**U.S. DEPARTMENT OF COMMERCE**

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**NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)**

**HYDROGRAPHIC SERVICES REVIEW PANEL**

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**PUBLIC MEETING**

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**TUESDAY,**
**SEPTEMBER 12, 2017**

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**The Hydrographic Services Review Panel met in the Prescott Ballroom, Sheraton Portsmouth Hotel, 250 Market Street, Portsmouth, New Hampshire, at 9:00 a.m., William Hanson, Chair, presiding.**

**MEMBERS PRESENT:**

**WILLIAM HANSON, HSRP Chair**
**JOYCE E. MILLER, HSRP Vice Chair**
**DR. LARRY ATKINSON**
**DR. LAWSON W. BRIGHAM**
**LINDSAY GEE***
**KIM HALL**
**EDWARD J. KELLY**
**CAROL LOCKHART**
**DR. DAVID MAUNE**
**ANNE MCINTYRE**
**EDWARD J. SAADE**
**SUSAN SHINGLEDECKER**
**GARY THOMPSON***

**NON-VOTING MEMBERS:**

**ANDY ARMSTRONG, Co-Director, NOAA/University of New Hampshire Joint Hydrographic Center**
**JULIANA BLACKWELL, Director, National Geodetic Survey, NOS**
**RICH EDWING, Director, Center for Operational Oceanographic Products and Services, NOS**

**STAFF PRESENT:**

**REAR ADMIRAL SHEP SMITH, HSRP Designated Federal Official; Director, Office of Coast Survey**
**DR. PAUL DOREMUS, Acting Assistant Secretary for Conservation and Management**
**GLENN BOLEDOVICH, Policy Director, NOS PCAD**
**CAPTAIN RICK BRENNAN, Chief, Hydrographic Surveys Division**
**ASHLEY CHAPPELL, IWG-OCM**
**DR. GREG DUSEK, CO-OPS**
**CARL KAMMERER, NOS OCS**
**LYNNE MERSFELDER-LEWIS, HSRP Coordinator**
**JIM RICE, NOS PCAD**
**ERICA TOWLE, NOS OCS**
**E.J. VAN DEN AMEELE, Chief, Coast Survey Development Laboratory**
**LT DAVID VEJAR, NOS OCS**

# T-A-B-L-E O-F C-O-N-T-E-N-T-S

P-R-O-C-E-E-D-I-N-G-S

9:04 a.m.

CHAIR HANSON: Welcome to the second day of the 2017 HSRP Fall meeting in Portsmouth, New Hampshire. As Admiral Smith gets prepped here, we want to let the panel members know that I'm going to be calling on you for some thoughts on yesterday's discussions.

And we'll also ask the audience for your introductions as well. We all introduced ourselves yesterday. In fact, let me go ahead and do that real quick, sir, if that's --- or you want to go ahead and say something?

RDML SMITH: Yes. Good morning. Thank you all for being here bright and early. Could anyone --- we did a round of introductions yesterday, so I think we don't need to repeat that all around. But could any who has joined us since yesterday please introduce themselves? I see Jeff back there.

MR. LILLYCROP: Jeff Lillycrop from the Corps of Engineers.

RDML SMITH: I think everyone else has --- thank you, Jeff, and welcome.

MS. MERSFELDER-LEWIS: Okay, this is for the record so, sorry about that.

MR. LILLYCROP: Good morning, Jeff Lillycrop from the Army Corps of Engineers.

RDML SMITH: Thank you, Jeff, and welcome. We'll be having some --- Jeff will be speaking later this morning or later today.

I did want to just reflect on yesterday. After the public meeting yesterday, we toured the facilities at the University of New Hampshire, very impressive operation. And it's a real crown jewel, not only for New Hampshire but for the Hydrographic community in the US and the world, so really world class research and development going on there with just a fabulous spirit and esprit decor. So thank you, Mr. Chair.

CHAIR HANSON: So, yesterday we had our normal introductions in the morning. We also were joined by Dr. Paul Doremus from NOAA.

And we didn't get to ask questions so we thought this morning, given all that we talked about with the introductions, we had the USV panel which, I think, is going to be around for a while, we keep talking about innovations and new technologies, and then the visit to UNH. And again, thanks to Andy for putting that together.

So we wanted to have the panel have a chance to talk. Are we ready to go with this, Rich?

So one of the things we've talked about over the last several years is trying to help understand and promote the good services that NOS/OCS provides to the nation and, in this case, actually to the world.

Rich, you want to tell us about what you've got here?

MR. EDWING: Sure. So about five years ago we received a grant from the State Department to establish a hardened tide gauge in Barbuda. It was being designed to withstand both storm surge and tsunami.

And the purpose was to provide a gauge that the Caribbean nations could use as kind of a kernel for their network down there for training and so forth. So let's roll the video. So this is in Barbuda. This is a video one of my guys found on YouTube that is going to pan around, it can actually roll, there we go. All right, stop it right there.

So there's the station. It operated successfully throughout the storm, provided data. We actually turned the station over to the local authorities in 2015, and they've been maintaining it.

But this morning we were talking about the value of hardened tide stations and particularly when it comes to these type of events. And this was, I thought, a great illustration. We'll talk a little bit more about this later this morning during my updates.

CHAIR HANSON: Great, thank you. Thanks, Rich. Okay, panel members, some thoughts, and recommendations, discussion from

yesterday's meetings, tour. And as usual, if I don't see volunteers, we will volunteer you. Ed?

MEMBER SAADE: Thanks, Bill. A couple of things, well, mainly I really wanted to compliment both the folks that organized the tour and the panel yesterday. I thought it was a great day for technology. I'm a bit of a technology geek, so the whole day was really educational, informative, thought provoking.

And I just want to emphasize, from the industry side, all that that we through yesterday is just another example of technology transfer. Because for me personally, to take all that in and then go share it with the company is a really big deal. And there's a lot of things on there that immediately lead to a benefit for what we do. So I thought the day was a big success.

CHAIR HANSON: Thank you. Go ahead, Kim.

MEMBER HALL: Sorry, just on a lighter note, I missed my calling. There is specifically a bubble physicist at UNH. And if I could be a

bubble scientist, I really want to go back in life and do that.

CHAIR HANSON: I think there's always room at UNH isn't there, Andy?

(Laughter)

CHAIR HANSON: Sure, Joyce?

VICE CHAIR MILLER: The thing that struck me was from the Teledyne, the Valley of Death from research to commercial I thought was a really, really interesting comment, you know, how you take something that's been developed at a research facility and successfully transfer it to industry.

