are relevant to what you are dealing with. Just a little simple instruction and that could be in the form of words or it could be also streaming video, an explanation at different levels of sophistication. It really depends on the audience.

DR. FISCHHOFF: Gavin and then Noel and then --

DR. HUNTLEY-FENNER: I would add to that to say that being clear about what you know is also important. In

fact you need to say what you know, what you don't know and what you are going to do about what you don't know. That sort of communication builds confidence and it is something you can then go back to at a later time and say we have moved the needle on some of the things that we did not know before.

DR. BREWER: I am thinking about this question. It is actually a really nice question this first question here. It strikes me that you would really need the message which is your basic finding of what your priority is, but that is separate from how you got there and how you got there I don't think is the message. Now for some groups they are going to ask about that and they are going to pursue you on that topic and you will have to have an answer for them. But it seems to me that the primary thing to do is to get your message, whatever that message is, agreed to. It sounds like you are already well on your way to doing that.

In terms of how to deal with this issue of the evolving methodology, I think I might frame it in terms of quality improvement that you do outstanding science and that as science evolves you improve the quality of what you have done and then consistently talk about quality improvement and then describe in the fine details how you went about all the rest of that. But I think that is the

thing that I would stand behind most strongly.

DR. COL: Is the cube going to be an interactive cube because if it is then I think it could be very interesting. Basically, you have a commentarial problem. You want to be able to have people look at the source of the bug versus the source of the products versus the source and the production cycle. People, I think, will be really interested in two by two. People think in terms of two combinations. If you had an interactive thing, you can have all your data plugged in there in some database but then people could interact with it. They could say I want to know. I want to compare the various sources of contaminants according to the various products and then they could pull that out and make that readable. The box could be the guts of your black box, but not necessary something invisible, but it would allow people to manipulate the data in any way they would like and then they could play with it as a two-dimensional bar graph or pie chart or whatever. It could be a great way of storing your data.

I have an unrelated comment, but going to this discussion about certainty that have been popping up again and again and how do you convey that. A lot of the emphasis on uncertainty and communication seems like how to communicate uncertainty. I think that we don't know much

about that, but I think what little we do know is that people are more interested in how to help people cope with uncertainty. We don't really know how to measure uncertainty. And even if you measure uncertainty at a level that is talking about the uncertainty and how much you know about the risk of contamination or attribution on a global scale that confidence interval or that measure of uncertainty is not going to apply to the person who is making the decision I am sure by bagged spinach versus fresh spinach or spinach versus lettuce.

In a way we can try to get that precision at a macro level and people will probably inadvertently apply that level of precision to the decision making that they are making at a much more micro level which is probably not at all relevant. It depends on whether they are buying it at a farm in Iowa or buying it -- in some ways I think it is more thinking about how to help people acknowledging there is uncertainty and how to cope with that in terms of here is what you can do maybe more easier to do and more helpful for your audience. The very limited studies show that it builds trust whereas if you focus on how do we measure it and given different estimates that can actually undermine trust.

DR. PAUL: This is a question I asked during Kara's presentation. I still have a problem with it being

a question. You have three audiences there and I am not sure that the issue is an issue for all those audiences and that is how to communicate clearly to multiple audiences the fact of uncertainty. I am not sure that everyone of those audiences wants to know it or needs to know it. That is still my question.

But then the second part of the question asks how do we project a message of confidence and assurance that the data is the best we have. That is messaging. That is artistry. That is showmanship. That is not an issue of saying how -- you are not asking how do I show that the data is the best. Just say how do I project a message that it is the best which is not the same thing. And, again, I may just be splitting hairs.

But in that sense it seems to me that what you are saying is we just need for people to know we did the best job, not that this is absolutely the best data that is out there because that is a given in the way you have this question framed. You don't ask how do we show the data is the best. You say how do we project the image or the confidence that it is the best which are two different things to me. I am struggling with even the basis of the question.

Like I said I may just be splitting hairs in getting to what you are asking and I think again each part

of that question will change with whatever audience you are projecting to because you have a media question and who knows what is going on Good Morning America or Sanjay Gupta doing a little thing about guess what the FDA and FSIS and all these other things do when something happens where they give a little bit of information about what a great job you are doing and how careful you are may have more impact than telling anybody about the fact that you are not quite sure whether you are 1 percent, 2 percent or whatever or some of the things we have been talking about. Again, I am having a little bit of trouble just digesting the question.

DR. ANDREWS: I have flash backs about the early '80s on the cube. There was something called attribution theory and I believe I saw the cube back then. It goes way back so maybe it has been passed on.

This is a little plot for what Gavin brought up a little bit earlier and granted you have different audiences and maybe this is only going to work with the industry, maybe a third of the public when you talk about college educated and government agencies, researchers. But there are some things that these matrices, these multifactor matrices, growth share matrices are very common in business do provide that I didn't see with the cube. First of all on planning purposes I think on strategic planning they are pretty good.

The big one is magnitude. We don't have a designated benchmark in terms of magnitude on a cube. You do have that on some of these matrices. Movement issues throughout the matrices. Relative positions. Different foods versus one another. Illnesses versus one another. And a little bit on time. I use this loosely on that. There are benchmarks first maybe a year ago and things like that. Anyway, just a little plug for that which we may be talking about later.

DR. BREWER: I am thinking a little more about this issue of how to communicate to the public about this. I know that it is not your main audience. If you are interested in how the public sees changing recommendations, there is some work by Paul K. Han. Maybe there are two middle initials. He has done some work on what he calls ambiguity which is a version essentially of research findings changing. He focuses on cancer, but I think it would be relevant to what you are looking at.

Maybe is it relevant or isn't it? I think the public does get genuinely confused about whether or not to drink white wine. Is it good or is it not good? Let's talk about this because we are having lunch and we need a glass of wine.

What is interesting here is it is a slightly different thing. I think it is that the magnitude of thing

changes. It is not necessarily the associations. It is really the magnitude estimates that maybe sort of bounce around a little bit. The implication of those changing magnitude estimates are that it is higher or lower on the list in which case it gets regulatory attention to a greater or lesser extent. A consumer group might want it to bounce up or an industry group might want it to go down. Is that right?

DR. MORGAN: I just wanted to add to that. It also is a reflection of how good of a job the regulatory agency is doing. That is fundamentally what it gets down to. Is the regulatory industry being successful in the way they are using their resources?

DR. BREWER: I am going to mentally set that aside for a moment because that is sort of an internal communication thing, but in terms of -- it is to a regulatory body. Communicating these other groups -- it is slightly different than you got the direction wrong. Red wine makes you healthier. Red wine causes health problems. It is that the size of the estimates is a little off. I agree with my colleagues. I am not sure the public cares, but these other folks care because they have skin in the game sort of speak. There are some resources that are for good or for ill that they want to help affect. That is a different kind of communication it seems entirely.

