We will jump right into it and some of the days with the round-robin with the panel members for comments, insights and to start that off and if you would like to go hand take the floor.

I'm interested in listening to the panel thoughts today. I yield back any remainder of my time.

We will go do the round the table and do it in normal alphabetical order.

Good morning, everyone. I agree that I think it was a great day yesterday and for the strategies my emphasis for a success in implementing the strategies will be depending on how much Noel will work with the private academia. I just want to emphasize the public-private partnership.

Next up.

Good afternoon and good morning. I completely agree on the comments. I believe the strategy is bigger and involves many more partners working together and I think there's a huge opportunity to have that public-pipe private partnership and as the Admiral said yesterday, the focus on innovation and technology to take it forward and are excited about the Alaska strategy is both of the initiatives are the way to go ahead and looking forward. We take a moment and wish all the mariners on the call and today's maritime day so happy Maritime day.

Thank you, Captain I apologize ahead of time for any background noise. My home here and I may have to go mute.

Sean, you may be muted.

I'm here. I don't have much to say so I appreciate the captain hitting maritime day. It is a big event for us and it is great that we are all working together on this day and I appreciate being here.

Good afternoon. I do not have a Hawaiian shirt but the surfboard has been to Hawaii with me and I'm really looking forward to the discussion today.

Good afternoon. I reflect everybody's comments and particularly I think the Alaska strategy has so much work going into that that we still have lots to do to round out the comments. The strategy itself is huge and it does present some really big challenges. If we can focus our comments on that today to get a good recommendation. Thank you.

Thank you.

Everybody can hear me, I trust. Yesterday was a good day and I'm excited and pleased with where we are. I think what we need to do is continue from what I've been hearing and to continue to focus our recommendations. It is the lead agency to get involved and

ensure the full interagency cooperation as well as public or private and it should be now as the lead agency to set the standards for the data and guidelines and the procedures for all of these and we have to continue to underpin NOAA in everything they do and the importance of all the services and products to the success of the economy. A couple of underlines and emphasis points I think we need to be putting together as we continue to listen and formulate recommendations and it's fairly sunny here Bridgewater New Jersey but not as exciting as why, Alaska, Florida or anyplace else.

Your muted.

That was not my fault, thank you. I totally agree and what Ed said. Particularly the idea that somebody has got to take the lead in pulling all of these desperate things together. Whether they are resources from whoever and pulling it all together. We have a big job and an important job. It's the old thing and have you eat the elephant, one bite at a time. We start with who is in charge and we start with what is the task and what is the first task and so on. Somebody has to take the lead and now what I think would be perfectly positioned to do that and began to pull in all of these private sources as well. Whether it's New Hampshire or whoever.

Thank you. For some reason my video camera is not working today. I was very pleased with the support we received with the coastal mapping strategy and I want to endorse the recommendation regarding the standards. That's all I have.

Morning. Nothing really to add here. I appreciate everybody's hard work. I agree with the comments that everybody else is made.

A lot to digest yesterday stepping on the accelerator Petter Petal and it's great to see so much attention directed toward this effort and right from the White House down so a lot to do and a lot of exciting opportunities. I'm glad to be part of it and we have some of the crew from right near in June of this week and I had them over at the exchange to go out and survey.. We are pretty excited and I'm glad to be part of the process.

Good afternoon. Good work yesterday and looking forward to another day of guidance. I second the comments. These are probably the biggest projects I have been involved in an obviously they need good coordination and planning for the results. Looking forward to another good day today.

Thank you. I just have to say that I've been so impressed with how engaged the whole panel has been with the Alaska mapping and no bad -- nomad and we saw some excellent feedback and we are compiling and I hope we can break out some things today and move forward. I appreciate the opportunity.

Good afternoon firm Raleigh, North Carolina. Yesterday was very informative. I think all the key points and I think the comment about NOAA taking the lead is very important with public- private partnerships and national standards.

Hello, everyone. I also thought yesterday was an excellent day. I think that we heard some really great comments from public input and I'm looking forward to another solid day of discussions and information.

Greetings. Just echoing the same thing. A great discussion yesterday especially on the Alaska coastal mapping strategy document and I look for to continue discussion and input today along with the other updates from the working groups. Looking forward to the discussion.

Hello, everyone. Like everyone else, I very much enjoyed yesterday's session and I'm looking forward to today's session. I think it's talking about the overall system that will be required to help vessel safely navigate low visibility conditions. Provide observations and helping provide forecast for visibility. The searches pieces and are not the end all by itself. How it will fit into the overall system is what will be discussed.

I could be contrary and say I did not enjoy yesterday's discussion but that would not be true because I did and I really like the way the Alaska study has evolved and the recommendations. I agree with everything that's been said in summarizing the discussion and I think that emphasis on collaboration and coordination is right on the mark with NOAA as the lead agency and I think that's great. I come back to what I mentioned yesterday which is my concern for the mechanism that goes beyond interagency collaboration. There are mechanisms in the interagency collaboration that I worry that NOAA will be challenged with finding a mechanism with collaboration and coordination of activities. I think it will be interesting effort to try to find a way to do that.

We are doing fine on the schedule. The next big item after this discussion period is going to be the next round of public comment. I would like to ask Julie, Dave and Lindsay to make yourselves available so that we can take advantage of this time window and talk a little bit more on the various items related to nomad an Alaska. I will go ahead and start on that and comment on the fact that one of the key elements of it is everybody's input that's been repeated many times and the strong focus on what we are trying to do relative to advocate for the public industry involved early on in the process. I am a big advocate of that and I see that's part of the discussion. And I would encourage us to keep going down that road as much as possible. And also the playback on what's been going on with COVID and the pandemic and the realization and success that we see and we've commented a number of times that NOAA got a lot of work done in the last six months in the field and a lot of that is credited not just people paying attention and being faithful and working hard in together but a lot of it is embracing economists ways to do things in remotely to do things and I firmly believe the door is wide open for us to push hard and bring in an crude and platforms and economist message in remote operations. We have proven it is tough to get anywhere in the U.S. during the pandemic and that there is great benefits to being able to not have to move everything around. With that, I will handed over to you, Julie. If you want to take the lead and keep the conversation going.

I think maybe what we will do is take this time if we have a minute, I think we have time before the public comment to address Alaska mapping and Dave can talk a little bit about the changes and then we can go ahead and see if the panel will consent to approve it and we will be done with the Alaska mapping and we can focus the rest of the time. That's what I would suggest right now. Dave, do you want to take it from here. I know you had one more comment last night or couple comments that you have included and highlighted. Do you want to take it from here? Dave? You might be muted.

The yellow highlight shows when addition that was recommended by Nicole and it addresses the quality levels in partnership and I think it is not controversial and you can switch to page 9 and the next yellow highlight I think it was Nicole also mentioned these are lower-cost sensors and that's a very minor thing. Now go to page 12. And there we have -- this one came from Molly and she thought we should mention it and it does not just serve as a data sensor but she sees it as an echo sounder that can do some echo sounding off the coast. This particular photograph shows that tethered offshore so she recommended I add this paragraph which we did describing the Hydro bulb. And it's been used in Canada and AOS is testing it for use in Alaska page 13. We had a recommendation to engage in the process. And those were the comments that we got from Molly and Nicole this week. I got one other comment overnight from the office in Alaska and it basically referred to the Alaska coastal mapping strategy meeting to talk about shallow water surveys and she was referring to the strategy not the paper because it has three pages on doing exactly that. I think that is a nonissue. And there are no recommended changes to the paper. Anybody have any comments otherwise I think we are ready to vote on this.

Let me just go around to each and I feel this paper is ready to be finalized but let's go around and get consensus from the panel and I will just call you out each individually and if you could just say yes, no or further comments.

Can I make one other minor change before we go around?

I sent this to Dave late so you probably did not get a chance to see it but I had one minor change on page 3 where it talks about the modernization efforts and in particular it says four states that -- potential data now scheduled for release in 2024 and I'm a little hesitant to put a particular year at this point in time with the modernization efforts. I would like to say instead of in 2024, after 2024 just so that we have a little bit more leeway because I'm uncertain as to the final date of the modernization rollout.

It's on page 3 right before the year 2024. So we are replacing the word in with after. And if you want to make the change go ahead and send it to linen team and that would be great.

Let's go around to the whole panel then and of course if you have additional comments, now is your time to speak up.

I'm okay

I'm fine.

I'm fine.

I agree with the paper and think Dave for all the work you did.

The low-cost comment that I added, maybe we should add low-cost, proven. I don't remember the exact terminology but I wanted to make sure that was clear but otherwise it looks good.

Let's go to that page where we have low cost I think it's further down.

We want to watch evaluating them to determine they are proven. The non-vented pressure censures -- sensors are below it and are in the process of proving it and that's part of the exercise.

If you can scroll it just a little bit --

How about just when proven?

The word consider. Right now they are considering the alternatives which might not yet be proven

That addresses my concern but you're right. And I agree.

It looks good.

I'm good.

All sounds good to me.

I think your on mute.

Good to go.

Sounds good.

I'm good.

I'm good as well.

Let's just make sure that Andy, do you have further comments?

No further comments. Thank you.

Larry?

I'm fine with it. Thank you.

I was trying to make a comment. On the page where we show lower-cost sensors, I would say lower-cost systems because sensor is one piece of a larger system that you need to deploy. Any sort of measurement. It's not -- the sensors are an expensive no matter which when you get. The system is built around it.

I will change it.

Nothing further.

No, thank you. Thank you Dave and everybody else.

I think we have consensus on this with the changes as spoken and Dave will update this and send out a final draft for inclusion with the recommendation letter to the administrator. Let's move on. What is our time schedule? We have some time.

You are doing fine. I will keep you updated.

Let's switch over and let's start our discussion. Lindsay, are you on?

Could I make one comment before we get started and then I will try to be quiet. That is that where we are in this, we have the strategy and we know that we need to be inclusive and have public-part -- public-private partnerships and we need to figure out how to do that and we really need advice on how and that is where we are. I think that any ideas that we come up with here could be helpful in developing that and that was -- we hear you, the coordination, how should we do the coordination, any ideas taking into account the laws and that kind of thing. How should we be taking thinking about tech and tech development and do we have the right tools and structures in place and do we need to do more of what we're doing or something different? And the same thing for the partnerships in building capacity and do we have the right structures in place or do we need to do more or new structures and new partnerships and what he does look like? The word partnership makes me twitchy because it means different things to everybody and I just know that if we did what we thought -- getting into the level of detail of how or even examples of what success looks like would be very helpful. And those are my thoughts to kick this off.

Thank you. Lindsay, why don't you give us an overview of the paper as it stands now.

With the comments, we are trying to address some of that but not well in other places. There were a number of points that were outlined and I think there's more to add onto that. One of the things was supporting the mapping as the foundation of the characterization and it's pretty clear and there was discussion yesterday and trying to define and make sure that we define implementation of what that is, the different types

of parameters that you might want to be observing to get us to the bottom of oceanographic parameters. Something that might not be something that is across the whole way scene it may reach the focus of different areas and it may mean different things. But I think it is pretty clear that we have said that that is essential for forming the basis and how do we get there and part of that is standard that we talked about and there is a symposium coming up and I think it comes back to the discussion that Larry mentioned about the partnerships and how do we put them in place and there is a mechanism for dealing with that in a legal sense. And I think that has been a key thing throughout this that is a struggle. It is reflecting the private industry, academia and nongovernment organization to be involved in this and they want to be involved from the very beginning and not be just providing input to be told later on when it gets developed but to be real and have the ownership of things as they develop and go along and I think this is that kind of all nation response to try to do that. I think that is a think we have not addressed but maybe we get back to that in a minute but we continue the discussion and I will ask Larry to have more comments about what he was talking about with mechanisms and that in the end and one of the other things related to that that I think is worth addressing separately is we heard from Vicky yesterday and I mentioned the vessels and the work that is done in the academic research fleet and other nongovernment assets that are out there that have provided a lot of that data into the archives already but importantly I think in that is what Vicky mentioned that there was a number of programs that are really addressing some of the issues and we should really leverage that and it should be a part of how we do it. Things like getting the data out. Out of the filing cabinets and having a program to drag it out and a way to do that and making sure that the data, the ships are well calibrated and you will get good data and that was the advisory committee. Those funded efforts federally funded and we should make sure and that's why it should probably stay separate as an item in the recommendation. One of the other areas that we talk about the data being -- we will be deluged with data and it provides great challenges and I think again it is really opportunities and this is why I always worry about calling it a map and it's no longer a map and the data in the system that are now there provide the visualization and the analysis, quantitative analysis to be able to get it to that and they provided intuitively and that is great when you're trying to present that not only to establish policy, show results to those people funding but also as an outreach to the public and how do we convince all those folk in the other part of the country that don't have a border to the notion that what we are doing has a benefit to them as well and I think that's important. The data that was mentioned about being able to present that using the latest system both for analysis and getting the maximum scientific benefit from that data that also the important key outreach for public, general public most funders and policymakers simplifying the data that was difficult to do and the other is a ton most systems and I think it is remote and I mentioned yesterday it's a trigger with COVID that has forced us and some people have been using it and that's where private and other nongovernment folk have used it and it's driven by economics and it makes sense to do that and not have people in dangerous situations and you can operate it properly and save money and do those operations with the non-manned or non-staffed assets. I think the coven situation has provided a trigger to say we can do this and move forward and it makes a lot of sense. Hopefully we will see that. I think that is the point so far that I've got that I'm

not sure we are addressing all of that and maybe that is just a slight change in the text that we put through on a number of those points that I would like to ask Larry since he raised it yesterday about the mechanisms that might be possible and maybe he can brainstorm that if you thought of any particular ones that he might think of from a regional and how do we coordinate that with the nongovernment assets across all the community, sorry to put you in it but I thought that was a good place to start because it could be a long discussion.