It would be interesting to know, from a UNH perspective, what percentage you think of what's developed there really goes to industry successfully.

CAPT ARMSTRONG: Well, I think I'd use a baseball analogy about batting averages. So somebody, you know, batting 300 is a pretty good hitter. And I suspect that, in over a time period that's sort of succinctly observable,

we're probably batting 300.

I think if you expanded that time period out to 10, or 12, or 14 years, you'd see that many of the things that don't appear to immediately get adopted and taken in begin to seep in and ultimately get adopted. So I think over that longer period it's hard to put a number on it. But I'd say we're up closer to batting 500 in that regard.

CHAIR HANSON: That sounds like Hall of Fame. Ann, you and I had a conversation yesterday. Oh, Kim's still going.

MEMBER HALL: Still going. Now on a more serious note, it just came to me. I think one of the really cool things yesterday to see, which we've heard about in the past, so I know at the last meeting Larry Mayer gave us presentation on visualization, and we all went, "No." Or some of us were, like, that doesn't work.

To actually see it up close and personal, so for instance the three visualizations for the currents, being kind of

the outsider non-hydrographer, non-surveyor, I saw so many applications for that search and rescue. You know what happens when somebody falls overboard. The currents are doing this. What a cool planning, you know, to add to the planning process.

So I think to actually have seen it up close and personal, I have a much bigger appreciation for what it could do to transform navigation and other aspects of maritime operations.

CHAIR HANSON: Absolutely. And thanks for that. Because that kind of was leading into what Ann and I were talking about yesterday on the trolley. It's the opportunity just for more data and, as a pilot bringing ships in, just how important that is.

MEMBER MCINTYRE: Yes, absolutely, the opportunity for more data and the integration of data, again, from other agencies and from private resources as well, I was very impressed with the autonomous presentation.

Just in looking at it, I see lots of applications for us in an inland, you know, situation where you don't have the launch and recovery type of situations. Where it really got me thinking is to -- you know, we're limited by resources, you know, particularly financial resources. And we need frequent surveys. And I see something like that, you know, just one of those little things, being able to buzz around the river and really give us a lot of good information.

I also was impressed with the virtual reality goggles that we got to look at, just in terms of how augmented reality will probably be a part of jobs, you know, pilot's jobs in the future, and probably not too long ahead.

And just looking out on it, I could see that there's a lot of valuable information. I can also see that there's a lot of clutter in it. And then I see the need to really get --- again, we were talking about end users --- getting the end users in there saying what would

be valuable from this technology and what wouldn't be valuable from this technology.

CHAIR HANSON: Thanks. And then Susan, from the recreational boater's perspective, I know the automated or the unmanned stuff is kind of interesting for the boating community.

MEMBER SHINGLEDECKER: It is. I think the first knee jerk reaction from the recreational community is, "Oh, more stuff we're going to run into." But, you know, listening to the presentation, and the investment that goes into these pieces of equipment, you know, nobody wants to have their baby get run over.

It was interesting looking at the programming that goes into how do you make these autonomous vessels comply with COLREGS. And as one of the panelists pointed out, how do they adjust for non-compliant vessels they may encounter? And we recreational boaters may be a few of those non-compliant vessels.

But I thought that was --- I would

love to see how the technology could go down the road to help recreational boaters actually be more compliant. I mean, the cars you buy today have blind spot monitoring. You know, is there something on a recreational vessel that could help you know whether you are the stand-on vessel or the give-way vessel? Because that doesn't always come naturally to a novice boater, so lots of applications.

For me yesterday, we ended up having dinner with one of the UNH grad students who -- I'm trying to help her a bit with her thesis.

And it just really struck to me -- I've had interactions with students from high school, middle school, on up lately, and how the middle schoolers today are using the very high tech equipment I thought I was using in graduate school, and so how the technology has gone down in age in what people are exposed to.

But yet, in my work with graduate students where that gap seems to be, they have a ton of experience, and a ton of insight, but kind of

that meshing it with the real world, and the realities of working in government, and the realities of policy, and politics, and how that plays in.

And so I kept thinking how we as a panel, when we go places, can interact with students to help them understand some of the real world, how that complicates the theoretical. That had me going for a while last night.

CHAIR HANSON: Thanks. Any other comments from the panel? Ed?

MEMBER KELLY: Yes, also being a non-tech person, I was very impressed with how the technology has advanced, especially with the visualization where now common people in the business are able to visualize that, and look at this stuff, and say, "Aha, I got it."

It's not just a bunch of geeks with meters, and keeping some kind of records on charts I couldn't understand. Now I can look at it and see what it is. And that lets me start thinking for practical applications to industry.

So I think, you know, the technology has really taken that leap where it's gone from an inside technical capacity to a usable tool. And I was very impressed with that.

And the un-manned just goes without saying, we're on the brink of going un-manned in so many systems, including large ocean going vessels. There's already research and test trials being done with that. So I think to see us, you know, UNH on the cutting edge of some of that technology was really very impressive.

CHAIR HANSON: Thanks, Ed. The other Ed?

MEMBER SAADE: So along those lines, Andy, does the University have a whole series of YouTube videos that demonstrate those type of things? Or could the University make a whole series of --- there were so many nice things that we saw that, as Ed says, are real practical for anybody to look at and benefit from it. Is that happening?

CAPT ARMSTRONG: So our center does

have -- and like Larry, I'm talking about something I'm completely baffled by, but there is a Vimeo site. We do have Vimeo account where there's a number of videos from our research projects that are up and available.

So I expect they're on YouTube as well. But I don't know whether we have a dedicated collection. So I can find out. Maybe Will, Will is probably the person to answer that question.

MEMBER SAADE: Yes. Could we get a demo tomorrow maybe? I don't know, two minutes, five minutes.

MR. FESSENDEN: Hi, guys, Will Fessenden, and I'm the technical coordinator for our weekly seminar series at UNH, and also I'm one of the sys admins for CCOM. And we, throughout the spring and fall semester, have a weekly seminar series where we often will record it and post it to the Vimeo account that Andy mentioned.

And I can link that in the GoToMeeting that we're running. And I can also send a link

to any of you guys if you need it. But you can also just go to our website, ccom.unh.edu. And if you click on, gosh, on --- you know what, I'll just send that link around. I can't remember off the top of my head.