DR. FISCHHOFF: I think Mary's comment about science illiteracy is -- I think there is something that people don't -- actually I think it is not science illiteracy. There are test of science literacy which are all tests of knowing whether you know some facts that somebody has collected from some curriculum. In my mind it reflects a failure in how we teach science. We teach it as a bunch of results rather than as a process. Maybe I was thinking -- I wouldn't want to call it science literacy because that would take us down to a dead end for this -- it is more kind of epistemological illiteracy which is to say we -- which I think is not hard to overcome which is to say that the message you want to get across is that this is a very complicated problem not hard to explain explaining why.

We actually know quite a bit about it. We know in some sense know as much as most people would need to know in order to make reasonable decisions about which foods to avoid if they are really trying to be safe or for us to know where to start inspecting -- the process of inspecting outbreaks and really know they have large uncertainties. Still know enough for many purposes. And the only way we are going to make progress is by a kind of disruptive science where we have multiple methods. We are looking for problems. We are disagreeing with one

another's data and that will get us deeper into the problem. We will do an even better job of protecting your food supply. I don't think that is hard to explain, but there has been one science after another that has been tripped up.

You think of climate science or generation ago the controversy -- two generations ago the controversies over tobacco that science was casting in the sense -- where the burden of proof is on science to produce iron clad results as opposed to recognizing the difficulty of problems, producing data that were good enough for some decisions but not for others and being cantankerous enough to learn more. That is, I think, the message that we want to get across. I don't think that is a hard message to get across to many audiences.

What degree to detail is important to different audiences such as the nature and the status of the data available and the methods for analyzing it?

DR. COL: I think there is no way to avoid actually just identifying who your target audience is and doing some kind of meeting with them and some presentations and working with them and asking them what they want and then not just what they want but then give them what they want and they will say no that is not what I meant because that iterative process people don't often know what they

want when they haven't seen it yet. You can do that not terribly difficultly. Some of the experts in the room, but I think can't skip that.

DR. MORGAN: You have a chapter on that about how to do that at no cost. It is in the book.

DR. BREWER: It is in every chapter in the book actually. Can we talk maybe here a little bit about I was interested in someone's comment that if you make everyone just a little bit angry that you are doing well. For us usually if we have angry recipients of risk information, we feel like we are doing something wrong. If they were to follow advice and go ask their target market, the consumer groups, and maybe some of the industry groups how they know like how much yelling is good. There is some amount of this that no one is going to like. It is a weird situation I think is a little atypical for what we deal with.

DR. ANDREWS: CDC has some expertise in this. I know I was at some focus groups years ago down at Atlanta where they were testing actually different labels where they were reporting foodborne illness on the labels to consumers and it was fascinating. I remember one fellow pick it up. I don't know if it said listeria or something and he dropped it and surprise. Maybe get some insights I think on some focus group testing to move in to more comprehension sort of things, quantitative things.

DR. FISCHHOFF: Maybe to pick up on -- I think it is not in here. I am trying to dual process. But a comment that was in Neal's talk which was asking about public hearings as a form of outreach. I think it is not in here. It was in your talk. You may be statutorily required to do public hearings. I don't know whether you are or not. I was the third of umpteen authors on a science policy forum piece exactly a year ago which you might want to take -- it has a good reference. It is just two pages and it has a bunch of reference on the question of public outreach.

The context was a presidentially appointed blue ribbon committee on America's nuclear future which we thought was doing out -- where a bunch of social scientists thought was doing outreach in just the wrong way or an incomplete way that they were doing outreach in a way that was suited to the well organized and well healed who were the people who learned about hearings and can take off work and feel articulate enough to present their points or somehow satisfied that they will be heard without a proper feedback process. We suggested that will get you an important part of the audience because those are often people that will cause you trouble, but there are lots of other people who are concerned about what you are doing. For one of those reasons can't come to the hearings and may

end up feeling disenfranchised if that is a primary vehicle. Conceivably the risks of leading some significant stakeholder groups to be disaffected might outweigh the benefits of the well healed and well organized making them feel even more consulted.

It wasn't one of the authors but there is a really nice National Research Council report written -- I think Tom Dietz and Paul Stern were the editors which are cited there which look at methods of public -- at the research into public participation. It is a big research area and that Academy report did a nice job of summarizing it. I don't know what the solution is, but I think you could get an idea of the recipe looking there.

DR. GOLDEN: Yes, just to note that it is not necessarily anything that is statutory. At least for FSIS we often have public meetings when we feel there is a need for public engagement or stakeholder involvement. As I mentioned very quickly in the presentation as you picked up on, we are considering strongly that this could be a good way to engage stakeholders and get some feedback from the public as one of our more primary steps actually to engage earlier and sooner.

DR. FISCHHOFF: My thought is that in the analysis cost benefits and risks of that I would consider the people who aren't consulted who just don't make it

there and if you could make certain that there are supplementary challenges in which some of that -- you learn from them. You ask them as Christine says. You found out what they care -- there are people you would consider stakeholder groups who just don't make it. They are not the individual consumers which we are talking about as a special group. Just make certain that those people feel -- that you hear what they have to say and their constituencies feel consulted.

DR. MORGAN: Could you talk generally about -- as Neil was talking, it dawned on me that I think our perception and I am speaking very globally now is that when we have a public meeting, we are asking them. That is our mechanism for asking them. There is also typically for folks that can't attend in person the ability to submit comments to a docket as opposed to doing a focus group or a study where you are actually picking people and saying I think you need to contribute to this. This is letting everyone contribute. I think that is how we think of asking people what they think and I see a bunch of heads shaking. I just want to know how we might readjust that. Maybe what some of the trade offs are on those two approaches.

DR. ANDREWS: You have to be careful on generalizing from focus groups, but still it works quite

well to go one on one with consumers as opposed to just comments in general. Maybe it is a consumer group here or there or maybe not. It depends on the audience you are really seeking I think.

DR. MORGAN: Given our audience that we have talked about we are not really thinking that we are reaching individual consumers. They might be the secondary target, but that our primary target is organized stakeholder groups, industry groups, associations, consumer groups given that that is our target. I get nervous when we talk about doing focus groups because there is always someone who is left out. You can't invite every consumer group who is interested in food safety. You have to pick - - when we have a public meeting, everyone actually can. It seems more inclusive, but that is just my perspective.

DR. ANDREWS: There are tradeoffs certainly. You are going to get more interaction when you do have a focus group, a little more in depth discussion. Of course there are tradeoffs maybe of leaving some of those folks on.

DR. BREWER: It seems to me that the focus group has a meta conversation going. If you have a public hearing, you talk about the thing you are presenting. You actually talk about the finding. You talk about the meaning of it. And people will comment at multiple levels. But I imagine they are primarily commenting on whether or

not they are alarmed by the finding or think it is true or whatever.

That is slightly different than -- focus groups of one-on-one qualitative interviews where you would have some sort of like conversation one above that where you would say here it is. Do you like how it is presented? Does it make sense to you? Would you like it presented in a different way? Is there other information that would be on the table? Some of that will come out in the public hearing, but some of that wouldn't come out. I guess I took number two to be more about that meta conversation. How do you have a meta conversation to get at the way that you communicate and improve that and then bring that back to the general communication?