I'm constantly thinking about it and I have no answers so I worry that I will ramble maybe we just start with the scenario where if we imagine that the leadership has done a phenomenal job and basically gone the support from offending perspective in terms of what we would need to complete it but the question is, how can we do it. Now it does not own enough assets and we will need to put all hands on debt -- deck and I keep wondering what mechanism is there out there that you can coordinate beyond and there are interagency work and it is still very difficult and I'm not a fad so I only get this by rumor but it's very difficult if not impossible but there are things like the partnership program which doesn't truly co-mingle funds but it offers a common front for the purpose and let's different agencies contribute and has what I hope is a common direction but I think we need to go even beyond that and imagine a situation where you have a huge area to survey off the East Coast of the U.S. and you have whatever now ask that you have available. The University of Delaware has their vessel sitting there and a small vessel and all these things contribute but how do you organize and coordinate it and provide a mechanism that would make that effort that goes beyond federal agencies through academia and things like that and you look at NASA and NASA have this solved a long time ago but they started is the only player in town so NASA certainly has a lot of private sector involvement and lots of academic involvement and things like that and there will be philanthropic organizations. But for all space exploration, NASA was able to control it so there is a mechanism they are and in our case we started with federal agencies, private sectors, philanthropic all generating their own capacity. Now there is a desire to coordinate but that is what I was hoping among HSRP with all your years of experience in the different sectors if anybody had thought about mechanisms and the closest thing I can think of was 80 and they do not have enough efforts to coordinate. I was hoping that we could throw this out on the floor and maybe somebody has seen some example wherefrom a national meet prospective, there is a national need, a mechanism where you can really coordinate multi sector activity.

Let's go to him right now. He added a lot of good comments in the document last night and -- do you want to take it?

Thank you. I'm glad that it was brought to her attention and I agree we have been exercising the issue of the importance of partnership, public, academia and private and the mechanism on how to do it, I was involved in a couple of national efforts like the development of the mapping standard the new one and that was the collection between government and private and we came together and put our act together and we worked on it and we achieved it and with good success. To answer that question on how I envision it to have a task force with leadership of NOAA and who ever they want on it

from NOAA's side and I have members of the interagency working group -- it does not have to be all but the important ones and maybe other members but those two need to be on definitely and we need manufacturer, we cannot decide as we tackle it without having that manufacturer because they can advise us on what can be done and what cannot be done and what is coming around the corner. I suggest too many manufacturer and it could be other but we need two of them to sit at the table with us. We need data producer a minimum of two like we have a good example, whoever is doing the surveys, other companies to bring two of them the most sophisticated company to sit on the table and have academia, two schools to sit with us and software data processing development and management and that is important because not only processing the data but how we are going to handle the data now that we are going on the cloud. If we form the task force on a voluntary basis, we will not pay anybody and this is all volunteer and I know it's hard, people will love, it is prestigious to be on NOAA's team so believe it or not if you think it is hard people especially from the private industry will serve the causes and I bring the example and I still attribute backs assess to the new data and they started years ago and they do an industry workshop and invite all of us to sit there and for two days or whatever where we discuss the software development and the data surveyor, we all put our act together and we share our vision and how we want to see it and so that -- everybody felt ownership and she should not feel bad about we cannot reach the goal in 2022. This happened and we have a plan and are marching toward it and this is an important thing to be launched that way the task force the stakeholders and we can try that and that is my suggestion.

I agree with everything you're saying and flipping back to what the Admiral requested, NOAA already has access to an existing structure network that reaches out and works with public and private organizations including academia and perhaps too much academia and I would say that is through the network and we have regional associations and several of us even on this panel are senior members of those regional associations and I am a vice chair of the mid-Atlantic and I know Julie is very involved. A lot of us are active in that and that is an opportunity. The regional associations incorporate academia as well as industry, private industry that comes to us and the goals are very similar toward leaning toward another situation and they win capability is it's already established and funded and it is voluntarily being worked on by academia and private interests to pull in more active involvement if I would put forth that NOAA were to structure and appoints as the network coordinators that we are looking for, that would help to pull in more private industry and all academia because no one would want to be left out of the formulation of this type of work, the structure exists and it's already paid for and it is active and it is functioning so why not use it. I have a very personal thing on this and I think now has grossly underutilize the talent that exist in this network including what we are looking for, the inclusion of private industry and academia to work toward establishing and through the organization the tasks would be broken up among the various reasons for various pursuits or things to serve regions. We are looking for ways to gather information, structure it and reach out to the private and academic side that already exists but is not being adequately used.

Thank you for bringing that up. We work a lot with industry on contracts so I think that there are some mechanisms here but let's go ahead, I wanted to call on Ed because he has done a lot of work on this paper. Do you want to give us your comments here too?

Sure. Following on the response, there is an endless strain of examples of successful public-private partnerships already. I think we do a terrible job of broadcasting the transfer of technology aspects of everything we do and all the types of things that get brought to the table between now and the partners in the federal government and ultimately make it into industry and literally bring in hundreds of millions of dollars because nowhere took the time and effort to develop these things properly and accurately and be able to then turn them loose and let the people go find ways to make money with them. A decade on the ocean another example and there are all different parts of the U.S. industries and government activities that are already coordinating and that is all about partnerships and at its core it is what is needed and what could be more of a partnership if you're looking for free data from industry and others and spending money on data as well the ability for NOAA to have giant databases that we can all contribute data to is an ongoing successful partnership. And partnership between industry and UNH and other universities and I was atpartnership . The other example is NOAA's ability to advocate for a ton of most vehicles and really encouraging the contractors to bring out new technology related to the vehicles in other items that will be rolling out when NOAA takes the time to advocate and encourage the industry to bring those to the table and by definition that is a partnership because new technologies and capabilities and the potential for profound impact on the future of the way we do things and everybody wins. I would say there's all kinds of other autonomous systems out there that now I can in particular say, bring it on. Our company bid on a job in Canada that was stated this will only be done with an autonomous system. You can go -- the ability to demand that now is acceptable. We can push the limits of that which by definition again increases the whole private sector to reaching out to do things and going back to the point about bringing the instrument manufacturers right to the table and getting them involved up friends is a really important point because they are dying to know where industry is going and where government is going and where is the need and where is the accuracy and what is more important, data collection time or resolution. They are just resting -- guessing unless they're getting important data from NOAA or industry.

I could tell a few of you have requested the chat. Dave, let's go with you first. I have --

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I have a couple of lessons learned on how just yet as cost-sharing. 2012 and assessment from federal and state agencies and private industry that collected 600 to mission-critical activities and got various customers to identify what their uses and benefits were from topographic data in various quality levels and it led to the USGS elevation program to collect light door nationwide and they did not have enough money to pay for that. They have a process in which difference -- here is a project we need to pick -- if you pay 50% we will pay the other 50% so USGS basically doubles their capabilities in many areas by soliciting cost-sharing from other people. That study from USGS is followed by NOAA's ongoing 3-D nation elevation requirements and benefits

study and in that study we are looking not just at inland typography that bathymetry and we have 1000 mission-critical activities in which different people say, if I get such and such data I will realize so many million dollars in benefits and NOAA will do a benefit cost analysis to determine what implementation scenario will provide the highest return on investments and that is another vehicle that if you could demonstrate a good return on investment then you can get other people to contribute funds to that but NOAA has to have a way to accept funds like USGS that I don't know if they have the mechanism or not but USGS has a mechanism for collecting funds from others who are willing to donate and lastly, we just finished mapping Alaska and we had an Alaska mapping Roundtable in Washington DC in which the budget is 22 federal agencies collected and we gave briefings on the importance of mapping and we got clearance from different senators and congressmen and federal agencies to give priority to the mapping of Alaska and when all was said and done the mapping of Alaska was just completed and USGS paid 54% and these other people paid 46%. USGS has some mechanism for getting other people to contribute funding so that USGS program benefits a lot of people other than USGS.Those are the main parts I wanted to make to see if NOAA has a mechanism for accepting funds.

Thanks. I know it's all about the color of the money coming out of appropriations but there are ways that I think we can brainstorm and put comments into this paper. One more and then we will go around to all the members and I think we have time but if not we will finish after public comment.

Thank you. My thought was that the NOMEC strategy is a step change in space and it is impacting the full maritime domain and it is not just in isolation and it covers across and it is interagency and at the same time we want NOAA to leave it . And that space, how do we get the public-private word out. My only involvement in that and there were so many town halls which were held and there was a reach out to stakeholders, educational institutions which made a huge difference embracing happened and today we have so much happening on the outer continental shelf and all the stakeholders have a dollar stake in it so they would come in and other agencies would come in. On the technology side, I would say they are organic ways and inorganic ways and organic is already in the space taken to innovation but I believe it's worth looking at inorganic spacelike incubators and we have technology incubators out there and where there is opportunity in that space. Just as an example where modeling is concerned using big data which has been used, there are new strategies available in some institutions and they are doing amazing work. I think there is some exploring their. I would like to second the idea that there needs to be a task force which has an independent structure and it's very important for the nation going forward how these assets are used. We need the structure with resources to take this forward. And that's what he had to say.

These are great comments and I'm hoping that they are helpful to Admiral Smith and his team. Let's just go around one by one and take a minute here and hit everyone.

I want to thank everybody for picking this up and running with it. The input from the rest of the team and the broadness of the idea is great and I appreciate it. Good job.

I would like to think and on his leadership again .

Collect all new data and it's a nice process that can start out with an interagency passport and flow to regional themes that could then go through the process of using the data standard to put out a call and see where the gaps are and work together to develop scopes of work, federal agencies can do this and we need a contract that went out. I don't know how deep Admiral Smith wants us to go into the process like that.

I think my feeling is the more we can go into the weeds with this as far as the suggestions and get them down and righting also but it's great to have them in the public comment. That will be helpful that we will get to that. Let's go around the panel.

I think the comments and where we are at and everybody that contributed, we've got a lot of work to do in a short time to make sure we get something useful into this recommendations for the implementation of the strategy. Lots of work to do but I don't have anything more to add

Ed and Kelly I know you've spoken up, do you have any further comments?

I'm good but I do think it's an existing structure that needs to be more utilized.

They definitely do have the mechanism for the private-public partnership.

This is something I sent out an email a couple weeks ago talking about this before because we got in the NOMEC document we have five goals with metrics and it's like building a building and how do you start? The first thing you do is start with designation of a project manager, delineation of specific actions for each of the five goals and the project manager then takes the responsibility for pulling in whatever agencies and so on and beginning to generate a list of steps to be followed. You've got to start somewhere and you can talk all day long about how many agencies there are but someone has to start and say this is the list and this is what they can do and this is what the resources can provide and this will duplicate if those guys do that and that has to start with some single entity, call it a project manager or whatever but you have to take the first step and we know the agencies are out there and the resources are out there and someone needs to begin to make a list.

Okay. Good point. Dave, anything further?

Whether or not it goes in the NOMEC paper I would like to know from NOAA if they have a mechanism for accepting cost-sharing funds from other people because I think we are going to need to find alternative ways to come up with the additional money and the USGS is found a way to do it and I hope that now I can find a way to do it as well.

We will let the NOAA folks comment on that in a minute .

And Paige?