And as far as the YouTube presence is concerned, I know that our outreach team is planning on having those same videos available through YouTube. Obviously, YouTube's a lot more prolific in their web presence and a little bit easier for some folks to get at.

But, yes, there are topics for both our folks doing their research and, of course, we invite folks from all over the country and all over the world to come and speak on topics in marine science specific to hydrography and acoustics. Yes?

MEMBER KELLY: Are any of them actually geared toward, like, common users? Or are these mostly technical, academic presentations? Are there any "gee whiz, wow, that's cool" kind of thing? Because that's going

to attract attention and get the general stakeholders more involved.

MR. FESSENDEN: So the short answer is yes, there are some cool, wow, common folk talks. Although a lot of them are geared more towards the science and towards other academics. It really depends.

I mean, we'll do everything from thesis defense in that format to folks coming in just to talk about emerging technologies. So it's really hit or miss as far as the focus is concerned. But it's always just sort of focused on sort of the specialties of the center.

MEMBER KELLY: Yes. I think we were kind of driving towards should you look at creating, for public common usage, a couple of YouTube type videos that would just put the message out there to the general public and not just to the scientific community.

MR. FESSENDEN: I think that that is a wonderful idea. And I will leave it to Captain Armstrong and the team to decide how best we

should do that.

(Laughter)

CAPT ARMSTRONG: That's a great point, Ed. And I think that can benefit us. There are probably some that are already there. But we'll try to make a positive effort to do that.

MEMBER MAUNE: I have an offer for you. I am right now editing a book on digital elevation models that has a section on 3D visualization. And we have an eBook version of this thing in which you can click on things and, for example, every reference, you don't have to enter the URL. You just click on it and up pops the reference.

Is it possible to have -- up pop a 3D visualization where things are moving, where the students can see how some of the things work that you do? I don't know if that's possible or not. But if it's something we can click on, it might help students.

That book has sections on sonar, for

example. And it's an offer for you if you think you can do something with it. But I'd need it within the next 30 days. I'm talking just a few second things, 30 seconds would be fine.

CAPT ARMSTRONG: Thanks. I'll get with you, Dr. Maune, separately and see if we can find something.

CHAIR HANSON: Sure, go ahead, Joyce.

VICE CHAIR MILLER: I just wanted to say how impressive everything at UNH is. And I think the panel got a really good appreciation of the value to the community that UNH provides. I think we were partially aware of it, but great job. And tell Larry.

CHAIR HANSON: All right. And also for Jeff Lillycrop's benefit, we did get a great chance to visit with Diane Foster yesterday afternoon and visit her new facilities and the new ocean engineering program. So take note of that one.

So I think we probably need to get going here on our next topic which is getting into our working groups. Again, thanks to the

panel for all the comments this morning.

HSRP currently has three working committees, Technology, Planning and Engagement, and Emerging Arctic Priorities. We'll hear from the first two committees this morning and from the Arctic Committee tomorrow afternoon.

Ed Saade is co-chair of the Technology Working Group with Lindsay Gee who could not be here but maybe. He said he might be able to join in this morning for a little bit. He's listening in, okay. Well, safe travels, Lindsay.

Ed, you want to --- we'll go ahead and turn it over to you and to the Technology Working Group please.

MEMBER SAADE: Thanks, Bill. So basically, and since we met last time, the most significant thing that the Technology Working Group's generated was the position paper that we're going to discuss later on regarding the official position on transfer technology between NOAA, the UNH, the other labs like the UNH, and over to industry and advocating that this is a

really good thing.

We have to tune it up a little bit. But that's the basic theme. We have some examples in that, as the panel has seen and read, to demonstrate the real value, return on investment, good use of taxpayer money, however you want to reference that, those kind of the running themes behind just the technology itself.

The meeting yesterday with the panel on AUVs and, well, particularly on ASVs, but autonomous systems in particular, that is directly organized, particularly by Lindsay and Carol. So again, I thought that was a real good success yesterday.

We have some ideas for where to go next. I think that would be a good discussion for the panel. We've done specific technology presentations on the hydrographic lidar now and on autonomous surface vehicles. I think there's a lot of benefit there. And it's nice to see that it's really appreciated by the panel and the audience.

I'd like to advocate that we continue along those lines. But I definitely think it's an open discussion on what we want to do next and where we should go.

So we've slowed down. As everyone knows, we've slowed down the monthly presentations to be bi-monthly. Since we last met, that only allowed us to have two meetings by conference call. And one of those was really geared towards preparing everybody for what we were going to talk about on the autonomous vehicles.

But that seemed to really work well in terms of laying the groundwork for a little bit of background for everyone on what the themes are and help focus us. So I think we'll try and do that in the future as well.

So, I mean, do we want to get into the specific paper? Go ahead.

MEMBER HALL: No. So I think we wanted to get into the comments back about the strategy. Because I think that's one of our due-

outs. That's why it was talked about yesterday morning, that this is one of the things we want to make sure we complete, unlike our accidental not finishing up the Charting Plan comments at the previous meeting.

So I know that I was kind of -- the way you were volunteered to be the vice-chair, I was volunteered to take over this with Lindsay not being able to be here. But I do understand from an email exchange with Lindsay, and I hope he's laughing now. But I think he's taking notes. So I'll leave that to him.

And actually, no, I'm very thankful that Erica has offered to take notes. But I wanted to go through this. I don't know if Ed was prepared for me to do that.

MEMBER SAADE: No, go ahead.

MEMBER HALL: Okay, sorry. So we had some conversations. A few of us were part of the Tech Working Group meeting where we got the strategy overview, similar to what we got yesterday. So thanks to E.J. for spending a lot

of time with our panel to talk through it.

And based on that, the comments were provided here. Some of it's based on, hey, we heard you say this. We didn't see it in the strategy. And I think you've seen them. So I wanted to walk through these kind of quickly.

I understand that a couple of folks might have some additional comments that they want to provide. If so, I invite you to say them and then write them down and send them to me in bullet point form. That would be very helpful.

But I kind of wanted to go through -- Lindsay did a very good job of taking our comments and trying to put them into kind of general bins and cover it as much as he could. So I really appreciate the legwork that Lindsay did on this.

So overall, again, we reviewed the executive summary, the roadmap, the one-pager, and then the presentation that we received from E.J. We kind of looked at them as a whole. Hopefully, that was what you wanted us to do.

I'm not going to go through all the document proofreading, editing. I am sure that your editor is going to catch that, or I hope so. But you'll see there's a few things in here, you know, some consistency in acronyms and that kind of stuff, which makes a difference.