DR. FISCHHOFF: A concrete suggestion for your setting. Pick up on the comment that Sokoya made earlier. Let's say that the people at the state level who are important stakeholder audience for whatever reason. There are some of them that routinely -- that you would like to hear from them. You would like to feel that that constituency feels heard, but they are too -- to get to the hearings. Whatever reason. They don't show up.

One could imagine taking the staff time that would go into setting up one meeting, producing a sampling frame of people at the state and the county level in health

departments, setting up semi-structure random models, interviews. And just calling them up and finding out what they have to say on behalf of their particular situation and their colleagues. That might be a way of getting -- and then talking to them one on one rather than -- would let you do this. But if you could do it that might be a way of getting kind of complementary information where people would both feel consulted and you would hear a sample of information. You probably wouldn't need all that many interviews before you would start thinking the same things over and over again for any given constituency.

DR. FAGERLIN: This is probably completely impossible, but can you almost have a focus group within a public meeting? If you have all your stakeholders have that kind of discussion there so that you don't have to worry about excluding people and making people angry, but then you can get this more in-depth conversation that you are looking for in terms of feedback rather than it be kind of more one sided. I don't know if that is allowed or not.

DR. FISCHHOFF: It is called the workshop. Craig and then we will take a break.

DR. ANDREWS: Other flashbacks of years ago. We had a situation right here in DC where there was a lot of interest among states, other consumer groups, federal agency folks with the elderly. They invited in all the

state protection people, et cetera. It was a fairly large group with a moderator. They used Delphi technique where it was kind of general to get people's ideas about certain things that were presented on -- actually it was pretty neat back then -- online to what we had. We gave feedback and then they structured that again to give information back. A lot of ways you can do one on one. But I still think it is like Noel said at a higher level perhaps than maybe you might get at public hearing.

DR. MORGAN: I just want to say before the break I think these are all great ideas, but I am not hearing ideas that don't cost very much.

DR. FISCHHOFF: I am suggesting swap a public hearing for the interviews. Budget neutral. Let's take a break and then we will reconvene. We will do the other questions and if we are good, maybe Craig and Gavin will show us something new. Come back at 3:30.

(Break)

DR. FISCHHOFF: Okay. Let's start now with question number three. I will read it aloud. How do you explain the basis for our confidence in using the current method as well as acknowledging the uncertainty? Maybe you will tell us and we will paraphrase it. How do you explain your measure of confidence in the methods?

DR. MORGAN: That is the work that we have -- I

don't think we know yet how confident we are in the methods. There are certainly the quantitative statistical data driven uncertainty that can be generated, but that the sense is that -- and even in this paper that we have talking about that that is the kind of the statistical uncertainty will be representative, but how do you take it? There are of course all kinds of publications about this. I don't think we have an answer to that. But partly I guess I am hoping and this is the whole coming to your really early thing. We are really early. We haven't figured out all the stuff out yet and can there be guidance from stakeholders and in what way would we gather that guidance that would help us think about how best to represent that uncertainty.

DR. FISCHHOFF: One of the documents you sent talked about expert elicitation or maybe it was one of the presentations today. Imagine we did or kind of a systematic expert elicitation and it was well explained and viewed as credible and all of that. Would you find that there is pretty good overlap and the probability distributions over the attributions coming out of the different methods?

DR. COLE: No. We see that depending on the expert elicitation and the experts. It boils down to the pathogen commodity pair. Earlier I used the example of

Campylobacter. A recent expert elicitation that Sandra Hoffman and others conducted found that there were certain pathogen commodity pairs that aligned very nicely with outbreak data. Others Campylobacter and poultry that pathogen commodity pair did not align well at all with outbreak data. It was informed by something else. We see the same thing at CDC because as I mentioned we have a variety of methods and data in our toolbox and we are pulling data from other sources and putting that in our toolbox.

And part of when we started as three agencies communicating the first question that came to us where I remember this question came to us possibly from Kara was well what do we already know. We want to see an inventory of CDC attribution estimates. I started thinking that is fair and starting compiling all the data. That process of just taking two pathogens as an example I started with Salmonella and E. coli. I had several PowerPoint slides and that morphed into a cube and we know where that went.

Part of that process was that the numbers, the point estimates were very different if you were looking at our source subtyping model and how that pathogen commodity pair, what that point estimate was. If you were looking at outbreak data, what that point estimate was and that sort of thing. The short answer is that we feel comfortable in

some cases the pathogen commodity pairs. We can do relative attribution. We can say this pathogen -- for this pathogen these are the top commodities relative to each other and that sort of thinking using a variety of methods and that sort of thing. And other pathogen commodity pairs we have less certainty about either because we know our outbreak data doesn't give us the story that we are looking for.

Then we are relying on case control study data which is a very labor intensive process. We can only do that every so often. It is not the best way to measure change -- case control studies and that sort of thing.

We come across this issue where it depends where the expertise are what they are sort of relying on as far as how they are attributing.

DR. FISCHHOFF: And of these situations where they are saying we are right and you are wrong or saying we are studying somewhat different things and we don't really know how to merge them which means that we could both be right, but we really need some additional research to fill that in. Is that the situation?

DR. COLE: I think it goes back to what is the need. I think people feel fairly comfortable at the relative notion of attribution. What are the top three commodities related to this pathogen for most pathogens?

We might have a certain level of confidence. If you want to know, for example, or if OMB wants to know how many illnesses are you going to prevent by regulating this at this point in the food chain, we can't come up with those estimates easily and we try and we get asked all the time how many illnesses will be prevented or how many illnesses are going to be caused by this. Patty mentioned earlier now that we have new burden estimates our next project is this big attribution project where we are taking our data and we are going to publish estimates of attribution across the burden estimates. We know there are going to be a lot of attention on that, but that is again based on one data stream and a couple of different approaches to that data stream and how we communicate that and then with other papers that are coming out with different data streams and different methods.

DR. FISCHHOFF: It sounds like you are ending up in some of these situations with fairly flat distributions where you don't have enough of the mass of the probability past the action threshold that OMB or whatever would need to approve a regulatory action. Is that the situation?

DR. MORGAN: That is part of the work of IFSAC and this is work that CDC used to -- they would be sorting through this and trying to think about and now the idea is emphasized and FDA helps. Like this issue of toxoplasmosis

that Dana mentioned. The question is where do you even start. Now we are in a position where we are working together. Of course we were working together before, but now we have this whole new mechanism for thinking about. Clearly we are not going to go to OMB with the rule about which food we should regulate for toxoplasmosis right now because there is no data. But maybe we should initiate a research program or maybe there is data out there we should be -- what is the plan? And then actually before you get to that you get the question of should we be looking at toxo yet or should we focus on Salmonella and E. coli. Those are the kind of -- but like Dana said the kind of high-level staff is not under -- there is not a lot of serious contention about it. It is more kind of being able to use the data for the things that we talked about.