I agree with Kelly's comments about IAS and capabilities. We demonstrated it here in leveraging resources and getting things done with less money and advertising costs and several public and private partnerships to establish the Coast Guard and Maritime ministry. Your providing services that benefit a lot of stakeholders and maritime industries and I think when you leverage and get other people on board they will see the need and will contribute to successful outcome and I think the whole idea of a public-private partnership is right and is recognize that the government cannot do it all and it's okay to partner with the maritime industry and you can get the word out for information and if you get up the information to the newsletter and invite the maritime industry to work with them, a lot of good information. It's a huge task but it is doable to partner with other and we talked briefly about how the Coast Guard is partnering, it's an example of partnering between agencies and the need to get things done through Coast Guard resources and I think it is doable.

I think that another important stakeholder in supporting the project would be the Department of Energy and the office of energy efficiency. And mapping the ocean not just the floor or water column. The currents and the waves that produce energy and therefore I think it could be an important stakeholder. Partnering with the blue economy will improve the economy and improve the ocean at the same time.

All my points have been covered so no additional comments.

Andy?

Thanks, Julie. This is sort of an odd comment that bullet number forces the majority of people backing -- mapping coverage come from academic organizations. That may be true but it does not strike me as something that is actually documented. I would either suggest we confirm that or take a look at rewording that if we are not sure. Otherwise that's a big bullet and if it turns out it's not right then I think we might be a little embarrassed.

Okay. Thank you for bringing that up. We can follow up on that one. Anything else?

I think the thrust of the paper is great. I think we do have some work to do on organization and wordsmith -- to get everybody together but all in all I think it certainly on the right track.

I'm glad Andy brought up that point about the academic line and I thought it was strange in the sentence and I suspect it may not be unique. A lot of the academic mapping and I think we have to be careful about that. I'm not sure is a separate point that it adds to the document we talk about the need for collaboration but recognizing that point is going to emphasize the need for collaboration cooperation. I don't think having it a separable it is appropriate but I'm very happy.

I want to address that because actually between -- is combined with number 3 Lindsay, do you want to make a comments on that particular input?

It is something we can check. And we should be able to do that pretty easily for the number of shipped tract and I'm not sure that that number has been calculated. The deepwater mapping to work out what the percentages but maybe that is just an example to include that it is sometimes part of the partnership and I thought it was better separate but maybe not it was more to demonstrate the programs that are being federally funded in support of that and the approaches to say there's been a lot of work there that should be leveraged. Whether it's an example or not I think it's important to highlight it either way.

Agreed.

Maybe we could just reword it like you said where there is a lot of work that we should leverage rather than making a definite statement so we might reword that a little bit

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I have nothing to add and it looks great.

I think Dave brought up a great point about the Department of Interior with products and services contract and I think it does definitely deserve is looking into to determine if there are opportunities to utilize something like that through the Department of Interior or through other acquisitions and grants office. I would also like to mention that different departments have different authorities and protocols. I think we should look at it both ways and I'm sure there's a lot more details that we have behind-the-scenes we can pull out and see about opportunities.

I think Andy has another comment

Now it does have authority to accept money from outside organizations to accept funds in it all has to get legal and administrative scrutiny but the basic underlying authority is there. Let's go to Sean.

We only have about 3 minutes.

I will make it quick. There's a lot of great stuff out there but the authorities was covered and we have the underline of Doherty and in my intro briefly gave examples of the federal money for mapping a couple of thoughts, one is the idea of a task force and if we talk to the lawyers about the thing that we want to start a task force and they will say you need to start with the federal advisory committee so I think what you're recommending is that we form a different federal advisory committee to advise NOAA on ocean mapping or we have it federal riser committee above the agency level and I think it's an interesting suggestion and we do have some authorities like that but I'm

trying to figure out how it is different from what we already have for engaging with outside sectors.

I just interrupt for a second we are going to come back to this discussion don't feel like we are going to wrap it up right now and we start with you when we come back to it okay I think that's great I think it's important to get the opportunity for public comment

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What it we go back over to Ed because I hear some of your feedback and comment let's break right here on this discussion with NOMEC and turn it back over to Ed that was a great job and obviously meaningful dialogue. Going to do a double handoff and headed back Shep is going to take the lead in moderating the public comment I'm not sure you want to say something in the one minute or we open up a line

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For those joining us today, we had a very full public comment period yesterday and we have a dozen or so written, summarize and then we invited folk to make or give a short summary of their own comment a couple minutes apiece and it worked out pretty well we would like to do the same thing today. I think we have about six comments that have come in and I think we will have an opportunity one of them the commentor will not be able to speak to you and I agreed to read them into the record. Otherwise, I think we will just recognize all of them for to make their own points. Without further adieu, first on the list.

Welcome

Thank you and a big shout out to the panel my comment is two fold. They've been performing project work since the 70s and the data deficiencies that exist in our state particular on the coast where activities of public, commercial, recreational and indigenous users intersects. That's why we been advocating for creation program for the last eight years. We are encouraged to see the great programs in the presidential memorandum last November and the good work HSRP has been doing in the implementation of the mapping program my comments is on the original Alaska coastal mapping program that initially is focusing on the areas that can be mapped only with airborne and satellite elegy and this is a great first step in the right direction in areas where airborne and satellite methods are usable or inefficient you to water clarity, acoustic sensors have to be used in this type of work and hydrographic surveys. It could amount to two thirds of the state. Since the Alaska coastal map does not yet account for these big chunks of coastline which falls under the national mapping strategy, there is a danger that the effort could end up being managed by two separate mapping programs so from our perspective that is not the most efficient approach. Certainly the clarity of water can change facially and temporally and it's difficult to predict where the technologies were at work. We believe that highly integrated and flexible approach that combines remote and the sensing technologies is the most efficient and cost-effective program rather than two separately executed programs. I had an opportunity this morning to see a preview of the recommendation and they are along the same lines as this comment. And the second, I echo -- the second point is the integration of the private sector particularly during the implementation of developed meant of the limitation

strategy and contributions in the cutting edge proven technology. They are already mapping and we have developed and are using the project, cutting edge technology in the realm of indication sensors, processing and so forth. Fully leveraging these innovations and resources would be possible if we are engaged and involved during the formulation of the plan and not just during comments on the plans. Thank you for the opportunity.

Thank you for your great comments and also thank you for calling out all of our EDs thank you for comment. Next a consultant and economist.

Welcome and go right ahead.

I submitted written comments earlier and I just typed in some more so you will have a record of it. The one point I want to make is that everybody agrees that NOAA's strength is the Longview but there's always concern about funding. We may be as little as six months away from the national infrastructure bill and I think there is additional work that needs to be done to make clear the early phases of such a program could be defined and how they might fit into such a bill in order to move quickly on the funding. That is one major issue. One thing I suggested that may not be the only way to do it is to have a plan that sits in the documents and a detailed plan. The second point is I emphasize the point of fixing responsibilities and that was covered very well so far today and I wanted to emphasize the fact that any work in the early phases could be done through an accelerated funding mechanism and could be sold as the long-term benefits to the environment closer in time so for those who think that emphasis should be a long-term benefits rather than more immediate or practical ones at the moment, they can be seen as helping what they want to do as well. In terms of technology, I think the point was made that most of the learning about what is coming down the line will come from industry but there also are agencies in other governments with similar issues even though we may have the critical mass and be farther along in many respects and we have a lot of mechanisms for interaction so I would like to see that expressly mentioned that we can use those mechanisms to try and learn what they know about what technologies are coming. That's it.

Thank you. We appreciate you taking the time to put together those comments and also appreciate your will thoughts and comments which we will incorporate into the public record.

Next is the deputy director secretary of Enos.

It's been super interesting to listen in and I appreciate being able to do that and thank you for allowing me to comment I am Alex Doyle and I work with the office, an organization that helps to facilitate U.S. academic research fleet. We wanted to point out that some of the comments were made but I'm pressing the point again that U.S. government agencies have invested significant funding into the fleet instrumentation and technical support making it very capable for mapping in Chark tour lesions and there have been further initiatives specific to data management and data quality which

have significantly increased the quality and quantity of data that has gone into the national data repository. The fleet is managed within a proven framework. We manage all of the vessels and everything is put onto the table and I can see where there would be integrations with the initiative. And it has been pointed out that the implementation of this initiative is going to take significant coordination and we hope to work with those involved to find the synergies where the fleet can help and this could be on the data side and we plan to participate with SOM P and on that mapping and characterizations side with little things like moving the track line and helping in finding areas where we could fill-in and also taking advantage of one of the vessels. Thank you and feel free to reach out if there's any questions.

Thank you, very much. So glad that you all are so plugged into both NOMEC counsel and also SOM P . Thank you for your comment today and for participating. Next up we have Kyle the president and founder of T Carter Marine LLC.

Thank you for the opportunity to comments and I appreciate listening on the discussion yesterday and today and I know for those of you I've not met I am President and founder of T Carter Marine a 15 person small-business space in Denver Colorado specializing in marine remote-sensing and small-business innovation research grants and the global innovators in our woman-owned small business and on several U.S. government geo-services contracts as a subcontractor. We somehow have a struggle and working with U.S. government at times. And at times we have had an easier time working with British and international governments not necessarily due to the contractual B vehicles with U.S. government lesson pragmatic approach when it comes to utilization of the satellite-based technologies and relegating the products to research products for the bottom of the priority pile. So from our experience in messaging and partnering with my business and fostering partnerships we say trilevel but not seeing it at the ground level as we try to push her innovative technology through. We have invested considerably in technology development and building business relationships and callous hours foraging into you as government agencies with the technology as a small business over the past five years and have made a lot of inroads and obtain technical approval and on many levels we see and hear of a tremendously need and utilization of our capabilities yet in each of the cases we encounter obstacles that take months or years including lack of access to entities, pointing to other agencies is the true gatekeeper to unlock the commercial potential. Since 2018 the National Science Foundation has awarded as nearly $1 million in grant funding to pursue the technologies at international, government and other agencies to use it in their operations and all the while waiting on the U.S. agencies to evaluate the data and work through the in-house technologies and meanwhile the commercial providers which are vital to the technology are less likely to support it if the government is slow in seeing the larger native using the satellites. We have developed a proven workflow in the past experience and contribute to national metrics surveying effort and mask areas of essential coverage. There is no coping in space so we are fully operational and satellites are still collecting imagery and we can contribute significantly to the mapping effort well other technologies are idled and I'm sitting here in front of the NOAA nautical chart that has imagery published on it from 2012 and the map has been a target to be a

supplier for the operations and the way I pictured it having data on the map should provide the pathway for commercial entities to follow those specification regulations to provide the technology to help NOAA the technology imagery has evolved by several orders of magnitude since 2012 get NOAA's acceptance of implementation has not. From our view in order to foster small business relationships the government must work faster and meet the pace of the technology that small businesses are developing and the operational cadence of small businesses and we have to be nimble quick and quick to deliver a final product. Government researchers are focused on how to work with the solutions and not to prevent them during decision in action. Those are my comments and thank you very much.

Thank you and we appreciate you joining us and thank you for the comments in the written version as well.

Next we have Jessica from the Army Corps of Engineers.

Hello and thank you for the opportunity to comment. I'm sorry that we are not hosting you here in Honolulu but we hope to see you here next year I want us to bring to the panel's attention a specific data election need in the U.S. territory of American Samoa. The data has recently been collected by now and other U.S. territories in Guam and we are very much looking for to getting that information but none has been collected in American Samoa. This is a need for many reasons and one of which is the subsidence from recent earthquakes has caused island to experience extreme sea level rise. Many times the global average and we think that this is causing an increase coastal innovation. The data such as lie door -- lie door would work well and it would help to evaluate the sea level rise vulnerability they are experiencing as it is a heavy lift in terms of low districting cost but perhaps it's an opportunity for the Corps of Engineers and NOAA to collaborate on the cost for implementation. And thank you for the opportunity to comment.

Thank you and it sounds like a problem and I will be sure the operations folks become aware of that requirement.

Next also from Hawaii Joyce Miller.

Is that good?

Loud and clear.

Also from Hawaii, I kind of feel like the corporate --

Your muted again.