But one of the key overarching comments that we received, and the way I described it was this doesn't appear to be kind of crawl-walk-run strategy. Does it need to be? Or it's more of a kind of a statement of where we're at versus a strategy of how do we get to where we want to go.

So that's kind of a big comment from the panel. And I'll let anybody correct me if they thought it was, and we missed that point. So I'm not exactly sure how we want to talk about this. Do we want to do it in each bin? Do you want me to run through it? So we'll do each bin.

So I just want to see if there's any other comments related to this being a strategy versus a plan, the comments that are in here,

again, from that idea of what kind of strategy really is this? Is there more that could be put in to make it more understandable as a strategy? How is NOAA going to get from here to there?

VICE CHAIR MILLER: Kim?

MEMBER HALL: Yes?

VICE CHAIR MILLER: For the panel members, this is in back of Section 3 in your book. It's the last part of Section 3. Do we want to put either the OCS plan or our comments up on the screen? They're working on it, okay.

Okay. The comments for the audience are comments on the paper, on the OCS Automation and Autonomous System Strategy. Copies are on the front desk.

MEMBER HALL: Okay. Any comments related to the recommendation that it be turned more into what we usually see as a strategy and how they might do that?

I think we've done a pretty good job already of kind of giving them some next steps. Okay, moving on.

That was one thing that was really striking, so the cost benefits. You know, and E.J. gave the presentation and explained that it was, you know, a full crew complement just to run the autonomous vehicle. And I think there was a huge assumption, and we've heard it by and by, that it will save money.

So I think, when we look at this, that shouldn't be the only kind of cost benefit that's viewed here. And that might not actually be the case, depending on how endless they're completely autonomous when we get there, but looking at what Doug very kindly walked us through, a little bit more of the levels of autonomy.

I really liked the car, or the boat, and the serpents. That works for me, so yes, the complements on the gap, and the Valley of Death, and the small boat being a serpent.

So I just wanted to see there if we captured everything. I'm not sure we did, in the comments that were there related to this particular topic area.

VICE CHAIR MILLER: Kim, or -- go ahead, no, go ahead.

MEMBER MCINTYRE: The one thing that we talked about informally earlier was risk. And I'm not quite sure if we're seeing risk reflected as far as a cost benefit where I --- just from a safety standpoint, we were talking about launching the, you know, the crew, or launching the boats and crews being exposed to various things that, from a safety standpoint perhaps, maybe something like that should be mentioned.

MEMBER LOCKHART: Actually, my comment was exactly the same thing. It's not specifically a cost, but it's a huge benefit. And removing people from those vessels reduces risk, especially in the locations those vessels could be working in shallow waters.

And I think that's an important, maybe, selling point for this strategy. But I think it needs to be mentioned somewhere. And I didn't see it mentioned anywhere in either the one-pager or in the strategy itself.

VICE CHAIR MILLER: Actually, perhaps E.J. should come up and join us, since he's the author of this document.

(Off-microphone comment)

VICE CHAIR MILLER: Well, why don't you come join us.

MEMBER HALL: And just to be clear, we're not looking for him to defend himself on this one. We're just going through and walking through. So I just wanted to make sure that everyone --- this is not an attack on E.J.

CAPT VAN DEN AMEELE: Yes. No, I certainly appreciate the comment about safety and risk. And I did make a note of that during the panel yesterday as well that, you know, I sort of recognize that that wasn't fully addressed in any of the documents, both the longer, you know, strategy as well as the one-pager.

So, yes, a good observation from yesterday's discussion as well. I appreciate it from Doug's presentation. And I think that's something we absolutely need to incorporate into

the strategy.

I just wanted to go back a section too. I apologize, I was looking for a microphone. But just on the strategy versus plan comment, we kind of threw around a lot of terms. I don't know if this is a strategy, or a roadmap, or is it a plan? Or Lindsay suggested maybe it's a strategic plan.

But, you know, semantics aside, I think getting to the intent of it was to recognize that, you know, we have places we want to go with autonomous and unmanned systems but recognizing that we, at least within NOAA or Coast Survey, don't necessarily have all the answers.

So it was, you know, we wanted to make sure that wasn't a set of concrete things that we were going to do but a place we wanted to be where we invited industry and our academic partners to help us get there.

Which is why, whatever the term may be, that was sort of the intent of the document,

was to realize that here's where we want to go, but we need everybody to sort of, you know, the collaboration and the help from everybody in order to get there, not that we were just going to do it ourselves.

MEMBER HALL: Thank you for that. And I think that gets to a later section here, if you've seen our comments about industry collaboration. So I won't skip ahead.

So note that benefit that we talked about. And thank you, E.J., for your comments. Anything else regarding costs or benefits?

(No response)

MEMBER HALL: Seeing none, I will move on to the OCS focus area. I can't remember. Joyce, are these your comments? I'm not trying to give credit, I just want to make sure.

VICE CHAIR MILLER: No, I think these were general comments.

MEMBER HALL: Okay. So again, I think this comes from where in the presentation we heard a lot about some focus areas. But maybe

that's E.J. Maybe this OCS focus area, I think --

CAPT VAN DEN AMEELE: Hi, sorry to interject. Lindsay Gee, out on the web, had a comment. I'm going to try to put him through. Lindsay, if you're ready, just a moment. Lindsay, I've unmuted you. Can you hear us?

MR. GEE: Yes, I can. Can you hear me okay?

CAPT VAN DEN AMEELE: Yes, we can hear you.

MR. GEE: Hey, Kim, Hi. Lindsay Gee calling in from Portland. I'm sorry that I'm missing the meeting there, and I hope everybody's enjoying Portsmouth.

And I heard some of, I think about ten minutes of Doug Lockhart's presentation yesterday from 36,000 feet. But it was really bad, not because of Doug but because of the reception onboard. So I'd really like to hear that later on.

I just want to general comment, I

think if --- and I know you've had discussions and all that work yesterday, but I think when I took these comments, it was trying not to tell E.J. And I really appreciate the openness and discussions I had with E.J. about autonomous strategy. I was just trying to provide, I think as a panel, a level of guidance, that it wasn't telling him how to write it. And the details within it was just some areas where we thought it needed some beefing.

And as Kim has already discussed, you know, the strategy was applying it. And some of that relates to the focus areas you just got to.