DR. BREWER: We were talking on a side conversation in part with Neal about the US Preventative Services Taskforce that grades the level of evidence for various services. If you want to think about prostate cancer screening, it is pretty terrible. There is a good long list of things now that they have there rated D which means that they harm people. It is things you shouldn't do.

I was trying to think of an analogy here. I really run up against a wall. I guess I don't really fully

understand. I am getting a better sense of what you all do and some very substantial constraints you are operating under because the data just aren't there or the data are imperfect or the data are conflicting or all of the above.

I do wonder if there is some way in some very rough way to rate the evidence in some qualitative way and it may be that the strongest level of evidence -- nothing would be attributed to that category, but there may be a B, a C grade. But anyways it is worth taking a look at. They have publications that describe their methods for grading the evidence. And for them it is about study design. They sort of mix internal and external in an ad hoc way. It is a little weird. It does come down to a nice tidy grade that some group of people agree on. Just that grading process can be very intensive and they have a lot of resources they are putting behind it. This may not solve a problem. It may create a new problem. I am aware of that.

I guess what I would like to hear from you is is that kind of grading useful to do both in terms of being able to do it but also in terms of yielding something that would be valuable to yourselves or do you think to other people you interact with.

DR. MORGAN: It seems like that kind of approach would be very satisfying for -- we are not talking about the general public really, but just people who are kind of

interested in this that that kind of -- it just simplifies it to a thing that we all can understand.

One of the challenges we have is that people don't understand. I was just thinking as you were talking before about evidence based and asking people and stuff is that I wonder. It would be really interesting to do a survey to just talk to people about how do you think the government knows what foods are most risky and kind of get their current mental models about what they think because we have learned all kinds of things and some other mental model studies that have been done with FDA about the assumptions that every product in the grocery store has been tested. Things that we would never cross our minds because of course we know that that is not the case. Understanding that I think would help us assess that kind of question of would this be useful.

One of our concerns is that people think that we have a lot more data than we do. There is something missing between what we know and what people seem to expect of us and so understanding that I think would help us to bridge that gap.

DR. BREWER: The publication -- the most recent one that I remember is by Harris. It is in the Annals of Internal Medicine. It describes their process for grading evidence. There is a more recent one. I am blanking at

some -- it shouldn't be that hard to find if you go on to US Preventive Services Task Force website. There is a nice publication that describes their process. You can see if there is an analogy to make. It is a resource of potential use.

DR. BRUHN: Building on grading of evidence I believe they do that when they consider nutrition claims. The agency has experience in that level. Barbara Schneeman is a lead person in that area within FDA.

And then in regard to the quandary that you have asked for this other question when the data is so variable I think we need to go back to Gavin's tell them what you know and what you don't know and express -- clearly lay out this uncertainty and make a determination. Use an average. Make a guess if you feel that you have to. But I think the best way is being straightforward in open and above and acknowledging the complexity of this decision.

Then one other comment in regards -- we know contamination can come from the product and also from the household handling or the food service handling of that product. If it a kill step is enacted then you have knocked it out at the source. The ambiguous question -- if I regulate this, how much would it be reduced? It depends upon on what that regulation is. If that regulation requires a pathogen kill step, you have greater opportunity

to make a statement on the impact than if it just requires some step that will maybe reduce incidence by 10 percent or 5 percent or who knows what percent. But if you knock it out at the beginning, you knock it out. Cross contamination, inadequate cooking, all of that is no longer mute because it is no longer -- the food is no longer the source.

DR. FISCHHOFF: Let's go on to question four which in some sense follows on just from what Christine was talking about. What does it mean for specific audiences? I will just read it aloud while people -- you can read it by yourself now. How do we communicate clearly to multiple audiences where there may not be actionable steps to take for all audience members? Rather the key message for industry may be how to participate in improved food safety surveillance and reporting, but not for the public. It is just to understand changing numbers as reflecting -- it is just done to understand changing numbers as reflecting evolving methodology as well as evolving food safety.

Part of that is just what we were talking about is to give the information and inform that different people can extract different things for it. I imagine there are situations in which OMB will say if that is the probability distribution and you have some kind of secondary uncertainty, quality of evidence measure. We can't

promulgate a regulation and then some of the regulated industries will say we would be crazy not to do that. And then the lawyers will say you should do it. Even within people will view the same evidence differently. It seems like some kind of probability distribution and the notion of the quality of evidence gives the disclosure that allows the sophisticated audience that you are talking about in a way -- it seems like it strikes me that some way of doing that is consistently possible as a way of educating them and just how to think about this kind of evidence. It is not that hard, but not that natural.

DR. BREWER: This multiple audience thing we keep talking about communicating differently. I don't have a lot of experience of communicating with multiple audiences aside from some work I have done on websites where you end up with literally different web pages. If you are a faculty or a student or media, you just go to different part of the school public health's website. But I am wondering if some of us could talk about what that would mean in this case or maybe different materials.

I feel like we implicitly have this idea of what it means to communicate with multiple audiences with different messages, but maybe we could go into a slightly greater level of detail.

DR. HUNTLEY-FENNER: There is a common approach

which I am not sure how well suited it is for this purpose. It is very common to have coded language, special words that once if they are using common -- can be interpreted generically by one group, but very specifically by a target audience. I am trying to think of a good example now, but there are legal of terms of art that if an agency makes communication. The attorneys hear that word and they pick up. They know exactly what is being discussed and they can go look into more detail. But the average person wouldn't think twice about it. But there are lots of different examples of that. It is one very common way that individuals will use or groups will use to communicate to multiple audiences.

DR. BREWER: I think one of the recommendations we made before when we are talking about the general public and other more sophisticated -- not more sophisticated -- other audiences with a need for information of greater detail just having some kind of executive summary and then a greater detail and then extreme detail maybe beyond that. It is little like this onion idea I shared before. That might also start to get at this different audience thing as having communications that build in some way, very brief, maybe executive summary and then something quite a bit more detailed.

DR. FISCHHOFF: I don't know whether this area

lends itself to it, but in thinking about these uncertainties if you are not inside an area, you often have no -- you can sometimes understand why something might be a methodological problem. We can only look at the -- because it is really hard to look at the sporadic. I don't know whether that says you know nothing -- you can't extrapolate from the known universe to the unknown or whether there is a kind of we know what the range of adjustment factors are. From the outside I would have no idea. There are people who have looked at medical, clinical trials. There is selection bias where often where people somehow one way or another they choose whether they are going to get, which treatment they are going to get. There is volunteer bias whether they will be in the study and then the selection model.

There have been places where you can compare -- look at the magnitude of that effect. There have been trials done different ways. In where we have looked at it treatments are 15 percent more effective where there is selection bias which suggests that somehow people for whatever reason that you could do it. And you could say for default in places where we haven't don't it it is worth 15 percent. That is not what you are looking at.