I kinda feel like the corporate memory here having been involved with IOC since 2002 and with the HS RP starting in 2011. At any rate, one thing that -- one comment was that the HSRP I believe in one of our letters about five or six years ago asked about

inter-agency funding and if indeed action has been taken on that and that is very good news if indeed action has been taken. I sent in two documents dating back to 2011 and 2012 and some of the panel members said they could find no records of mapping standards and I sent the documents and their titled no IOC C 4 mapping standards 2004 and also sent in use of external used data for charting policies version 4 and I pulled those off of my computer from that time period so please do not reinvent those wheels particularly for deepwater mapping where technology really has not changed much recently and we have been following the standards for years. And the third comments is on the statement about academia funding research and at least here in the Pacific in the last decade, most of the funding for mapping inside the U.S. ED has come from private organizations such as the Schmidt Ocean Institute and others and there have been several particularly in the Northwest Hawaiian Islands. Schmidt using it provided millions of dollars of funding to map of the Northwestern Hawaiian Islands. 70 days of free ship time about four years ago. That and the other major chunk has come through UNH from the Department of State for the extended coastal mapping and the statement about academic funding and inside the U.S. ED, I would agree is probably not accurate. And I will be sending in comments once I've read the draft paper on the comments and I will send in comments. Thank you.

Thank you. We appreciate your comments. Next up.

Thank you for allowing me to speak about the geospatial data act of 2018 and the value that is inherent in leveraging that by the HS RP by this requirement. One example I wanted to point out to the panel is the GDA mandates inventory and assessment of geospatial data assets is part of the mission and this should address long-standing issues about the evaluation of geospatial data and the associated infrastructure in each agency. This may be a way for the HSRP to stress the need for the integration. Also highlight the need for sharing that information to others and that could be a public-private partnership experience. There are other mechanisms as well and academic as well as non-academic and sharing should be encouraged. That's all. Thank you.

Thank you. I appreciate that and that's an important piece of the policy puzzle. That's the first time it has been raised. We now have two comments from folks who were not available to make their own statements and the first is from Jenny Haynes. The first comment is if it has not been clarified in riding in the district writing in the presidential mandate and it should be stress that NOAA has a lead role in accountability for fence distribution in the delivery of outcomes in outputs of the program through U.S. federal agency in the departments in seconds, it's important to make sure that the capacity building strategy developed through means such as crop source and transfer of traditional knowledge taking place with aboriginal communities of the Alaska coast and everywhere in the U.S. to mobilize all the alliances. Thank you for raising particularly the role of indigenous communities. But I think the larger point is even more broadly available and closer to the coast that the locals know a whole lot about the waterways. Appreciate you adding those to the public record. The second comments is from Jeff Douglas. Jeff is a founder and CEO of artificial intelligence company. The comments is the founders say I have managed autonomous surface vehicle programs and self

driving car economy development for Pooler, Lyft. The developers apply state-of-the-art technologies to create robust scalable autonomous solutions. We are developing the next generation a ton of me framework we believe will revolutionize the hydrographic industry by enabling the adoption of advanced machine learning entry automation in the sector and the mission is to create the first a ton of me framework vertically from the ground up focused on coastal survey. We have confidence that technology will solve many challenges associated with the hydrographic workflow. The plan is to use technology together and provide more data efficiently than current technologies allow given the business model the government is one of our largest customers and if tech startups we find it difficult to obtain and leverage government funding and the hydrographic technology and services page. We can partner with research institutions that we may have to share some of our IP and it will be helpful developing enabling technologies in this space to have efficient access to funding. So thank you. Jeff Douglas and John Houston for providing that. I'm checking my notes here, to have another comment as well?

One more comment from Eric Fisher if he wants to speak or otherwise you could just summarize it and put it in your agenda.

Eric, are you there?

Just one moment.

Hello, Eric.

I was not sure if this got touched on earlier but would envision some type of Joint Chiefs of Staff kind of scenario with organizations of leadership from the top but also including folks like from the Navy and I think there could be value in coordinating with different military intelligence needs that are going on at the same time.

I will comment really quickly because I think we did not cover this in very much detail although it's buried in the Trenton strategy. The beginning of a future or, cross government structure being set up and it does include representatives -- there are a lot of different navies it turns out. And there are representatives and in addition there is a coordinating function happening on the classified side that will coordinate this in these activities with the national security.

Excellent.

I'm happy to give you more detail if you would like it some other time.

That is what I see for public comments so thank you all for some excellent public comments. And with that, I will turn the floor back to her chairman.

Thank you. Thank you to everyone that took the time to provide public comment and get engaged. We really appreciate that and consider it a big success during HSRP when

there's a lot of feedback and interaction. With that, I am now going to introduce the two to give us an update from the working group activity. The two of you can pop up and turn on your mics and we will handed over she can take the lead.

Good afternoon and thank you. Can everyone hear me?

Your good.

This afternoon we are going to be talking about a billion-dollar problem and the billion-dollar problem as we see it in the port of Houston/Galveston. The panel is that you will hear this afternoon will explain that very well and I am excited for you to hear what she has to say had a chance to preview that and I think you will find it very interesting. I know NOAA stands by to assist in this situation and not just in the port of Houston/Galveston but as an issue, fog as an issue across the country. As he will see it does have a significant impact. As Rich said earlier today, we are actively working on the observations required to assist with fog, the predictions of that through the probability of visibility models that are currently being created at the National Weather Service and all of our various charting products and water level information. I think we are standing by to bring the full force and weight of now's maritime data enterprise to this problem. Without any further ado, I will pass the Mike and I appreciate the opportunity to sit on this panel.

Thank you. Good afternoon to all of you. I hope all of you and your teams and families are doing well in these COVID times. I would like to especially thank a very big thank you to Lindsay, Captain Brennan and many of the members of the HSRP for the comprehensive technology workshop group meeting where we have carried out robust discussions on the marine traffic interruptions for ports caused by restricted visibility, specifically fog in the winter months. Especially in the Texas ports and as the captain said, looking a Houston/Galveston for specifics. We looked at commercial and economic impacts as to how they were successfully dealing with the fog issue without causing without causing a serious interruption to the cargo flows by using precision navigation and technology. To better understand the impact of the port closures due to fog and specifically the economic impact, it is indeed my privilege and pleasure to introduce Professor Maria Burns to share her thoughts and findings and I understand her bio is already available to all of you. Maria, very grateful if you could come on with your presentation.

Thank you, very much. First of all, I feel grateful to be invited in your amazing meeting and the annual event. I really appreciate this. I was hoping to be able to be a part of the solution in this billion-dollar problem. We are going to talk about Houston/Galveston area and the challenges of restricted visibility and I would like to thank each one of you has a committee. Let's just mentioned that the impact of fog in the maritime industry everything we are going to say here applies to many other ports in the country and the world. In this presentation I will estimate the financial and commercial losses across logistics network and underlined the need for new sensors, fog and visibility detectors. And we can move on to the next slide.

The ports of Rotterdam and Hamburg are among the leading ports globally and as you can see, they combine very intricate ratios at the same time suffer from fog what they have done proactively, they have adapted new fog sensors and transform the shipping logistics operations and as a result, they have minimized the costs which include operational capital costs and the growth within the region in general. We can move onto the next slide. Everything that have implemented we might need to consider because we are having a problem the Houston Galveston region expands 52 miles, just the port of Houston comprises 25 miles and 200 terminals. It experiences closures for over 22 fog days every year. We have noticed the number is close to 22 but pretty much there is a consistency for the past few years. Just understand what is at stake during the 22 days. We are evaluating the role of Texas and the U.S. Gulf region and we have heavy traffic as well and many firsts. First of all, maritime contributes to 7% of the regional GDP with 2 million transportation jobs across the country. At the same time, over 90% of the as energy comes from the U.S. Gulf and Houston, Texas and Galveston are very close to the U.S. Gulf. And of course we have many millions of jobs in jeopardy every time there is no action or stance when it comes to the Gulf. This is a common problem when we talk to industry professionals and of course other entities, government entities because fog related delays are very tough to explain to our customers. Let's say the industry people when they are expecting their cargo and the cargo is five days late, we have to consider the entire logistics network from serials to process goods and refineries, value added stages of the supply chain and finally the distribution, warehousing system and five days of idleness or five days of delay are making a big difference. Another particularity in this region is that fog does not just last for one day and it goes, typically we have three days in a row, five days in a row and we can Google that and it's very easy to see that on the front page news. Basically, the newspapers, media talk about this financially, the ship channel and problems that the articles that we have seen so far just focus on the ship side. Like how much has been lost on behalf of the shipowners. If we consider the client of the shipowners, the entire logistics network, the amount is vast. You can see the whole supply chain network right here. You can see many of the different layers or die mentions of the fog disruptions and impact. We are talking about safety problems, ship collisions and we are waiting for an accident to happen and we cannot even imagine what would happen if it was one major accident within 52 mile channel and that would be very damaging. And we have to consider the economic losses and thinking of Galveston and the cruise ships, consider the many thousands of people that are navigating and taking their vacation and those make her cruise ships can have 10,000 people at a time, 7000 people at a time so the impact is vast. In the past we have had people stranded at the port of Galveston. And the social impact, we have to mention coronavirus. We know that a lot of the supply chains pertain to urgent items and these items cannot wait. They are medical supplies, first-aid and plus food. Lockdown is not out of the equation so we don't know what will happen. These are just some pictures to illustrate what we are trying to see here. Any kind of collision, any kind of -- people stranded and we see thousands of container boxes being stuck at ports. Finally, let us consider the trucking industry, all of the trucks being stuck on bridges and making a huge turn creating havoc within the city. We have seen this again and again. This slide in particular in the next two, very short and sweet, pertain to

U.S. Coast Guard primary data. This is from the U.S. Coast Guard and this data pertains to COVID-19 and the previous years are pretty comparable. We do not have huge actuations. The yellow boxes, very simply mention the mega ships, the top box in the bottom box pertains to barges. This is how we have classified them. The interesting thing is because barges sometimes they don't have cargo and sometimes it's a pilot ship or they are empty and sometimes they are offshore support vessels for the offshore industry. It's very difficult at this point to bring a dollar value to the losses. What you will see is just the mega ships. Here we can see basically that from 2015 on word, every single month the fluctuation year after year, month after month, do not give you too much. In our estimation, we cannot be very much off because we see the numbers every single year when it comes to the traffic at the port in the Houston/Galveston area. Here we see all the risks within the port limit. Fog dredging up operations and incidents. What I have highlighted here in yellow is fog and it is by far the prevailing challenge. This is what is interesting. And here basically we are just doing the math a very simple with the U.S. Coast Guard and you can see on the top left the daily traffic and oceangoing vessels and we have as an average 135 ships every single calendar day and of course on the high side and when it comes to smaller ships and the members very high. Close to 700 ships every single day. The average number is close to 22 so you would agree and for the past year has been pretty much like that and we can move on. Basically we can see that for single ship and according to a number previous researchers some of the research projects I have undertaken but many of them including the Texas A&M University agree and we all agree that the medium loss for a vessel per day is $1 million.

[Captioners transitioning.]

We are talking about $4 million a day per ship. If we multiply this, and I have to make in a knowledge meant here. Although I work with the data analytics and our studio and-, I could've created some impressive algorithms. Just to make it simple, because it is simple mathematics for everyone to have no doubt about the root cause of the matter. For one days impact of fog we are talking about the entire fleet being stuck in stranded with import limits, 135 million. This is a very average number. But, when we have more ships this number goes up. And of course, the high values that expand throughout the supply chain can meet up to 848 million approximately for one single day. Then we multiply this by the 22 days that we are impacted every single year. You can see this number is an exorbitant number. It is very simple mathematics. We can't go wrong. We go to almost $3 billion as an average loss for our region. And, the maximum, and we don't wishes to happen could be up to $18.5 billion for that year. Just for those 22 days. This is a final flight. This is just the observation. How come we didn't know this yet? How come the front page news doesn't talk about this? This is because companies don't take pride when they lose money. It doesn't sound good for the client for the public image. So, they don't talk about this. Of course, the losses don't affect just the port of Houston, just one ship owning company. Because all of these companies that are having a very bad year, or a very bad fog year. At the same time, we have to take into consideration that according to the act of God, weather conditions a lot of this is covered by

insurance. So, nobody talks about it. But, this is the reality ladies and gentlemen. Thank you for having me.

Thank you Maria very much. We really appreciate you bringing to light the numbers in the research you have done on this. I am an Estonian and the idea is that we don't want to put Houston on the front. This was just an example of one port which is a major port that has impacted this. If we look at the collective economic impact for the region, the numbers are astounding. This is the reason we feel this need to be brought to your attention. Needless to say, fog occurs in various spots in the world. They have found a way to work in fog to keep the supply chain working. Maybe it is time for us to relook at this issue and explore avenues and how we can get our economy working during those five days. With that in mind, I would like to invite Dr. Quassim Abdullah on the technology side. We look forward to his comments. Thank you.