And I think that was one of the key differences in the presentation that I have seen from E.J. during the Tech Working Group, versus the plan itself, was that he raised the focus areas and how that was, you know, part of -- the technology was hopefully going to address those, and then the autonomy levels that he discussed and, again, that it wasn't in the plan, and it was kind of the why.

And we know it's not, you know, cost effective now. And I know it is in the future, but how do we address that and how do we get there? But it seemed like it needed to address some of the why behind that, in particular that was the discussion regarding the focus areas.

I mean, they have been identified by, you know, a kind of survey now. And I think it's important that may be kind of called out related to the, you know, autonomous strategy about areas that may be better addressed, all those target areas when you're sort of developing the strategy.

So that was just a general comment and one specifically about the focus area. I'm not sure I'm going to be able to comment later. So I think the remainder of really trying to just --- my thoughts of grouping, hopefully, that are sensible for the discussion. Thanks.

CAPT VAN DEN AMEELE: Yes. No, that's good, that's good observation, Lindsay. And I appreciate that. We'll certainly look to

incorporate that.

MEMBER HALL: Well, I think one thing, maybe based on what you just said when we were talking about the strategy and plan, or versus the plan, that it was kind of a larger concept, not just you guys. It's kind of the broader.

So I think there's a fight between those two things, or kind of because it's that you try to encapsulate everything. Maybe you talk about industry collaboration, that's kind of the purpose of this. We have an idea.

And there's an addendum that says, specifically for OCS, this is what it would solve for us or, you know, the appendix on the back. So that if you really do want it to be this larger roadmap for everybody to kind of adopt, chew on, give their input to, that you've started something bigger than just NOAA, I think that's great. I mean, you put the NOAA's interests, or at least OCS's interests, on the back. That might be an option?

CAPT VAN DEN AMEELE: Yes.

Absolutely, that's good feedback, thank you.

MEMBER HALL: Speaking of that, the going through each thing doesn't seem to be quite what I thought it was going to be. So I'd like to just offer, as you look at this from the panelists' perspective, if there was something that caught your eye, rather than waste our time with me saying let's move on, if you could just let us know as we're sitting here talking, and then E.J. But I'm happy for people to jump around at this point and provide their comments.

VICE CHAIR MILLER: I think addressing the --- your presentation at the webinar, you know, you talked a bit about the large unmanned vehicles, getting it back onboard, and so forth.

And I think that's a --- having driven a small boat up to the side of the ship and being bashed around, it's difficult. And I can see that great progress has been made. But it's certainly with submersibles and so forth.

Almost always they put a manned boat in the water to get the unmanned vehicle back.

And so our comment is there, that you might want to address that a bit more in the document.

CAPT VAN DEN AMEELE: Right. Sure, I agree, absolutely. That is one of the larger challenges and one of those enabling technologies that we had talked about. It's not just the autonomy but the logistics of it all.

MEMBER SAADE: This is Ed. I was going to just mention that, just from experience, it's proper that we emphasize the LRS. But we're going to get there. And a lot of it has to do with this technology's changing all the time. So if we focus a particular LRS on the systems that we're using right now, it's probably not the systems we're going to be using in two to three years.

And it's constantly an improvement. It'll get there, as I said. But it is going to be a changing challenge all the time. So listening is right, but keeping an open mind is going to be important.

And then on the next section about the

industry and other collaboration, I think yesterday's panel is a really good example of kickstarting that. Because there was a whole --- we had everybody represented yesterday between industry, and yourself, and all the different ideas that go into this.

I think everybody's edits on this are going to be greatly enhanced just because we had the panel yesterday. It's a little bit cart before the horse, but it's okay. Because it's on everybody's mind.

VICE CHAIR MILLER: In reference to that, I had added the last comment in that section, not only industry but Naval Oceanographic Office has a lot of experience with that. And I know you guys are establishing a remote -- or a facility down there. But looking to their experience in already running partially-manned vehicles, I think, would be valuable.

CAPT VAN DEN AMEELE: Sure. And that was an absolutely great comment. And even based on the feedback from the Tech Working Group, we

acted on that right away and already had a visit to NAVO to reconnect or, you know, re-establish that collaboration between us and, you know, not only the Naval Oceanographic Office but others who are involved as well. Thank you.

CAPT ARMSTRONG: So I guess I would -- - one thing I noticed in the comments was, in the last section, in terms of the comments, was a disagreement with NOAA about the clear cut mission for UAVs.

And so I, rather than inserting myself in that, I just raise it as an issue that maybe I invite the panel to address or E.J. to address as to whether we need to clarify that or ---

VICE CHAIR MILLER: Well, it was my comment.

RDML SMITH: We've got a lot of acronyms, and everybody uses different acronyms for these things. Just for the clarity of the room, would you mind being more clear with what UAVs means in this context?

CAPT ARMSTRONG: Yes. So the ---

MEMBER HALL: He's saying --

CAPT ARMSTRONG: Unmanned ---

MEMBER HALL: -- of the aerial vehicles ---

CAPT ARMSTRONG: Unmanned aerial vehicle is the issue in question. Thank you, Admiral.

MR. GEE: Can I comment again, please, Lindsay Gee?

MEMBER HALL: Go for it, Lindsay.

MR. GEE: Yes, I think this was --- I forget who put the comment in, but I also agree. I think it was something --- my view was -- my understanding is that most of the airborne sort of photogrammetry oblique imagery is done by the NGS Remote Sensing Division.

But I think this was more just saying, look, it's not you should pursue this, it's something that is there a way to use autonomous technology to, again, improve safety and response and, again, looking at the focus areas.

And this was related to more the type

of aerial vehicle you could launch from a ship that could be used like an eye in the sky versus, you know, regular mapping. So this could be there's a disaster, you need to go in quick to look at something. You go into a reef area, you have an aerial vehicle at the right, you know, angle to view something. Chart discrepancies, you're going past, you can quickly go and have a look with it.

So that was my idea. It was just --- and again, this is not trying to tell Coast Survey how to do business but saying, oh, just consider this. And, you know, if you consider it and rule it out, that's fine. Or you say consider it, that's being done by the Remote Sensing Division. That was my thoughts behind the --- when I grouped that into the comments. Thanks.

MEMBER HALL: I think one of the things I would do to change this is an editorial thing, is put it into a positive, that HSRP believes that NOAA has a great mission.

Is that kind of what you're getting at, Andy, versus the don't? And just leave that there for NOAA to ask us either more questions or for them to pursue on their own. Does that make sense, to make it a little bit clearer here?