But I think any place where you could say something about how severe a problem is because if I don't

know, I might not know whether it is disqualifies it or whether this is just kind of -- is one of the nuisance things we would like to get it right. And some kind of summaries even kind of consensus documents or something that would help people to orient themselves might be a helpful thing and be widely used. If you really do believe that the sporadic universal looks like the outbreak university just can't prove it. But somebody has looked for some payers, some commodity pathogen payer. It is not too bad. If that were the case it would be nice to know about it and I have a base rate.

Question number five. How to communicate both directly and working with media channels to communicate clearly to multiple audience so that we appear as forthright as we intend to be in brief that numbers and methods are changing to reflect the improved methods available now, but not to cover up information or previous statements that were based on methods that are now outmoded but were a standard of their day.

DR. FAGERLIN: Is the issue that the methods for detection are different or the statistical methods different? Because if the statistical methods -- can you go back and say if we looked at it this way using these statistical methods 5 years ago you can see that things haven't actually changed over time.

DR. COLE: That is great if the data sources are there from the previous time period. That is inherent to the problem. We have new data sources and new methods simultaneously. It is difficult to go back and do that retrospectively. If everything stays the same ideally we can do that and for short intervals of time we might be able to do that, but then for short intervals of time our variability is such we may not be able to really say much about it. Our data streams -- because we are simultaneously working to improve our data streams and improve our methods. Being successful in both areas leads us to this challenge.

DR. FAGERLIN: That is what I figured -- almost an easy thing to express because you can just say look, now we have these 10 new data sources. Aren't we really lucky that we can do this? We are fortunate that we now have this access and that people can understand that. Because if it is just statistics then it is like why couldn't you figure this out earlier? But if you now have better mechanisms in place, I think that will just strengthen it. Maybe I am optimistic because -- never mind. I will keep my comments to myself.

DR. COL: I guess this is probably the easiest question put forward here. Generally people love and embrace new technology in advances without much question.

I think as long as it is framed positively, here is new and improved stuff. I don't know. Do you get a sense that you are going to get push back? If you just frame it positively and this is we did the best we did now. Now we have these advances. I don't know that most people are going to distinguish whether it is statistical advances or laboratory detection advances. It seems it would be positively received.

DR. MORGAN: Well I think -- it was suggested the idea of labeling this as quality improvement and I think that is really an interesting idea. It is much more complex than that, but that is kind of a way to represent it. I guess our concern and again we were coming to you really early so we are just kind of laying out what we are thinking about for the future is that it can affect -- will it affect trust because now we are saying simple outbreak data is the best we have. We are using it to make decisions. And then 2 years from now we are going to say now we have this new method. Wouldn't people look back and say I can't believe you made decisions on that data? It is true that we don't have that method now.

It is just kind of like this issue of well and especially if the numbers change a lot with the new method and some of the folks who were most upset about the simple outbreak attribution. They are kind of lower on the list

now.

There are all kinds of things that can happen. We are anticipating how can we practically adjust this so that we don't run into issues later.

DR. COL: I think one way of just citing some of the other areas where there has been phenomenal advances like computers. No one would go back and say oh computers. Two years ago they were all obsolete there for computers. They are terrible. If you could tie this into your ability to do this is tied into other revolutionary advances and computational ability or new scientific discoveries and quality improvement. I just think this is going to be -- you will be able to look really good no matter what you do in this one.

DR. GOLDEN: I just think that the add on to what Kara said is what if we get connotative questions in regards to well then what don't you wait about 2 years and do the complex attribution and not put out anything with the simple if you think it is so much improved. We don't want that idea to begin to bloom because we do feel that the data are good and that this is a good first step.

DR. COL: I mean in medicine all of our tests are so incredibly imperfect. We don't say wait 2 years and wait until we get a better mammography screening in the meantime. People accept that. And they accept that as

long as it is the best we have people are really happy to embrace really poor technology as long as they trust that this is the best you have.

DR. MORGAN: That was just what I was going to say is that we are evolving. We are improving. We have all these ideas about how we might do thing differently. What if other people don't think that it is an improvement especially if it is affects their ranking on the list because you add in consumption data because it is going to affect -- the stakeholders care about these things and they want us to be kind of using the best method, but that is a qualitative decision. It is more complex method. We are trying to represent uncertainty. As Baruch said we might actually identify greater uncertainty with these improvements. The assessment of that -- I guess that is the question. How do we convey this message of this is an improvement successfully?

DR. COLE: Especially when I consider some of the directions we are going analytically because our data streams are what they are. We have a limited number of resources to really make dramatic improvements to the basic data coming in. We target here and there as resources become available.

One of the main things is like your mention of the computer coming out. We can do analytically things

that we could never do before. But it becomes much more complicated. It is much more easy to communicate outbreak data where it is sort of here is the data. Here is the attribution. There is the pie chart. Then our most recent collaboration with FSIS where we adapted this complex Bayesian mathematical model that was done in Denmark and they are using it quite successfully, for example, in their food safety decision making. We adapted it here and we would like to pursue similar types of projects. We would like to go where you need to have PhD biostatisticians to tell you what to do because it is very complicated and then we are communicating that where the common perception you always say is statistics can say whatever you want them to and here we are moving from what seems to be straightforward into this realm of analytic complexity and it is always based on certain mathematical assumptions and this and that.

We foresee and again Kara keeps saying we are coming to you early. We are looking into our crystal ball because right now we have biostatisticians working hard even though the difference between the Mead and the Scallan estimates are a case in point. The Scallan estimates have lots of uncertainty about them and much more mathematically complex and has the appendices to the paper are longer than the paper practically where we try to explain all that.

DR. COL: People are really willing to embrace new technology and new models -- a year or so ago there was one of these social networking models looking at how obesity is infectious. People embrace that almost unquestionably. People weren't asking what are the real problems with this model. But that whole concept is now -- now everything is infectious. It is funny. That was really a complicated model that was really fraught with problems. I guess they tried to publish it. The theory has been around for a while, but suddenly people are questioning all -- models. I don't know. I am worried that people will embrace whatever new you do without asking enough questions not that they are going to be hammering you with questions.

DR. REYNA: I should say. I think that people love science, et cetera, but the public -- there is repeated examples and very understandably so. The public becoming very confused over contradictory information. One year it is eat this. The next year it is bad for you or vice versa. And the public does get confused by that and is annoyed and wonders about the whole enterprise. Do you all know what you are doing? You are changing your mind. And I think that is very understandable.

I think, however, seeing what you said in this message is a good thing. The nature of this change is that

there is a measurement technique and we think it is better than the old measurement technique. I think summary statistics can be communicated like predictive validity. This predicts outcomes better or the accuracy rate here is better because we can now account for more of what is out there. Type one, type two -- everybody explain it in English as opposed to saying type one and type two error. I think those things can be expressed as summary. This is actually a better measure than what we had before rather than try to really understand the model.

Again, I have to add sometimes these models are not better measures. They have so many assumptions. They are rather fragile and they are not necessarily predicted. They are postdictive. I think there the concern is a legitimate one that people have. More parameters are not necessarily better. I would say no doubt in your case they will be better and you are only going to go with them if they are better. Directly communicating that kind of summary is helpful because I think people really are confused and off put by contradictory science of information.