Thank you very much. What a beautiful introduction Dr. Bernd put me in and made my life easier to prove to you the seriousness of the problem. Thank you. We will talk about this problem, the problem of selected visibility during inclement weather, especially fog. What does it mean to us? Next slide please.

I think we have lost the slides. There they are. Back again.

Thank you. So, the statement of the problem, like Dr. Burns and Captian Anuj stated , the problem is the fog. We have been dealing with import closures and you saw the impact, the economical impact when you talk about billions of dollars. $4 million per ship and we have 200 average and day. That is a big one. And, when we look at what can we do about it, I think we are in a better position than any time to elevate the problem and provide the technology that will help the pilot to navigate their ships in the channel with minimal risks. There is risk in anything we do, so if nobody is going to have a 100% solution. But, if we go to the 98% or 99%, I think we are there. Our example and role model in this is the jetliner. I mean, look here. What do you think the pilots see when they go through this cloud and things like that? Nothing. They rely on instrument navigation. They might take over on the last few seconds before touchdown. But, a lot of the flight nowadays, even in good weather they do it with the instruments. So, the aircraft navigation, it is always foggy up there. I mean, like the fog we experience at the airport, it is always there. We are in the middle of a cloud. They utilize a few navigation systems to help guide the flight from point a to point B. And, these navigation systems could consist of global positions GPS for the jetliner. It could include inertial reference systems and radio aids. There are different technologies for beacons they have in the airport. But, the combination is for the safety, because if one fails you can rely on the other sensor technology. So, pilots really don't get lost very often, right? Nobody would fly if we hear about the pilot getting lost because of fog or clouds or rain or something like that. That is the philosophy we want to build into this capability to overcome the fog imports.

The other example is on connected vehicles. We are way into it now and people are expecting in three years we are going to see level five cars driving on the road, or trucks

platooning on the freeway. I believe it. I am involved in it very heavily and I think it is coming. In a new car, you are going to have a level three with all of these technologies they have implemented in the $30,000 or $40,000 car. But, we know it is capable. We know probably navigating a ship in a port could be much easier than the task of navigating a car in the downtown area situation with construction going on on the road and things like that.

So, we know there is a technology which enables us to do that. To give the pilot an instrument that if he can't see visibly with his naked eye, he can look at the screen and he or she can see where they are and where things are around them. How far they are, you know? So, a good example is the Rotterdam. Dr. Burns mentioned it. This is one of the most advanced port in the world and the largest one in Europe. Look what this manager says. This will be the next man on the moon for the port of Rotterdam. That is counting on an autonomous navigation of the port and moving things around. So, it happens to be this port has the best port infrastructure in the world. That is a witness is, according to the world economic forum and the global competitiveness report in 2016-2017. Now, in the last few years it is even better. So, no wonder Rotterdam can do it because they are very progressive in their thinking and their updated infrastructure and sensors and so on.

Here, all we need to know is the thinking is very simple. How can you bring Google maps into a ship? So, if the pilot can't see his way ahead due to the fog, the screen will show him where they are and how far things are around him. We are very interested in GPS and 3-D modeling. It is very accurate now. Both horizontal and vertical has good quality. And, we have a great 3-D GIS infrastructure on any port now. We just need to update the frequency.

That is what you see here, the Bathymetric mapping with sounding. We might do sounding in the port because sometimes the radar doesn't work. If we have the combination of the two, that gives the pilot that look. Not only horizontal, but he needs or she needs to navigate the canal or that port channel from depth, too. So, those are technology pieces we are proposing for the solution to happen. It is every time real time kinematic GPS / GNSS receivers. Thank you to NOAA for providing this course and Julianna talked about the foundation coats. That is what we are going to need in the ports. It is important that they have it. We will need to install it if they don't have it. We have a dual frequency receiver on the ship that could be even multiple depending on the size of the vessel. When you talk about $4 million a day loss for both, and a system cost $10,000 or $20,000, it is not a big deal at all. Radar and cameras, and four small boats it would probably be hard to implement. But, for these big ships they are all equipped with radar and cameras. Port high definition infrastructure maps, is a 3-D GIS database. Almost all ports have that. But, now we are moving to the smart city, smart infrastructure. If it is not developed we can develop it overnight. This is very easy to do. And port Bathymetric map between the core and a NOAA, I think they have done a good job on surveying the area. We might need to do it more frequently if we are going to do the solution. And, we need application software from technology. Whether it is Google or garment, we need an app and we need the screen. That is all it takes. There

is nothing really out of the reach of our capability. It is a very simple approach and it can be done to save the economy. What Dr. Burns showed is just one port. Think about all of the other ports. When you put all of this together, we can do that. Thank you very much. That is all I have.

Thank you Quassim Abdullah. That was a very comprehensive view of the technology capabilities which exist and may be harnessed. That is something for all of us to explore after the economic of you. I would like to invite comments from Captain Rick Brennan and all of the rest of the HRSP on the presentation and any discussion you would like to lead us forward in.

Captain Brennan, do you have any comments? I think you are muted.

Sorry, I think I have been hitting the mute, and mute button over and over again. First, the only thing I would like to say is to thank Dr. Burns for her presentation. I think it was a very compelling. That was the question I think everybody had coming into this problem was, what was the magnitude of the problem? I think when we look just at the port of Houston it is very clear what the magnitude of the problem is. And, it is not hard to extrapolate out to the rest of the nation. I would think it is best that we pass the baton and let the other members comment on this. I think that is what we are here for, not to hear me talk. I will let you pass it around to our other members.

Thank you for your comments. We can go around the room and ask the rest of the HRSP members for comments.

Let's go ahead and continue on with everybody. I don't have any comment myself. I think it is a good idea to check with everybody else and maybe come back to me.

Thank you so much. Duly, would you like to add a few comments?

Yes. That was a great presentation from all three of you. And, I really appreciated, and I have seen this in action in San Francisco on the West Coast. So Amy McIntyre can chime in here, too. That is our port. It all makes sense to me, this concern and I am sure Anna will speak about the small boats. Like, how do you control small boats in the harbor? You want to make sure they have some type of transmitter on them that would get picked up. So, that would be one comment that I know everybody has thought about. My other comment is, I am interested in the one million-dollar per vessel. Not because I question it, and I don't know how proprietary this is. I would love to know what goes into that figure only because we have done it a few times. I am always interested in how far down the supply chain you actually count? It becomes very blurry to me at some point. So, that would be my only other area of interest. I don't know if Anuj Chopra could get a breakdown on that out of personal interest. I understand if it is not available. That is all I have to say, thank you.

Thank you. Go ahead.

Maria, please go ahead.

There was a breakdown in a recent study. After September 11 when the port of New York and New Jersey goes down. Based on that I added some other components across the supply chain. What happens is, we have [Indiscernible]. The second component has to do with reservations for warehousing systems, distribution centers, trucks and other multimodal transportation areas and options that are on a standby basis until that cargo becomes available. So, we also have some clients that are purchasing something in advance and they are waiting for their cargo. It impacts wholesalers, retailers and sometimes we have mass cancellations and things like that. I have the detailed report. A couple of my books actually have a breakdown. But, I can provide that to you, as well.

I would be very interested in that. You so much.

Thank you so much, Maria. I think that explains it so well. I have the privilege of working in the petroleum injury in the Houston corridor for 25+ years. I have seen actual numbers on the loss of export. So, I would treat exporting from Houston as a hotel room. If one night hotel room is empty, that is economic loss to that hotel that can never be recovered. It is exactly the same when we look at it as a port. The capacity to export during that time period because of that loss is the one which we are talking about. I completely agree with the numbers of $4 million, depending on the value of the cargo. I am sure we can share that at a later time.

Thank you.

I was going to call out and. My concern, of course is small vessels. That is my main connection. And, there are a lot of them and a lot of them, we don't have AIS. They may have GPS systems that sort of work. Maybe, they don't. Even a lot of the smaller ones don't have radar. Personally, at this point I wouldn't have a boat that didn't have both radar and AIS, but I know they are not cheap even in inexpensive systems, they are sometimes beyond the reach of a small boat operator. From my own experience working in San Diego, when the fog then you can't see anything. It is a combination of issues. One is knowing there is fog is out there. The other is knowing who is in the fog and being able to communicate what they are doing. I have come in and out of San Diego in AP soup. When they gave me AIS, I felt like I had been given the magic wand because on my radar I could see someone on my AIS. And I knew how big they were and how fast they were going and whether or not we were going we were going to get acquainted. The challenge is going to be, particularly in a port like San Diego which has a fair chunk of fog, even though we don't have that heavy commercial traffic that Ellie-L.A.-Long Beach has. I can relate to the airport analogy because I have waited in the airport to find out whether they were going to open San Diego so I could go home one night. It is an issue and has a big impact on the little guys who go fishing whether they can see where they are going or not. That is part of the problem, is how do you get this kind of information and this kind of tool to those kinds of voters. I think it is something like 50,000 boats in the port of San Diego, small craft. Not that everybody is out there

and doing anything. But, on any given day there are a lot of boat maneuvering around the entrance coming into San Diego Bay. Technology is a part of the problem. Cost is going to be a big issue, too.

Absolutely. I think that is very well brought out. I would say the port of Rotterdam, Hamburg and Amsterdam is very foggy for a significant heart of the year had similar issues. Maybe we can learn to what technologies they use and what other practices others are doing. So, if there is a solution we can explore the opportunity while not sacrificing safety. That would be my thought. Captain McIntyre?

I think I am unmuted. Can everybody hear me?

Yes.

Thank you for that. It is interesting. I am going to go a little bit of what the other Anne just said. Having been a working pilot for 23 years, my concern is that technologically icy how it works, like in a closed system. But when you have an open system with all types of boats and traffic coming from different areas, particularly in the United States where there is not such a structure of port authority within the other ports there is a lot of coordination that would have to occur to make this type of navigation a reality. There is a lot of variability in the quality of commercial ships and the quality of crews and the quality of the equipment. Again, academically I see how it works, practically I see it as being difficult. Just generally, and I know that as you are working with this, I think it is important to be evolving with different pilot groups.

Absolutely, Captain Anne. Our initial discussions were based on finding out what capability we have and whether there is a technology solution. Then, invite partners and stakeholders and say, this is what we have laid out and leave it to them. Let get some more comments. Captain Sal? I know you are an interested party and you understand Galveston very well. We are interested in your comments.

Yes, how long do I have? I have been a cruise ship captain out of Galveston for 18 years and many more in New York. In every port fog is a challenge. But, they respond in different ways. I think the problem goes a little bit beyond the technology available. The ships navigate in fog since the second world war with radar. The communication that we had was there. The problem comes with the coordination. I think Captain Anne touched on the point. For a pilot to feel comfortable to use the technology, assuming that he knows how to use the technology available, it is important to have a backup of coordination from the BTS from the port authority to make sure that all of the traffic is under control. The issue we have in Galveston was not so much technology, it was more of a decision-making by one person to close the port at that time. Now, things have been changed a little bit. Based on what? Based on feeling comfortable to navigate in the fog? Or, not having enough technology on our hand? Or, because there is no control of traffic? The coordination of all of these entities and the technology is very important when talking about navigation. Rotterdam, I have been there. Amsterdam, I have been there. They are different ports. The port is prepared to accept

the ship in fog. Therefore, they coordinate the traffic. They shut out warnings for small craft so, they should not go out with the fog. And, everything set in place to make the operation safer. Therefore, a solution on this, technology yes. We have brought these issues up 3-4 years ago and still, I am glad we are still talking about the technology in place. We have technology in place like Dr. 18 said. There is a lot of stuff on the market to make sure that a person can see through the fog. Now, it is just a matter of moving some white somewhere. I think on the Mississippi we solved the problem with fog. The river is to close for fog, now it doesn't close anymore for cruise ships. Going back on the economic loss, I want to pick up Dr. Burns numbers she gave us. Thank you very much. But, I can confirm that one cruise ship loses more than $1 million a day standing outside the port because the financial loss is not just for people losing flights or losing daily activities. The economic loss at the airport at the transportation centers. There is a complex list of economic losses. It is not just the cruise lines. It is difficult to face these thousands of people as to why the port is closed. I have a lot more to say about that.

You only have about five more minutes at the most.

I am finished.

Thank you so much Captain Sala. I know that came from the heart and you have experienced that. We appreciate your comments.