CAPT ARMSTRONG: I like that suggestion. I just wanted to highlight the fact that we didn't just pass over something like that that was sort of a fundamental and remarks that we clarified it for E.J. and the panel.

RDML SMITH: Can I comment? I think it's worth noting that this document that you reviewed is very Coast Survey-central. That is mostly about the missions as we have them currently divided up within NOAA.

And as such, we did not get into the aerial. But I do know that Mike Aslasken, were he here, would be commenting that they are doing unmanned aerial vehicles for quick shoreline jobs. They have, it's called an EV that they're using for similar applications that you're suggesting.

So I guess one thought could be that

maybe we need to make the scope of this document broader to include unmanned systems for navigation services more broadly. And I see Juliana perhaps commenting.

MS. BLACKWELL: So, yes, we do have some work being done with the EVs. And it's really very small areas that we're using these systems to map.

I think leaving it open for future opportunities is probably more where we're going. Because I'm not sure that what we have right now is something that's going to be efficient for the types of data collections that we currently are doing for the NGS mission.

But I think a lot of the research that's being done with these smaller units in estuarine areas and things like that is something that can be beneficial to other communities. But if you want to broaden it, we certainly can go back and have Mike and his team of experts look at this and help maybe massage some of the aspects of it for the aerial collections, if

that's what you'd like.

MEMBER HALL: I think going back to what Lindsay was saying is we're just giving you an idea where we think it can go. So I --- go ahead.

MEMBER LOCKHART: I kind of want to further this a little bit and point out, I mean, there are, you know, every survey company out there has an aerial drone. It's actually a great idea. I think this should be spun into a positive that absolutely could be used, certainly not for the larger area mapping.

And that's one of the things I wanted to point out. There are actually a lot more regulations on aerial vehicles right now than there are on autonomous surface vehicles. That's far more advanced.

And one of those restrictions is that you can't do larger areas, because there is a restriction on line of sight operations. Having said that, if you're on a boat and you just want to go out and do some quick shoreline

verification off some smaller sheet that you're surveying, yes, it's a good application.

But you need a pilot's license, you need all these things to be able to do that. So there's a whole skill set that has to come along with that aerial vehicle as well.

MEMBER SAADE: I'd just like to add that, you know, autonomous is autonomous. I think the UAVs, the airborne vehicles should be included in this whole discussion, however we can deploy them. But now that it's been raised and discussed, I think it's an oversight not to have it in there.

MEMBER LOCKHART: We did discuss actually having that as part of the panel too. And I think we decided there was just so much to talk about in that panel that we left it out on purpose. It wasn't that we ignored it, we actually did that on purpose. But I agree, absolutely, when we're talking about autonomous, it's another tool in the toolbox, for sure.

MEMBER HALL: And I think that E.J.

might go back to the scope of the --- and your vision for the strategy plan, strategic priorities, whatever. And so as you guys said that, you can either make it something that's a little bit thinner, and specific to OCS, and kind of leave that out, and then maybe a bigger plan for what we do with autonomy.

And they have --- the MGS has their own for the plan. So I think we just want to leave it to NOAA. We just want to let you know that that's something we saw that was missing or something that could be addressed in another venue.

VICE CHAIR MILLER: Kim, in that section, other than AUVs, or UAVs, too many acronyms, that section, and the personnel in training issues, particularly with a large AUV, my experience is the set of people that you need to send out with a large AUV is not a hydrographic surveyor and a boat driver. It's an electronics engineer, a network communication expert, on and on.

And I think, well, I guess when you send out a Teledyne engineer or, you know, an engineer from a company that knows the vehicles, but as I said yesterday, talking about personnel requirements without looking at the requirements to maintain, and operate, and fix it when it breaks is, to me, a bit glossing over your personnel requirements.

You know, talking about personnel requirements only in terms of somebody to drive the thing and somebody to do the survey, the person who --- one of those people has to know how to fix it when it comes back onboard.

And so I think there needs to be perhaps a broader discussion of real personnel requirements. And that was one reason that I questioned NOAA keeping the REMUS-600, is because that's an incredible, I mean, I've been out with AUVs with six people, minimum, and that meant that AUV was in the water for eight hours. And those six people spent the next 16 hours getting it ready to go the next time.

And so I would ask you, you know, why does NOAA, why should Coast Survey keep the big guy that doesn't really meet your needs? And I would recommend that you more broadly discuss the personnel issues in the document.

CAPT VAN DEN AMEELE: Sure. No, thank you, Joyce, for that feedback. That was something that we, you know, at least tried to touch on was the -- when we said unmanned systems required different skill sets. Those are the types of things that we were talking about was, you're right, it's not a coxswain and a sonar operator, necessarily, per se. It's somebody who knows how to, you know, really get into the guts of the system.

And if you're talking a surface vehicle, then you need a diesel boat mechanic who's going to be able to maintain it and all those different types of skill sets.

So we certainly appreciate that. So certainly we want to flesh it out a little bit more. And just another comment, what you were

saying, that was something that we, you know, a slogan we adopted from the Navy, I guess. They say when it comes to unmanned systems, two is one and one is none, meaning there's always going to be one that's not in the water that's going to be the next one you're sending out because of all the things you just mentioned which is, you know, recharging the batteries, and downloading the data, and all those sorts of things that you also need to do which requires those types of skill sets.

So your comments are very much appreciated. And it sounds like maybe we need to go into a little bit further detailed discussion on that in the paper.

MR. GEE: So Lindsay Gee, just to ---

MEMBER HALL: Go for it, Lindsay.

MR. GEE: Yes. No, just regarding the personnel, again, trying to keep it at a top level again, I think -- and E.J. almost responded there, I think -- there are many issues. And I think we now --- and it is a transition of

technology.

And being one of those old guys, I didn't quite come from sextants, but I did come from terrestrial-based navigation and with lots of seamanship and, you know, tide gauges, and all that sort of stuff.

But we had people almost in a boat every day to where we are today where we don't really need to go ashore sometimes. And I think we sadly, well, certainly in my experience when I was in Australia, I think we didn't plan ahead for the transition with some of those people that were great seamen into no jobs eventually.

And I think, just at a very top level, you've acknowledged it, E.J. And I think it needs to be a key part of your planning going forward, to keep looking as you move forward, you know, what sort of people are we going to need? How are we going to train them? How are we going to recruit them, and what effect does it have on our overall manning? Because this goes beyond just the autonomous strategy. I think it goes

back to your whole personnel issue, that it's going to impact that.