The other thing is I think it is important somewhere to cover. I remember having a friend who was an expert witness on a trial and the lawyer on the other side said about the scientific evidence. Well, you said the

opposite last year. And this person said yes I did because now there is new data. The conclusion is in fact different and in fact proceeded to give a lecture about science always changes. That is the nature of the beast. That is another thing I don't think is common knowledge. I think people think of science -- regular folk think of science as a set of facts and that is an edifice. And maybe you add to it, but you don't change it.

I think what we all know about science is of course it is constantly ideally progressing. The set of facts do change.

DR. MORGAN: This is an example of where I think this -- and Gary asked me the question earlier -- is helpful. Are we being helpful? This was something now that just kind of triggered an idea for me that I think might actually going forward and that is being proactive about identifying the criteria we will use to decide if a method is a valid or not. And we have talked about that that there is going to be all this work. There is going to be validation. There is going to be this. There is going to be that. I was a little nervous about that. What if CDC thinks this is great, but we are not that sure and FSIS is deciding and what is the process for deciding and having measures that the stakeholders would find useful? Now, I don't know about predictive building accuracy for this

work. I have to tell you right now that that is not the kind of stuff that we are dealing with.

PARTICIPANT: Okay. Postdictive.

DR. MORGAN: Right. Those can trigger some kind of measure that can be objectively measured and that we would have to collect data as we are doing the validation. Have this conversation now instead of 3 years from now is helping us because then we can build that into this process.

DR. BREWER: I think some of my comments Valerie already covered it better than I am about to. I think I am going to disagree politely with a couple of my colleagues here though on this issue of what the public thinks about tests is going to translate to what these stakeholders think. It is really absolutely true that the public loves screening tests. They love any kind of medical test even when they are bad, even when they are harmed. Some of the people have spoken to this committee have actually done some outstanding work on that very issue. A false-positive mammogram. Women have had them. It is absolutely useful. It was a good thing. They are anxious. They are upset. They may have been over treated. Who knows? But they will actually talk about how they -- like not a small percentage -- like 99 percent of them, 95 percent of them will talk about how they actually think it was a good thing. That is

amazing to me.

But that is not the same as having people who have financial or other stakes in this -- the stake of the outcome of your research or the outcome of your test. I am not convinced that they are going to just say it is great. I think what maybe sort of underneath some of your arguing here -- not arguing -- your trying to feel your way through it is that you are trying to anticipate outrage and scandal. There will be one of these things that will somehow become a lightening rod that several groups that are influential will come together on and then will start to bring other policymakers in and all of a sudden you have this sort of mess that you are trying to dig yourself out of. You are trying to be proactive in sort of setting yourself up. You may not be able to protect yourself against all situations like that, but at least you would have a good arsenal. I think that is actually really smart. I like that way of thinking. I think it is useful. I think it is good for the organization.

And then the suggestion that Valerie made which is a version of what I was thinking at the same time is having clear reasons why it is good that you can articulate and then going insofar as maybe to articulate them at least in an internal document and possibly in whatever report that you release. I think that is useful.

And if in your estimation the thing that you are going to regulate or the test that you are going to create or whatever this issue is that you are getting in the middle of, if it passes some level of potential toxicity, I would think about having an advisory board for that one particular issue where you bring in other scientists. You bring in other people from outside. You come to some kind of consensus statement. And that would share the blame in a way. You lose a little control over the outcome, but you also spread the wealth a lot when it comes to the culpability or whatever the negative consequence might be.

DR. FISCHHOFF: Question number six. How to help stakeholders and interested parties navigate many diverse sets of attribution information being generated outside the federal agencies and inspire trust in the government estimates even though they will not always be consistent with other estimates.

To kick off the discussion it seems like the trap is that if you are less confident than others, they will steal the seam. You make your case more forcefully than you feel like you really have the evidence and then things change and you look like you have promised too much. In some way the strategy has to be to tell it like it is in a way that your candid disclosure of the limits of the evidence works in your favor both in the short run and in

the long run.

DR. MORGAN: This gets to the question that I mentioned about -- seriously, how many resources should we put into this because we certainly could do that and we could point out where there were assumptions or uncertainties in the analyses that were presented by others that weren't fully expressed? But we could have three people doing that all the time and it is not really clear that it is helping us. But having those strategies is also not effective. I guess we are looking for some kind of --

DR. FISCHHOFF: Maybe there is a kind of reporting template that you could develop. Look into those used in medical journals that kind of get out the issues that you think are essential to evaluating the quality of the evidence. Somebody looks at your full serious disclosure and that looks at somebody else's kind of glib thing and thinks there is more work to redo. I would like -- but you had better evidence, but these are the people who are -- these are the serious people in this domain.

I suspect there is a way to do that but it would require a lot of -- it would take advantage of the science that we had already and required quite a bit of -- not expensive but it required -- you can do empirical testing quite cheaply if you don't have to see it through to publication. That is what makes our kind of science really

expensive, but to bring people in to do one-on-one interviews to kind of rapid appropriate prototyping of different -- to have people with different years including some social scientists listening to what they have to say. That is really not that expensive. In fact it is cheap.

If you think well you have to say it some way or another, you could either argue around the table guessing at how your different audiences would do or you could let your audiences decide for you. It might preserve relations around the table and get better answers of less time and aggravation.

DR. SCHWITZER: I thought that was really important and it ties back in to what Noel said earlier in my mind about the beauty and the strength of the US Preventive Services Taskforce's recommendations. I think to independent thinkers they have put their stake in the ground. We do this better and we explain it better and more deeply so that as opposed to many conflicted guideline, setting, agencies which give no rationale or evidence for their recommendations. The US Preventive Services Taskforce goes to great length on their website and not just for academics, but for individuals, for consumers to access their rationale, their evidence statement in incredible detail. It is their public stake in the ground that we do this. We have nothing but good

feelings about the way we do this.

DR. COL: One of the problems with risk information in the medical area is there are so many terms that -- attributable risk, relative risk, absolute risk. People often think that there are different estimates and often they are saying the same thing. They are just using different measures. There is going to be cases where you have genuine disagreement and genuine different interpretations of data, but then you also are going to have what might be even a bigger problem is people use different terminology, but mean the same thing. And uninformed public might not know that. It might be useful just to have a glossary or very simple primer on what some of the terms might be and how they might be able to interchange some of the terms. A lot of this stuff has been developed. The AHRQ has developed some of these glossaries. CDC I think has some this work done. I think I have seen that. But I know there are these places where you could help people at least to try to understand some of the terms.

DR. BRUHN: I was wondering if this task might be taken by some of the risk assessment community rather than you. If you prepare your information, clearly identifying what you have done and why you have done it and how you have done it. You have done homework. If someone else

comes up with something that is vastly different that is not supported with the scientific strength I would say that it is for an impartial observer such as the risk assessment community to examine the two and do the communication, write a paper or whatever. It is more their worry and not your worry. You need to focus on doing your job and communicating it as clearly as possible.