Thank you very much. I have to apologize again for not being around when you're developing this. And thank you to Dr. Burns for that presentation. When we started this, I think the last session talking about restrictive visibility we knew that the discussion would go beyond just the technology. That is not something for this discussion to deal with. I think what we wanted to concentrate on, and I appreciate Quassim Abdullah's presentation is to number one, look at the technology available and then, what can be done about those recreational boaters? I will take the saying about being a big elephant. We have to take the little bites and do what we can. Technology is obviously a solution. It is part of the solution, it does not the full solution. It is part of the solution here. One of the reasons I think for doing this workshop was also to say, technology is going to be part of the solution down the track and, what do we see that NOAA has to have available to support that? That is the HRSP rolls thing to workout. We want to make sure that NOAA has all the technology necessary to support that. That is partly the source to produce those models. And the extension of the port system. Where does it work? Where does it work? How do you extend it and sent kind of thing? That would be my general comment in the thrust of where we started with why the technology group was taking this on in the beginning. We acknowledge all of those other issues. But our focus was trying to stay on where is the little bit that technology can help, and what does NOAA have to do to be ready to have that technology to support? Thank you.

Thank you, Lindsay.

Thank you everyone. It is great to see this--

--Could we let Ed Kelly make his comment, it will be very brief. It is only because he is an and.

Four Ed's is even better than two. I am looking forward to seeing the numbers. In my prior life I was CEO of a number 12 container carrier in the world from North America. If I had chips with $1 million worth I would be astounded. I know there is a lot of economic drop-down. The other thing is, I never made it past my second ticket, so I defer to all the captains in the group. I think the key thing is to question four technology will lead and if the actual practice will have to follow. The reality is fog is only an issue in close proximity areas namely, insight ports. That is where there is the most cross traffic, small vessels, nonprofessional vessels involved. That is where the risk factors come in. The technology is certainly doable. Technology will we practice and we have seen that over and over. 20 years ago nobody would have thought we would be operating the way we do right now with cell phones and computer technology. So, I am positive we have technological solutions. But, that question will be, it will have to be demonstrated to be safe to people like the international Maritime organization, to the U.S. Coast Guard and all of the governing places because I am pretty sure Captain Anne McIntyre would agree. Right now, I would not risk my pilots license by completely relying on technology. There would be too many risk pastors involved. I think it is a very positive thing. The technology is outpacing the practice and I think the focus on this has to be, how to make the industry be willing to rely on the actual technology, itself. Because, you only get to make a mistake once when you are operating a large tanker and you take up the entire area.

Great stuff, Ed. Thank you. We have plenty of time for the comments before the end of the day. So, if we need to come back on this, it is great to see the energy on it. We are going to take a break and be back at 3:45 depending on which time zone you are. We will see you soon. Thanks.

[Review Panel is on a Break and will return at 3:45 EST]

[Captioner Standing By]

Welcome back everyone. I heard the bell. This will be our last a break for the day. I will hand it over to Julie in a moment. As a reminder, we have about 45 minutes to talk about all types of HRSP priorities and issue papers and the working groups. Then, we will slide from that into the wrap-up session and the roundtable with closing remarks. So, over to you Julie. Thank you. You are in control.

Thank you so much, Ed. I think we want to get a closing remark from Quassim Abdullah. I know on the fog section he just had one response that he wanted to make. If you are there, please feel free to go ahead.

Thank you, Juliana. I need to respond to Anne's concern about this technology. We totally agree. We don't think the technology will just be introduced and thrown on the boat. This is going to take some legislation and regulation changes. I think it is going to

be the priority of the closing of the port totally versus maybe regulated on a small fisherman, for example. This is going to be a $10 billion industry or a $10,000 industry. It is going to take some regulation, definitely. As for technology, I want to bring to the attention of everybody, the FAA implemented what we call remote drones. Talking about $1000 drones. This technology is getting very less expensive to achieve. Garman, and all the small aircraft cannot flight without a Garman system. It could be a $1000 system. They technology is there and I think we are going to come to the regulation to regulate the small boats to be equipped with these, whether it is Garman or transponders or very small chips that are cheap, like the drones. That is my only comment on the fog.

Thank you. I think, if we have any time at the end of the day we will come back and discuss this more. That was a great session. I appreciate it. Thank you to you and Anuj for putting that together. Let's move on. Edit page? Ed page? You have a few minutes to update us on the Arctic.

Okay. Good. There is still ice in the Arctic. We sought maritime issues addressed. Basically, I am just going to give you a quick update that follows up with our HRSP policy paper or document on the Arctic that we generated about two years ago, I think. We have updated that from a previous version. The key thing is, it is still relevant. The things we outlined, as far as things that should have taken action, there has been action taken by it. I think it is relevant. I will talk briefly about what is happening at the Arctic. I will go through the slides. They will control it? Okay. The traffic is not expanding that significantly in the Arctic as it is on the Russian side. You are seeing tankers and vessel activity in three months near the very top of the Arctic. You can see the black is tanker operations from a larger tanker to the larger tankers. The heavy ships go to Canada, which is far west of the Northwest passage. You see small landing craft and you see a lot of tugboats with barges. The traffic is not that significant. But, with the erratic traffic because of the ice conditions. They are trying to avoid the eyes. The standard routes that you expect to see sometimes changed because of the ice impediment. That is an issue for NOAA and the National Weather Service. We just get information on ice conditions and polar waves. That is a brief example of the traffic, which is not that great. But, it is increasing. The idea being prepared so when there is additional traffic in the future we do it safely and don't impact the fragile environment of the Arctic. There are plans to increase Arctic operations. Shale is going to come back again. I realize there was a shot at it the last time. We spent billions of billions of billions on offshore development of plans going back to 85. There were a bunch of offshore rigs and platforms and ships that were exploring the sea for oil. They came back 20 some odd years later and of course, because the Marine casualty the whole thing died. Billions of dollars were shut down. To me, that highlight the importance of having safe maritime operations. Of course, NOAA plays a role in providing information to ensure a safe maritime operation. Shale is coming off closer to shore now. They do have plans to come back to the Arctic and start producing oil again. That lead to more maritime activity, obviously. There is also a project underway right now for producing LNG, which there is a lot in the North slope. To bring it to America the talk is to build another pipeline which is somewhere in the neighborhood of a 50 doll and $50 million or $60

million project. They are saying let's just do a liquidation plant on the north slope and have the ships take the LNG to international markets. That is moving along. It will be a couple of years. There is an indication of increased maritime activity, a different type in the future. Some of the issues with that happened to be with subsistence activities. They are trying to make sure they do it right so they don't interfere with the indigenous communities, as far as hunting whales or other subsistence activities. And, ensuring they have areas that will be avoided that kick the shipping's out. That is another issue that NOAA weighs in on.

The people that are making some noise about it or raising concerns our Alaska Eskimo whaling commission and other parties. They are saying, this is our waters and we have been operating them for years. Now, ships are coming through how do we make sure we don't get run over? We are talking about issues regarding supportable IES units. We have been demonstrating, and that is my kayak on the left. I sacrificed a sunny day instead of staying in the office where I wanted to be, I went out in my kayak to test out the technology. I took one for the team. We can see, that little portable IIS was actually powered by a USB power device from the power trail, no less. Subsequently, we have become more sophisticated in that. We were able to put it in a pelican case. If you put it on your boat you can see where you are and other vessels because it goes to your iPhone. My iPhone display shows the other vessels. Also, the other vessels will see you in the Coast Guard will see you and they can put up dynamic detected areas around your filing activities and notify vessels of your presence and vessels can avoid you. This would be like a dynamic copilot. Right now, the coast pilot talks about boilers being out there. Also, the Coast Guard is exploring port access routes. They are trying to figure out the best routes or quarters, if you will. That is going to lead to areas of traffic lanes, etc. Once again, NOAA get involved in that because in these traffic lanes, the survey needs to be well done to ensure we are not sending them into an area of and surveyed or poorly surveyed or outdated waters. That is a process that is going on. Next September is when the public comment will move in. That will lead to traffic separation with two way tryouts. It will have recommended routes and deepwater routes, etc. Those are the things that impact NOAA in charting and other services to ports. More on the same as far as the different things that may come out of this port access route, which overlap NOAA once again. The last thing I want to mention is the mapping of the Arctic Ocean. We are involved in an international effort to increase the charting and mapping and surveying of the Arctic. There is an international effort that went from 6.7% to 20% of the Arctic waters mapping the Arctic Ocean. I think the goal is to have it done in 2030. Eventually, everyone is anticipating the Arctic will be significantly more traffic. It saves significant thousands of miles. This is a press release about that. Are getting a lot of attention about mapping and charting as we have discussed earlier in this meeting. We are kind of monopolizing the conversation these days. I apologize, but not profusely. That is it. That is our effort up in Alaska. That is called social distancing and how we handle social distancing in Alaska. That is to get more than six feet away from whales.

At its best. Thank you, Ed. We appreciate your update on this important area. We have a lot of attention to Alaska through the Arctic on this meeting. It has been great. Thank you, Ed.

I want to say that we have one half hour left to do a lot of work. I think we need to talk about NOMEC here. Then, we would like to go around. I would like to summarize on what we would hear with NOMEC. We want to leave the last 15 minutes or so, maybe 10 minutes to let Shawn talk about recommendations. He has been getting a lot of good ideas. Then, we would love to touch base about the priority matrix. Let's see how far we get. So, Shep are you there to be on so you can finish up your comments on NOMEC from before?

Sure. Can you hear me?

We can hear you. I really thought it was a very thoughtful discussion. Each of those big ideas that I took a couple pages of notes on need some working out. If any of them were easy, we would've already done it, right? Just like the fog issue. If that was an easy problem with would've solved it already. It is worth billions of dollars. I think the comments on NOMEC are to thank you for your thoughtful comments. There are a lot of things we need to follow up internal to coast survey and a lot of things that can really inform the larger national strategy, as well. Specifically, I still keep coming back to this task force thing. It sounds as though you think we need a different federal advisory committee. Or, we need to figure out a structure that is not a federal advisory committee because federal advisory committees wouldn't be good at this. And, that is why I keep getting stuck on that because whenever we try to set up something like this, and this is really why talked about it at the beginning of the whole meeting is, our lawyers will tell us that if you want to have public input like that, you need to do it in a structured away. That structured weight is defined by law in the federal advisory committee act. There are clearly, and we dance around it sometimes, but for something formal and high-level like this, we need to figure out what that structure looks like. Obviously, within the government we can coordinate and raise it or not, but it is the public comment and public engagement in government policy part that is applicable to what the federal advisory committee lot is. I would ask you to give a little bit of thought to that. And, if we have to have a federal advisory committee, I think the HRSP should act and ask itself whether or not they want to have any of that role. Or, whether we should do it through the ocean exploration advisory board or come up with a different mechanism entirely. I understand what it is we are trying to do with this task force. But, we do have this structure defined by law for how to do these types of things. I would also be happy if somebody can tell me if we could do something that is not subject to FACA. That is all I had to say. Thank you for your thoughtful comments.

I know Anne has a comment. Before we go there, in the interest of time I want to summarize what I have heard because we need to make sure these are in the public comment and in this document. So, I will then go around to everybody and ping you and see where I captured it wrong or what other ideas you have. I have heard that NOAA should be the lead on this. I have heard that it would be good through the appropriations, the color of money if we would have the flexibility to take advantage of some of the existing mechanisms through federal agencies and partnerships, such as IU. There is the joint Institute and the Army Corps. We also do it through the operative

cooperative unit. We do not have a separate FACA. My opinion is not to suggest having a second FACA because of the overhead and expense of that. But, if appropriations allows the discretionary funding NOAA to take more advantage of those opportunities. Then, I guess the one last thing that I don't know if we really covered, and maybe if somebody has a comment on this, but are the U.S. ships and vessels really prepared? Do they have the technology for this project? Or, it has been expressed that foreign flagships are better prepared. So, we just want to make sure that it would be interesting to enjoy your comments as far as the capacity of the U.S. ships for the mapping. I am going to go around and ping everybody for last comments on this. And we will be sending around a revised document for NOMEC. Edge?

Let's start with the last first. I think it is shortsighted to be worried about the ships when certainly within 10 years and most likely within five years we are going to have a lot of our autonomous forms doing this type of data collection. We are getting hung up on the flag of the ship. That is a nonissue in my mind, unless we are just worried about tomorrow. And, I don't think that is an issue. The point of this is to talk about the next 10 years. Anything else to add?

Okay, we will keep the group going. This is the biggest thing going geographically and the breadth of it all. There are a lot of good opinions here. All of them are valid and one level or another. My main recommendation is let's not cut this off for time. Let's cut it off when we get it right.

All right, thank you. Next? Quassim Abdullah are you on? All right, let's go to Anuj . Maybe we need to unmute.

Okay thank you. No comments from me. Go ahead. I am completely aligned with the VTSA for strategy at this time.