And I think just acknowledging that, the very top level in this document saying, "Please, worry about this, because it's important." And it's going to affect you, you know, OCS generally, personnel in the future. I think that's the level of comment I was trying to put through on that.

MEMBER SAADE: So let me just emphasize. I think, building on what Lindsay just said, I think this is really important that we're talking about the future. We're not talking about the right now.

The XPRIZE is going on right now. And the whole purpose of the XPRIZE is to actually have and AUV that launches from shore, goes out, and does all this mapping, and comes back completely on its own, right. So all your technical capabilities are sitting onshore.

And your comment about AUVs are going in water for eight hours, we have AUVs that go in

the water for 48 hours, and 68 hours. So there's a lot of technology that's changing constantly. So it's really important for us to talk about where do we really want to go with this stuff, including the manning.

Because what's the point of doing it if we're not trying to get to someplace that's significantly better than where we are now. Let's not focus on the problems that we're having now. Let's focus on where we want to push this stuff.

MR. GEE: It goes down to that as well. And maybe this is the segue into the industry comments and discussion. I think that, having worked in a national organization, I think it's sort of, you know, it's very similar to NAVO and NOAA.

It's different to a survey company and the experience of the operations from, you know, the survey companies is kind of, I think, with the move of technology, it becomes more important for NOAA Coast Survey.

And the other aspects of that are -- I did catch it out of Doug's, you talked about the Valley of Death --- for the product. And in product, from my background, the product development, we used to call it crossing the chasm to go from the early adopters into the --- you want to get to those pragmatic users who are writing the purchase orders. You know, it's never easy.

But I think that's important to include and be part of kind of an industry consortium here. Because there isn't the momentum, and there isn't the pool of people to be able to do this individually.

So I think that's really key to embrace that. And I think one of the things that we suggest that came from this team, and I agree totally, is there's a real place for NOAA in this to lead the, I think, coordinate that as a, you know, industry partnership with government and academic institutions to look at, you know, the COLREGS, just at a broad level.

I think that's a role that I would certainly support that really wasn't addressed. But it then helps to push forward the overall agenda of, you know, the more people using the autonomous system, if they're cost effective, if they lower risk, and all of those sort of things, benefits everyone. And that obviously has a benefit to Coast Survey if there's others using that as well.

And I think that was one of the general thrusts that you don't --- you had a comment about being the leader, the nation's leader or something. I think you can do that by coordinating, you know, a consortium and doing those things that industry can't do.

I mean, there was a comment in there about Fugro's working because internationally they work on different committees about the regulations of using these and how they get established. But they're kind of pushing from the bottom up.

And I think, in the US, you have an

opportunity to, you know, form a really good partnership across industry operators, manufacturers, and academic research to coordinate the activities or autonomy on the water moving forward. Thanks.

MEMBER BRIGHAM: Yes, just what I mentioned is that it's clear that, in all of this development, that the IMO is going to be the central organization. I think the International Maritime Organization's going to develop rules and regulations that are about standards, but both for -- certainly for surface vessels. Underwater vessels, I don't know.

But I guess there will be some security issues too. But IMO, and NOAA, and the Coast Guard have all been in IMO committees, safety committees, whatever, and probably have a place in all of this.

So I don't think they'll be regional. I mean, it's a, you know, an International Maritime global enterprise, so it will need international rules and regulations that cover

the entire planet rather than just a region.

CAPT VAN DEN AMEELE: No, I certainly agree. And I did make a note here that I don't think our documents really address the regulatory or policy side of this at all. And that's something I think we need to mention, at least, that we need to engage to make sure that it protects our interests and our ability to do our missions with these systems.

I will mention that NOAA, the agency overall does have an Unmanned Systems Working Group. And one of their functions or roles is to advise the US Coast Guard, you know, as they look to set policy for both underwater and surface vehicles, you know, as to what our needs and interests are to make sure that those are considered. And, you know, I would say it's probably a good idea to wrap that somehow into this as well.

MEMBER HALL: E.J., in thinking about that, and kind of going between the what autonomy is going to be, and what it is currently, so

going to Joyce's issue for personnel issues, maybe there's a section here for those kind of hurdles and challenges that have to be overcome to get there, right.

So that's going to be regulatory policy. That's going to be technology, that's going to be personnel. And maybe you split it out that way and just say, hey look, this is our vision to get there. But here are the hurdles we're going to have to get over in general --

CAPT VAN DEN AMEELE: Sure. Yes, absolutely.

MEMBER LOCKHART: So I have a comment that's kind of --- I don't know that it really belongs in your strategy or not, I guess. But Shep, and Doug, and I were talking about this a little bit yesterday.

You know, we talked about the bandwidth yesterday of trying to get all this information off of these vehicles. Because you don't want it sitting out there for five days.

But, you know, we tend to right now,

this is very acquisition focused, and data collection focused. And we're not really talking about what we're going to do with all this data. We talked about it being a force multiplier. And we know there's a backlog just pushing data through and getting to a product.

But I think there needs to be a discussion within this, but maybe not necessarily in this paper. And it could be something that we want to hear more about later as a panel, about how we're going to deal with this data.

Can the data be processed onboard the vehicle so we actually get a product or an answer back rather than just terabytes on a point cloud. And I think -- I'm just thinking about that as Ed talks about where want to be rather than where we are now.

Obviously, we have to babystep it right now. The answer is getting the collection method down first. But I think that's a necessary part of the process is, okay, we've got all this stuff. What are we going to do with it?

MEMBER SHINGLEDECKER: Yes, I would just echo that. And I think Ed brought it up earlier. I think that that is an excellent topic that we should be looking at as far as how is data being managed, and processed.

And, you know, the collection is fantastic, but if the product doesn't come out in the end, you know, in finding that balance, and the challenges, and bringing in experts that can really advise on big data.

VICE CHAIR MILLER: I found in the past that a lot of people who are involved in systems see the system as being the product, not the data. And if, you know, even if you've got a system, if it produces bad data, then your product isn't good. And so I think Carol and Susan's comments are very valid.

MEMBER MCINTYRE: I speak from a position of total ignorance on all this. But when I look at this now, to me, it looks like it's very relevant and near to being very helpful to a waterway like mine, like an inshore

waterway.

And so I wonder, when you look at it strategically, I see a lot more barriers to overcome in an offshore application. But if you look at it mission based, where it's like --- I think there's a lot of things that can be used inshore, near shore with much less of a barrier to overcome. And it might be good to look at it. I mean, when I see this, I see it as being super helpful to us in a very near term way.