DR. BREWER: It feels defensive having to defend each of these studies and also just time consuming. I can't even think of an analogy where it would fit. I guess for really again these lightning rod cases you may end up having to weight into that. Then I started thinking what if you came up with a general primer on how to -- 10 questions you want to ask like a one page or two page or 10 questions you want to ask what do we study and hopefully yours will also hold up under that scrutiny. Then people can do that on their own. And then I think will people ever really find it or this will be one of those facts that they linked on websites that sort of never seemed to get read. I don't know. I guess if you have an intern who wants to write that thing and you can put it on the website somewhere, I guess do it and then point people to it every now and then. I guess I agree with you, Christine. It is best not so much your job except in exception cases.

DR. FISCHHOFF: Question seven. How to integrate

communication concerns such as these throughout the initiative. You are off to a good start.

DR. MORGAN: I understand that you often give this advice that you want people to come earlier so we are here and we are listening and we would love to hear your thoughts on what that means. Obviously this is hugely helpful and we will be working on this for the next 5, 10 years.

DR. FISCHHOFF: We have a frequent visitors' program.

DR. MORGAN: What is the path for this early intervention in communication? Then things are kind of happening and we are communicating, but how do we know we are doing it well? When should we stop and ask ourselves questions. When should we come back to you? Just kind of general thoughts.

DR. FISCHHOFF: I think that talking to -- the group is obviously thinking very hard about providing service to the audience because that is why you are here for, but also recognizing that your ability to operate to do the things that make sense depends on people not -- your public is not wandering off on the wrong direction or you are not doing the kind of proactive stuff that will make life difficult for the people who want you to fail.

I think talking to your public in ways that don't

somehow constrain -- there may be some limits to consultation. I don't know -- but to find the kind of information that would be most helpful to them so that you can -- where you have the discretion you can formulate the research -- the analyses in ways that will address the questions of particular constituencies or do those ancillary studies that will patch the uncertainties where you feel most vulnerable that having -- these are really good presentations. Perhaps other than Christine I don't know if any of us knew anything about this before coming in. I think we all feel like we have a basic understanding of the issues. You all know how to explain.

I think that there is a way to consult so that in some ways the communications drive the analytical process within the constraints of the science being sound, but answer the questions that people want. And then find some ways of routinely testing what you have if only just showing to members of your family or people that you have access to see whether -- does this plan make sense to you? Are we communicating? I think in the last couple of questions there has been the suggestion of coming up with standard templates or ways of telling these stories that could then be used in multiple different ways. Input from a couple of social scientists will probably help you to have a better first guess at how to do that in ways that is

consistent with your technical knowledge and then to do evaluations and interpret what is going on.

It might also help -- people are going to be looking at your work with different motives. I suggested earlier. There are those who really want to get it right and just want to understand what you are doing and hope that you focus it on their issues. And those people who will be in an adversarial process but are in for a fair fight. And then there are people who really want to do you in and will fight dirty. In some ways it might be helpful to have somebody who is not immediately immersed to help you. Some people you to say you know you are never going to make them happy so don't start the whole project out of line in order to make somebody -- to satisfy somebody who just wants it to fail. They are going to overstate their case. Let them trap themselves rather than falling into that trap. There might be that kind of strategic -- if you are viewing this as a strategic thing, there is a little -- I know that is strategy or tactics or whatever. Somebody could help you to do it without having the burden of actually having to executive like ourselves.

DR. BROWN: I wonder if a lower, no cost resource and I don't know how much you already rely on your office of communication and technology transfer or whatever you call it in FDA. I know that in AHRQ their office of

communication and knowledge transfer works very closely with the scientists. It is beneficial because they have some knowledge of social marketing techniques that the scientists -- that is not their expertise.

I would really encourage you to have a voice because if you have no voice then you surely will get stepped on and you will lose the battle in the public sphere if you have no voice. Having a case -- building a case and having it agreed upon ahead of time or for the criteria you are using for quality assessment I think is a great foundation.

DR. FISCHHOFF: Let me present to you what we are doing now and see whether this corresponds that the cube as I understand it has preserved a valuable function in helping the working group to understand the structure of their problem in common terms and see where the definitions agreed and disagreed, but it is not the only way to represent complex multidimensional problems and it has a limitation and not readily lending itself to showing what the results are. It shows you what you did, but not what you found -- almost in parallel Gavin and Craig suggested this alternative representation and they are going to show it to us.

DR. HUNTLEY-FENNER: It just so happens that my suggestion falls squarely in something that Craig teaches

every semester or so. I come to it from a business background having been a business consultant. Just very briefly we have four slides and the hope is that we can kind of T up the collective energy and intellect in the room to sort of fleshing out the idea to let's see if this can actually do some work for our guests today.

We are going to introduce what is called a growth share matrix. You are seeing an example up in the screen right now. It has the advantage of being a two by two as opposed to more categories and more dimensions. Essentially it is a tool that will allow you -- it will support strategic planning and recognition of the fact that you have limited resources you needed to allocate those resources.

But it is also flexible enough to allow the shifting of focus to supply chain issues. You can put multiple pathogen information on the same page at the same that it is informing these broader, strategic decisions. I think this gets you the big picture at the same time that it helps move the ball forward. It can portray magnitude - - as a short coming of the cube and as I said it links to action specifics.

Ultimately we are hoping to get engaged. Just talking enough about it so that we can engage the rest of the group in solving some of the outstanding issues that

Craig and I are noticing as we delve into the analogy.

DR. ANDREWS: There will be a quiz on this in a second and then wake everybody up. This is really cool doing this on a fly. In actuality this goes back about 40 years. It is going back to the Boston Consulting Group matrix. There are criticisms of this. It is something that industry certainly if you have had marketing classes or strategy classes, they would definitely understand. But basically brands were strategic business units as little circles usually start out as question marks. They start to grow. They start allocating funds. They move to the star region. And usually growth slows down a little bit, down to the cash cow even though -- that is a total dollar sales for the size of those circles. It might grow like a Coke Classic or something like that where the growth has kind of tapered off, but the total dollar sales are still fairly large. And that funds the other businesses on the other quadrants.

DR. REYNA: I just wanted to ask what those -- I am not understanding the size of the dots because low, high.

DR. HUNTLEY-FENNER: You can think of each of these as being -- large company. There are lots of different products. You have new Coke Classic, Cherry Coke. Each of these is going to occupy some market share

and there will be some general growth in the industry.

It turns out that individual businesses don't stay in one quadrant. They migrate through quadrants in the course of their life.

DR. REYNA: (off mic)

DR. ANDREWS: It is total dollar sales of each of the business units. Occasionally I will tease my student departments in a college and things like that. It could be a lot of different things. That is why we immediately thought of different foodborne illnesses, different foods that could be labeled up here.