Sean?

Nothing to add. I will just follow the guidance of the panel members who are better able to speak on this.

Okay. Nicole?

The only comment is that I do have some experience in working with interagency groups that are able to engage stakeholders and academia, as well as federal agencies that are not FACA's. I know we don't have time to going to that right now, but I would be happy to contribute that to the conference of the paper if desired.

That would be great. Okay. If you could follow up with me on that, that would be great. Lindsay?

It is interesting. I think what the Admiral just said is there a way to do it without a task force? And without another FACA the legislation to do that? If there isn't and it came

down to it, I guess the question would be, could we get people from the various FACA ? You mentioned some others. Maybe it is both contributing to that and maybe there are other FACA's that are related that could be done as well. I was interested in what iOS and others said. That sounds interesting and I don't how the structure would be. I was really interested in that. Because, from a retail perspective it was interesting I think, to hear Jessica from Honolulu and the Corps of Engineers comment about how these things get coordinated backwards. This was a project we were on last year in America Samoa and it is related to what Joy said, as well. We were on a project with national Marine sanctuaries and partnered with others. And, they had their autonomous boat preparing for some work we did together that was funded by the national Marine sanctuaries in the harbor. They did some setup and test and it has been surveyed recently. There was some work Joyce had done on the reef around their and we did some of that work, as well with the ISD. To close that out, it was also submitted to the external source data. This is where I think we are saying those kind of happenings need to be more informed. How do those kind of things always happen? And, people know about it in advance and it goes forward. I look forward to the work we have to do in getting this strategy through. Thank you.

Great. Next?

I don't think we need to have another FACA. Once again I throw it back to iOS. We are in a position with iOS, with the various regional associations that could probably bring the right number and type of persons to the table for individual and platform systems. I don't believe HRSP is the place to do this. I don't think we have the depth and breadth of participation. I think our papers are great. The I.D.s are great and the implementation for the development, I would recommend goes through the iOS network.

Anne?

Okay. On page III of the NOMEC document, at the bottom half there are 50 names in an existing task force. I would think that out of that existing task force, of which NOAA is cochair and, as executive secretary you already have people there, NOAA leading. I would think that could be the beginning step for creating a working group of that task force. Somebody has already put a task force in place. It is not like you have to create a new one. Why not take advantage of something that has been called out in the document, itself? And, as I said put together a working group, whoever it needs to be to get this thing started.

Good comment. Is there anything else?

May I ask a clarifying question? What was the list? Is that the list of [Indiscernible]?

It is on the screen, Shep. Do you see it on the screen? It is in caps towards the bottom.

Yes. I think Anne was talking about the strategy document itself and the list of people in the task force. I think they are all government people. Whether you could establish the main government working group with them I think was the question.

Okay. Correct. So, it is how to get nongovernment people into the working group. Okay, let's move on. Dave likes

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I am interested in seeing what the autonomous vessels are going to be doing. I am interested in seeing what NOAA is doing on the north slope with the drone fleet. They can deploy dozens of these failed drones with an operator from central control and go out there for weeks at a time and start mowing the lawn in a systematic manner in either a single vein or multi-thing. I see great potential for that technology for adjusting the needs for mapping. That is my major comment.

Thank you. Anne?

Nothing to add. Just thank you everybody for the work on this. It is a huge project and I appreciate working with you.

Okay, thank you. Ed page? You are muted.

Now I'm not. Maybe we could explore the committee Marine transportation system interagency group that basically should have some concerns and issues to support the NOMEC and have botanicals of all kinds of connections with other agencies. Helen talked about this briefly the other day. It is important to do that. That is the only thing I think of. I think we can do without another advisory committee. There are other mechanisms and ways task force to address these issues.

Good, thank you. Jerry?

I will go back to Lindsay's comment about other federal advisory committees. We have a lot of data siskins discussions about land-based vehicles. I think that committee could provide some input to this committee with GPS technology and position.

Okay. I think what would be really good is if you could capture some of these comments, particularly those that have not been mentioned or I didn't read back. You could capture them and send them in to us, Lindsay and myself. We will finalize the document.

Julianna, I didn't have a chance.

I was going to come back to you, yes. Go ahead.

Just to respond to Admiral Shep. Whatever we do, we need a team of doers. We need to keep it away from bureaucracy and big agency. We need people who can roll their sleeves and do that work. They could be executive or technical, but whatever you call it

I don't want to be stuck with big agency. I know you are limited. I think if we don't find anyone within NOAA capability to form an active, dynamic team to help the execution of this strategy, I think HRSP should take responsibility over it. But, form a team within that. Just to go around the regulation. Not necessarily everything can be done by the HRSP members. But, we can oversee a new working group when we bring all of these, academia, federal and others into it. Just as a suggestion. For funding, we are looking at whether there is funding protocol or a model for NOAA to take over money to execute. I think we should encourage that. NOAA should support some program or other agency who has more capability or availability. We need to consider that instead of just bringing in somebody else to do it. That is really what I have. Otherwise, I think it is great and we can keep it going. I agree with Ed, we shouldn't rush it. This is a huge thing for the nation. We should take our time to think it over if we are not ready. Thank you.

Thank you. And Sal, I didn't catch you.

As I commented before, I think besides the seafloor and the HRSP mapping , I think using energy over the water to produce electricity, like the wind farms like they have in the Netherlands and around the coast of the UK. I think that is a good try to take interest of our stakeholders into the project.

Okay. Let's go to Andy. Are you there, Andy?

Yes. Double punching buttons sorry. I wasn't going to raise this but, you said you would like to finish up this document. So, that prompted me to make a remark. In number five that is up on the screen now, there is a sentence that said, these updated methods are hampered by outdated, slow-moving regulatory framework. That is just an invitation for us to go down a rabbit hole with the people that read this. If we just took that sentence out we would be better off because somebody will say, what framework? Or, what do we need to do? So, just a suggestion. I don't think that is helpful. It may be true but I don't think it will be helpful in this case.

Anything else?

We are good.

Larry?

I think we have had some great discussions and I think we are beginning to focus on the critical issues we are going to face in China with NOMEC. But, I come back to Lindsay's story about what happened in American Samoa. I think one of the keys is to see if we can turn the situation like that, which happened by chance and people were able to get some critical mapping in a very remote area, even if it wasn't remote and make it happen by design. That is the key in finding these mechanisms that can explore all the potential assets and use them efficiently and effectively. I am very intrigued. I don't know how much Iowa's works iOS works. Or, what Nicole has in mind in terms of the

experiences she has had. I think we should explore those and maybe we could help NOAA in trying to identify a mechanism that can go beyond interagency collaboration, but really multiple sectors.

Thank you. Let's go to Julianna.

I don't have any comments, thank you.

All right, Rich?

I don't have any comments, either. We are really primarily in a support role in this effort. It has been a great discussion by HRSP and Shep and Julianna. I have gotten a lot of valuable input from you guys. I appreciate that.

And, Shep?

Thank you all. I don't have any additional comments. I look forward to the final version.

Great. So, in the interest of time, we are going to stop the discussion with this. Sean, I am going to turn it over to you to talk about some of the recommendations that have come in for the letter to the administrator.

All right, thank you Julie. I am going to do this and something I say a lot in my normal job is, risk management is a team sport. It is very true here today. Sometimes, I will add that might team acronym is together everyone achieves more. When we go through this, I will hit some of the high points of the comments I have captured so far. Then, I am going to go around the panel. There were several comments about recognizing, acknowledging Congressman Don Young. Think that has hit a lot of discussions about the NOMEC strategy and the Alaska coastal mapping strategy. And, one including making it a recommendation to approve it. I think we covered that today. I will address that later. A comment that we heard a couple of times was about sale drone mapping of the artistic. A lot of discussion about inter-agency partnership over private partnership. Again that teamwork kind of throws through a lot of it. And, a lot of discussion that NOAA should be one of the leading agencies in this. I won't say lead, but that is what was said. Connections here are related to economy, economic prosperity, promoting maritime commerce, protecting the environment and ecological resources. Complements came in on the port sensor information being broadcast over AIS, something that has been worked on for a long time. Standardization back to NOMEC standards , nearshore deep ocean type of discussions. Considering requirements and potential benefits of high-resolution nearshore and storm surges with runoff. Other than that there were a lot of different comments about COVID-19 and adapting to the present system, looking at being on a webinar and not in person. And, how industry has responded in a lot of different ways outside the box thinking. With that, that is the majority of the comments I received. But, I really would like to go around. I will say I will start off the list I have of alphabetical order going backwards. Hopefully, Gary Thompson will be put on the spot. Gary, if you would hit anything that I didn't mention

are you would like to make clear. Again, this would be used in helping to put the recommendation letter in a format where everybody would be able to comment and we will work through, as you are familiar with the editing process to make sure we have a final product that represents everybody.

Can you hear me?

Yes.

Since I have been on the HRSP it seems like most every meeting I hear about a small boat and technology to help them determine their position. I think that would be something that NOAA needs to take a look at. There is technology out there that we could utilize for this. May be, it is maybe already being used. I think that would be an area of research, looking to help the small boats, especially in port areas.

All right, Gary thank you. That is huge. Julie?

You called off everything I sent them to you. I am good. Thank you.

All right. Thank you. Captain Sal?

I think you called everything. I don't have everything else to add.

Captain Ed page?

Yes. I think the position navigation app, we should mention we are making progress with. There are many other efficient marine transportation apps. I think we are moving in the right direction. We have a better appreciation of the financial impacts, rippling impacts and the impacts, the blue impacts to mother nature. If we could mitigate those adverse impacts by some of the tools that NOAA can provide to the precision navigation. That is a pretty good story about Houston and that small area it impacts. I realize many other factors come into play as what brought up to this small boat issue. There are other ways of addressing that. All of the pieces have to be fit together. The type of vessel, the size of the channel, the wind conditions and current conditions, etc. all come into play. The better information the Mariners have, the more likely they can proceed. Maybe want to mention that to some extent. That is all I have.

Captain Anne McIntyre?

I have nothing to add, thank you.

Thank you. David?

I will be anxious to see how NOAA reacts to the Alaska coastal mapping strategy comments we have provided. We have several dozen recommendations and there. I hope they are practical recommendations that could be implemented, rather than

something that just sound like a good idea but may be impractical for some reason. I will be anxious to find out if our recommendations are beneficial or not. Otherwise, you have covered all of my topics. Thank you.

All right, thank you David. Anne?

I just want to echo what Gary Thompson said because small craft are my focus. I know what they are willing to do, whether they can afford it are not is the thing. I know what they would like to do. I think there is going to have to be some mechanism, I don't know what it is, some sort of communication to let them know if they are going into this electronic area dealing with restricted visibility. Which, by the way isn't just fog. The little guys just don't know what they don't know. They don't know what they don't have. I can see some issues if the big ships are all equipped, but they haven't stopped to talk to the little guys, the 26 foot center console fishing boat, or the 30 foot sailboat who has no electronics onboard. That is going to be an issue. Have to be looking at the little guys, too.

All right, thank you. Ed Kelly?

And that hate to say it but, can't face the world on the people least equipped to live in it. There has to be across the United States a significant effort to upgrade the capability of smaller boats and the people who operate them. There are still some states, New York and others included that still don't even require a license to operate motorized draft. That is my comment on small boats. Overall, Shawn you have done a great job in capturing the big hit points. I have nothing else to add to that.

Thank you. Ed Monday is up next.

Thank you. I think we are beating to death. It is a huge challenge and bigger than our normal HRSP responsibilities. When I commented yesterday that we didn't want Shep to move away and he said, sometimes you get money with a note. I think what we should put forward in a positive tone is to use the leverage that is in the NOMEC strategy to say, any funding that comes from that shallow area should be accelerated. Not only is it a general NOMEC, wanting to map the seabed, but specifically for the task they have for Marie navigation and support. We shouldn't lose sight of that. Thank you.

Thank you Lindsay. Dr. Elko you are up.

Two things, the comfort of NOAA leading and the comfort of collaboration. It would be good to put those under one bullet or in the same paragraph, or however you are structuring it. We recommend NOAA lead while still encouraging and facilitating interagency collaboration. Then, my other comment is that I think we should put a big thank you in their that Dr. Jacobs attended the meeting and it was so engaged and NOAA's senior staff, let's play that up and encourage them to continue doing that in the future. Thank you.

Will set. I will keep going down the list and come back at the end if there is time.

I'll I want is already there. Thank you so much. You have covered it.

Thank you. Councilman Abdullah?

I think you hinted to it. I really want to emphasize this realization. I really want to push the development of a national incentive for coastal mapping and hydrographic surveying. The statement the lady came in earlier with a comment and mentioned about the existing standard, she is right. There is a document called a standard. I went to it. It is 3 1/4 pages. Two pages is a table. And, you read inside and it tells you this is guidelines. Standard is not guidelines. This is confusing. The protocol is calling best practices and project specifications. We have a lot of them. None of them come to the level of national standards. That is what I want NOAA to please listen to. There are so many things around and none of them is a standard. Especially, the lady who claimed there is a standard. It is totally false. It wasn't a standard. It was a guideline. It is a one page text and the rest is a table. Thank you.

Thank you. That is the panel members. I will go to the directors now and start with Dr. Mayer.

I am good. You have this.

Thank you. I appreciate that.

Sean, on your long list, you had a very comprehensive list. Did you have anything about a discussion that went on today.

No, and I will tell you that is a good point. I didn't mention it, but a lot of what happened today is still being processed. It will be incorporated into the draft that we will post for everybody to comment on. Very good catch.

I agree. I think the discussion today answered a few questions and raised a lot more that still need to be explored. Just getting past HRSP emphasis on the topic, you might want to acknowledge it somehow.

Very good point. Ms. Blackwell, are you available?

I would like to say I support the recommendations you have identified. I don't know if you want to say anything related to the delight of the NSR's modernization. I don't think it is necessary. But, if you had thought you wanted to include that would be welcome feedback. Thank you.

Yes ma'am, I appreciate that. Captain Andy?

Thank you, nothing to add. Sean, really nice job on rounding all of this up and running this comments process. Thank you for that.

Okay. I appreciate that. That is a good segue. I will say something about the fog. I want to be polite and not careful. I think this is a great effort. I look forward to having some discussions with some of the members later on. Fog is a really tricky issue. The Mississippi River, we have almost 260 miles of ship channel. Sometimes, when we have fog in one area we may not in another. Depending on where it is, it could impact the whole channel or may only impact a very limited number. Looking at the small boats, that is a real issue. The sportsman's paradise and the lower Mississippi River and the Delta, we have a lot of fishing boats and hunters and a lot of different craft transiting across a very busy ship channel. With that, I will leave it that again, we will have a draft set up where everybody can comment and we will whittle away on getting everything right. Hopefully, pretty quickly for these comments back to Dr. Jacobs. I appreciate everybody's support and comments. Thank you.

Sean, I am not sure we got ships comments.

You are right and I will say Admiral, you are not on my list, Sir. But, I should know better. Thank you, Julie.

Thank you Julie. I do have just a couple of thoughts. One is that the more we talk about NOMEC , I keep remembering that we have for about 20 years had a structure in place to coordinate ocean mapping. The IOC M program authorized by OC MA and there is already quite a bit of established resident for a lot of things we are asking for. On a larger scale, and the thing is the biggest difference is that was about coordinating activities to avoid duplication and finding synergies. As opposed to structure to run a big program where we might expect to have increase in resources. A lot of the pieces are the same. But, the fact that there might be money has changed everybody's calculus about how to engage with this program. So, for instance the group that is involved with this is hosting the standard ocean mapping protocols forum with full public participation, speakers and everything in just a couple of weeks. It is exactly the type of form I think you all were describing. Now, it doesn't nest under a larger structure that is similarly inclusive with officers and staff from other sectors. But, I think it is illustrative of some opportunities we already have. Similarly, the IOC M has sponsored regional workshops for gathering priorities regionally. And it is obviously a little bit awkward to do that right now with COVID. But, I know they are working on coming up with a model of doing that even in a distant way. We are working within existing structures. And, I think it is worth looking at the opportunity to enhance our existing structures and programs in addition to consideration of weather we need something larger and grander. That big change of having money is a big game changer. Second is, Quassim Abdullah I would love to have the same sort of standards control over mapping that my peers around the world have. You need to get a permit in most parts of the world to do any mapping and you need to do it to the standard and you must divide the data to the hydrographic office. We don't have any of those authorities. This is freewheeling America, right? We don't like lots of government rules. But, if that is what we are talking about we would have

probably 50 models around the world of exactly how to put a standard in place that requires a set way of doing things. So, it is certainly worth considering. As you might imagine, everybody is in favor of a standard as long as everybody does it my way. As soon as we start saying, it has to meet hydrographic office standards then, the fishery people will say they have to put tides and sounds beat into their system. Etc., etc. and, we have tried in the past and have had a lot of pushback. That is not to say we shouldn't try again. And, the moment is different now. Maybe the time is right to make another tilt at that windmill. I really appreciate you reminding us of the value of that. I will stop my comments there. Thank you all for a great discussion.

Okay. Sean, maybe I will pick it up from here. Actually, Ed I know we are at the time, over time for this particular session. What we haven't had a chance to look at is the priority matrix. But, we could dedicate the next session to really go through the priorities matrix because it was that the topics for the next meeting. I don't know, what do you think?

I think that is fine. Because we are up against the wall.

I would just show it because I think everybody just went through what would have normally been your closing comments. You just had them. So, you have a little bit of time.

Okay.

And, I would just ask, do any of the members have things that are giving them heartburn that they would like to see discussed talked about? I know Quassim Abdullah wants to discuss an issue paper. Are people interested in talking about standards? There might be other things, as well. I think Nicole Elko might want to talk more about that near short symmetry. I don't want to speak for anybody or not speak for somebody. But, if you have something burning that you want on the record, now is the time.

Okay, so let do this duly. We only have 15 minutes. We can put the priority matrix up. In the meantime, go quickly through this. There have been a couple of emails running around on other topics to cover. We haven't done those bimonthly or once every few months types of meetings that are designed to do a little bit of background and are open to the public and people can at least get the ball rolling on some of these new ideas. For instance, Dr. Jacobs brought up yesterday about coastal mapping and the reasons to do that. Of course, we course, we want to follow up on that but needs its own background technical presentation for everybody's benefit. We can go down that road. If anybody wants to throw something on the table right now for ideas for meetings coming up that we can organize and have a discussion and do some technical deep dive on that, let's get data on the table right now.

Let me just say that I do have Quassim Abdullah's emails so we don't have to do that again. Go ahead.

Dr. Nicole, do you just want to voice your idea and we can capture it and come back to it?

Actually, I am not sure what Lynn was referring to. I will pass for now.

Okay. That is fine, too. We communicated enough on the side. I personally, would like to follow up on Dr. Jacobs ideas and some of the things that were bantered around this morning as we were communicating with each other between Ed number one and what Quassim Abdullah was saying. We have a really good list and it will be good to have some more deep dive backgrounds. I miss the fact that we haven't been doing much with those technical presentations on the side. I think they are beneficial and they are easy. In the environment we are in with everybody easy to dial in and get involved, we can probably do a lot more of that. I guess my recommendation is to have some more technical presentations in the interim in in between these public formal meetings. Ship, if you want to say anything else we have a bit of a gap and everybody is coming to the end energy wise and everything else.

Sean was either muttering under his breath or was muted.

Take your pick.

Sean, did you have something to say?

Ed Kelly is that an old comment?

I appreciate that. I was indeed, muted. I would like to talk real quick about the partnership. I think that gets back to the interagency. I think looking at the AIS over the port assist system over AIS, it is part of maybe combining those two under interagency's. I will leave it at that.

Okay.

But, Sean I know this brings up a discussion we had going forward and you were thinking maybe the HRSP could talk about sensors, partnerships, different agencies having different resolution or format of sensors, etc.

I don't know if that is even ready for atopic. I would like to bring it up later. I am looking at something and it falls under the umbrella of interagency cooperation. But, I do plan to go to the planning and engagement MIDI with that as an idea and see what other members think and if they are willing to support that. And there would definitely be a connection to the tech folks. I will leave that for a later date. But I think the partnership combining those types of things takes a couple of items and focuses them on what we have talked about with interagency efforts.

Great. There is an interagency on our priority list so we can expand that if needed.

Julie and Ed, may I add another comment in regard to this, please?

Sure.

It might be useful for our future meetings whether it is a biannual meeting or a regular meeting to dedicate maybe 45 minutes or one hour for technology showcases, for example bring technology manufacturers on. They are really doing a great job Larry, I'm briefing us on what you are doing. It is nice to have the manufacturer, and brief us on the latest technology. And, that session could also be dedicated to bringing other interagency members, like the Corps of Engineers to brief us on what they are doing to complement NOAA activity. It would be good for us to just see what is going on outside NOAA, for us as HRSP. Just a suggestion.

That is a good suggestion and we have historically done it a lot. We may have drifted away from it and that may directly be related to the fact that our meetings are only four hours long now. We don't have a morning session and a lunch session. We used to push it to about three days of eight hour days. Part of it is the schedule. But we fully support the idea and we work on future agendas.

We don't have to do it through this big meeting. We could schedule a virtual technology meeting in between.

We have done it before, and we invite the public to have a topic relative to technology.

It is good for everybody. Thank you.

Both Ed Kelly and Gary Thompson want to make a comment.

Ed Kelly here. This is my eighth year and probably my last public meeting. While I have the public record, I would like to go on record to say it has been a great run. I have been tremendously amazed and gratified by the great work done by the NOAA leadership and staff. Over the years I have consistently found all of the HRSP members to be dedicated , extremely skilled in their fields and a real pleasure to work with. Just a thank you to everyone. It has been a tremendous experience for me. I just want to also be on record that NOAA still owes me a trip to Hawaii. And, the second part is that port should be federally funded. I hope somebody out there, I see Sean shaking his head and I hope a few others will be in the same way along there. When I was hearing about how the Navy was getting ports, that means if the Navy is paying, the federal government is paying. That puts my port at a competitive disadvantage because of things like that. Enough about that. I hope somebody will shake up the structure and carry that forward. Thank you to everybody involved. It has been a real pleasure. Thank you all.

This is Lynn. I just have to jump in and say Ed, you are retiring too early. You have another year.

I need to still get to Hawaii.

Nice try.

You have to push as hard to get there before December 31. We are keeping you for another year.

My mistake.

We are going to record that speech so you can use it in a year.

It might not be that good by that time.

He just had to get that federal funding for ports into the discussion even though it wasn't on the agenda.

Gary?

One of the topics I would like to see in our future meeting is about DNS elect comedy. I think it has potential. We could see a lot of use on our coast for measuring water elevation. I know there has been some research done on it. I would like to see at least a presentation on that and possibly more research.

Good. Okay. If there are no other comments or required topics we need to cover, Julie anything else from your perspective?

No, I marked down a couple things to add to the priorities list. I think we really need to go through this and clean it up. Some of this stuff is pretty old. It is not the topics per se, but the comments for the topics are pretty outdated. Amazingly enough, a lot of the topics are still relevant. I will take a first pass and go through it and try to clean it up and send it out. Maybe we can take some time during the next meeting to really discuss it. We want to get topics for the next meeting, is the point of this. It is a good tool to get them into the priorities list so we can focus on them during the next meeting.

And the next meeting is late March or early April, correct?

I am still laughing at Ed Kelly trying to get off too early. Yes. Ed Kelly, I hope we'll see each other before you leave and we can have a glass of soda or water together.

Absolutely. I am looking forward to it.

Maybe even Hawaii. Yes, we will come up with dates. You have five more minutes and we really can't hold the transcriptionist over. Is what we did okay? I would welcome feedback. It can be any time. If you haven't already turned in your time sheet, please do so.

How about our travel vouchers? I got her thinking on that one.

I want to thank all of the staff for putting this together. I think you did a wonderful job.

Yes, we owe a clap to that one.

Agreed.

A lot of people helped. I want to say specifically, Amanda Phelps, Christine Burns, Virginia Dentler, Jill Stoddard, you guys were amazing. Best behind the scenes I have ever seen. David did 100 million updates on the website for us. Thanks to everybody.

Thank you. And, also to the directors.

And, Christine Burns.

Okay. I was just going to say the directors have spent a lot of time reading through our different notes. I really appreciate it all. And, to Ed.

In the worked working group meeting we can go into more detail on that and the wish list for speakers.

I am going to go ahead and and the meeting. Thank you to everyone. I thought the meeting on a technical level was seamless. It was really, really excellent and easy. With the exception of all of us that forget to unmute. That is a technical deficiency that is human and we will figure it out one of these days. With that, I want to say to everybody stay safe and healthy. Look for you on the web. Let's keep the energy going because we are really doing some great things and tackling some incredibly big issues. They are really, really meaningful. Have a good evening and afternoon. Everyone take care. This meeting is closed.

Thank you.

Goodbye.

Thank you.

[Event Concluded]