Also, high versus low on the industry growth or business growth it is versus the economy. You take a look at the percentage change versus a year ago and growth domestic product. And then the relative share. Are you 10 times the size of your next largest competitor? The same size which is the cut off between high and low or maybe one tenth the size of your next largest competitor.

DR. REYNA: (off mic)

DR. ANDREWS: If you go all the way out to the end of the continuum.

DR. REYNA: There is a market share. There is high/low and then there is the size of the dot which is --

DR. BREWER: Could you draw out the analogy and sort of draw it to this? How is this relevant?

DR. HUNTLEY-FENNER: We are envisioning that each of those circles will correspond. This is an E. coli example. Each of these circles would correspond to a different food product. You encode the growth of E. coli outbreaks in general as well as the individual food products contribution relative to its peers.

DR. ANDREWS: Each one of those business units will be a different representation from E. coli in this particular one. You might have H2O, leafy greens, beef, eggs as different units up there based upon an average growth rate that could be put between high and low and then the relative contribution to whatever events you want to tag. For example, dentists, hospitalizations, things like that.

Now this is limiting because you can't in this matrix and Gavin and I were talking about this. You can't tie different diseases with the different food categories, but we are going to get to that in a second with another matrix where you can do that.

DR. HUNTLEY-FENNER: Maybe this is a good time to pause to ask if there are any questions.

DR. FISCHHOFF: The labels are all wrong. The dog would be a star unless you are competing for market share as the pathogen --

DR. HUNTLEY-FENNER: That is right. In our case

what is a star is really something that is a high-priority item. It has a high contribution relative to total number of events and you are in a situation where it is high on the growth curve as well.

DR. REYNA: It is contingent tables are usually for social scientists -- other way around. It is low-high. It is low-high. The dog I guess is a dog because it is low-low. Is that why it is a dog?

DR. ANDREWS: On business units. If you think in terms of business units, yes, but we have to do it in reverse. Obviously a star where you have high E. coli growth and it is relatively high versus some of the other events that would actually be negative of something you want to deal with.

DR. HUNTLEY-FENNER: You could imagine a supply to a simple problem. You need to allocate surveillance dollars. Where do you spend it? You pick a quadrant. You could also look at it from a perspective of public communication where might you get the biggest bang for your buck or what have you.

DR. COLE: I had a question about understanding it. Is the size of the circles the number of illnesses? Okay. Thank you.

DR. HUNTLEY-FENNER: That is right.

DR. ANDREWS: A few years ago back about 1970

there was tremendous criticism of a Boston Consulting Group growth share matrix that it only had two dimensions. You needed factors that were indices of a lot of different things and to expand it a little bit to put all business units up there. We have two dimensions here: industry attractiveness that includes growth rates, costs, other sorts of factors in the industry, and business strength and how that particular business is doing. You can see there is a little traffic light demarcation up there. Green as in vast. It is not showing up well here. Yellow, the middle ones, are hold. And red tends to be divest as far as interest in business.

The key here for us though is you can have individual pie charts for each disease. You might have Listeria, Salmonella, E. coli up there and the portion that is contributed by beef let's say or H2O, et cetera and it could be labeled by different indices on those two different dimensions.

The problem with that is a little bit you might overshadow one so maybe you wanted to focus on growth. That might just be one of many dimensions up there. But anyway it is just a different way of representing data.

DR. HUNTLEY-FENNER: One of the nice things about this tool is that you can also incorporate movement over time. For example, as I said those circles move around

from quadrant to quadrant and you can actually attach an arrow showing where the circles were last year or 5 years ago and where it is now. You can get a sense of trends and potentially if you know about interventions that could be a very useful piece of information. Also, it can tell you which problems or small problems now would seem to be growing quickly.

DR. ANDREWS: And one thing Gavin and I were talking about is let's say instead of in vast under the normal business strategy where it was green maybe that is regulatory focus. Maybe the hold or yellow might be more of education and maybe the red area that divest might be more surveillance. We don't know. There is a range of options that you might think about. There are criticisms of all these sort of things. It is just a different way of presenting data.

DR. HUNTLEY-FENNER: Any thoughts? Obviously we spend quite a bit of time thinking about this and working up the model. There are certainly no holes.

DR. MORGAN: -- and I like this one because it is starting to look like the cube except a little bit simpler than the cube.

DR. BREWER: One of the structural things that is different between this and the cube is that the cube has categories on its axes. They are not a continuum. They

are distinct qualitative categories. Each of these has a continuum that is a criterion in which you evaluate something. The nature of the information you gather is going to be different than what you get out of the cube. The cube is a framework for organizing information. This is actually a framework for action for saying what is good and bad.

I will just say also. I am going to guess that growth won't end up on your list. I appreciate Valerie's comment and the inclusion of this. Just what I have heard of your data is that the data on growth is probably not stable or all that reliable. You can certainly get time series, but with the kind of noise you have I am not sure that the growth or the fall on something necessarily comes out, but maybe it does and maybe I have that wrong. There may be other things like the total number of cases and then the relative incidents. Those are sort of two dimensions that the CSPI, Center for Science in the Public Interest -- they identify two criterion and demand that could be the two of the dimensions on this.

DR. ANDREWS: If you are looking for a site on this, there is a single name. He is being doing this for decades. Phil Kotler. Any book in marketing by him. He is out of Northwestern.

DR. DEHONT: I will say we have been using these

type of graphic representations in the food industry to demonstrate risk for years -- different titles, whatever. The last one is a very interesting adaptation with -- pie charts. You could definitely put arrows on it to indicate past 5-year trends or whatever. Whether it is a food commodity basis or in my case a facility basis I have to rank my facilities because I have to allocate resources. The same thing can be done from a disease standpoint -- a pathogen standpoint very easily.

DR. MORGAN: Lee told me that we had a chance to ask one more question maybe if you guys had enough time. We are going to walk out of here and we are going to sit down and while the CDC folks are in town and start talking about what is the strategic communications project going to look like. I wanted to feedback to you what I heard and tell me if maybe you could add to that because it seems what I heard I think was pretty simple and maybe it just is that simple. It is certainly not what we were thinking about. We will have to talk about what that means. What I heard was -- I am thinking about kind of steps to develop strategic communication. I don't know if there is anything out there published on this but if there is that would be helpful too. Ask people what they need, what they want to hear about, develop materials, test them to see if they are working whatever that means, and then implement and then

ask them again.

I know those are kind of basic social science research steps and it is like I said certainly not what we were thinking of in terms of a strategy for communication. I just wanted to play that back to you and see if you would want to amplify or add or say that is part of something bigger. I am not sure what you might say --

DR. FISCHHOFF: It is a shame it took us 8 hours to say that. There will be something published on that tomorrow. We will see that you get copies.

Let me thank you for really such a wonderful topic to us and the presentations -- especially having those presentations in advance so we could study them. They were great. We got into it and the backup material and come back. We want you to succeed. Let me thank the committee and thank our audience and we will see you here tomorrow at 8.

(Whereupon, at 4:52 p.m., the meeting was adjourned.)