MEMBER SAADE: So I'm going to ---

MR. GEE: Can I just make one more comment ---

MEMBER SAADE: Wait a minute. Wait a minute, Lindsay.

(Simultaneous speaking)

MR. GEE: Go ahead.

MEMBER SAADE: Just a second, Lindsay. Sorry, I just want to say real quickly on the back of what you both said. It ties into the comment I made this morning about big data.

We had a panel yesterday. And if you

look at everybody on the panel, including Carol, we're all big time data collectors. We've been to sea a lot. And we're really focus on data collection, data collection. A lot of technology stuff's been focused on data collection. And it leads into your comment. We've got to start to focus on this big data issue.

And not only that, as Ed pointed out, it's not just the big data issue, it's the whole visualization of the big data issue that gets everybody's juices flowing. So it's all tied together in being able to really get out there and get folks involved that are not necessarily technical, and they're not necessarily directly working with NOAA. All right, Lindsay, your turn.

MR. GEE: Yes. I totally agree. And I think we're all really interested in the data. And that's the type of people we are. But I think it's folks like Susan, and Ed, and others, and Sal, that should be saying here, hey, I want to get products to navigate my boats or ships on.

I'm not really --- it's really cool what I saw, but how's that helping me update the products that I use and the future products that are going to be available? So I think that is a key aspect, in that how does that relate to autonomous systems and doing that autonomously to support, you know, the current systems as well.

Because I think we made a comment in this, in our comments that one of the benefits that we see from the autonomous systems is it feeds back onto the current ones on the ships and launches.

So, yes, I think it's really important to not lose track and get buried in the really cool technology. That overall the folks that use the data, or use the information in the current chart product, you know, what are we going to have in the future, and how is this going to help me, is kind of something we should not lose sight of.

MEMBER BRIGHAM: Just a comment back to semantics, you know, that strategy plan ---

strategy in plan means it's more definitive to me. But this new term of ours roadmap, to me, is flexible and more open.

And this whole thing is evolving. And maybe the roadmap --- you know, the Navy has a roadmap for the Arctic. And they call it a roadmap and not a strategy for some very good reasons. And they don't know where it's all going.

And so I just throw out that I think that the roadmap says it's kind of what this is about and not definitive, we're going to do this, this, and this. It's all evolved. But it is somewhat semantic. And you all and NOAA may need to use the word strategy for specific budget reasons. But I think the roadmap has some agility.

MEMBER HALL: I just want to go through right now, because I know we need to reach consensus on this and make sure that we're pretty happy. I have some changes to make. Luckily I had Erica as aid notetakers while I'm taking some notes.

So I just wanted to walk through, and let you know what I heard, and what I think were the things that we wanted to add a little bit more to this within the next day, and make sure you all agree with me. And then we can finalize this on the last day, Wednesday. Is there time for that, Joyce?

VICE CHAIR MILLER: Yes. We also need to take a look at the issue paper and pad the issue paper. So that's what I was going to say.

MEMBER HALL: I'm just going to walk really quickly. I've got a couple of things. So, I mean, one thing we've all talked about is kind of clarify that intent and scope, whether you call it a strategy, a roadmap, a plan, but just clarify the intent here. It kind of, with the recognition that this is an ever-evolving kind of concept as technology gets better, the roadmap will change slightly, right.

The other, going into the cost benefit, obviously we know we recommend about the benefit of removing people from the vessels.

Ultimately, when you take people out of harm's way, how to incorporate kind of the OCS focus area, that goes, again, back to your intent and scope. Is this just an OCS thing, or is this something that's for NOAA, is this general?

And I'll skip forward to then, if that is the case, if it is NOAA-general, we say we recommend looking at the UAV aspect of this as well. If not, we still believe that UAV should be addressed in some other form or fashion. Because it is obviously also a force multiplier in some ways but has its own challenges.

Then we have, like, going back to the challenges, the support and logistics issues. And that was kind of my quick talk to E.J. was, hey, maybe we put this, maybe a caveat that would secure the challenges. It's regulatory, it's technical, it's policy, it's a port logistic hub, maybe that DOTmLPF, DOD way of looking at things, what could fall underneath those?

And then, sorry, I'm going back and forth. And finally, where there might be just a

consideration for big data, and it might not be here as Carol was saying, but we'll put that into our recommendation.

That doesn't necessarily mean that it gets included it in the strategy, but I'll have a note there just, hey, by the way, don't forget all the data that you're collecting there and users for this. What does this actually give them?

And that might be able to help you justify that you're doing this. Hey, this is what it'll give folks like Captain McIntyre.

So I think that's everything. Did I miss anything that we had talked about, in general? And I will work with Erica's notes and my notes to update this. But I just want to make sure we're generally happy with a couple of additions. Oh, and I'm going to make the UAV comment a positive versus --

MEMBER KELLY: Kim, I'd just like to stress what you mentioned. But I just want to make it that there should be a synergistic

development with end users and data collectors/producers so that they do keep track and that it can be done in a synergistic fashion so that, you know -- and I think that'll make a faster track toward usable products.

MEMBER HALL: Well, with that, I will leave it to the issue paper and possibly we'll have some time for that.

VICE CHAIR MILLER: Ed, do you want to lead the discussion on the issue paper?

MEMBER SAADE: Sure. We were just discussing if we were going to do this now or later. If we want to do it now, that's fine.

VICE CHAIR MILLER: We have 18 minutes. Can we get that up on the screen please?

MEMBER SAADE: So I think the last version of this, or the version that we're going to take a look at, from my point of view, it really captured the essence of what we were trying to say in a way that was encompassing all the different aspects of the contributor ability.

It's not just singularly focused on

one aspect of what NOAA does, or one aspect of what the research institutions do. It's a little bit more generalized capturing of the fact that all of these aspects of what is going on is really useful, and important, and to get the word out on that.

So with that said, I think all of you know my position on it. It's very mature and ready to go. But we need to get everybody's input on this to make sure that there's other aspects of it, or we get everybody's opinion on it. So I'm just going to open it up to whoever wants to make a comment.

(No response)

MEMBER SAADE: And with that, I guess we can say that it's all done.

(Laughter)

MEMBER SHINGLEDECKER: I have one quick comment. As I read through it, and I think about the three offices, I would maybe just ask Juliana if you think that the recommendations encompass the R&D in your areas as well as it

covers some of the other areas.

I'm looking specifically at the recommendation, the third bullet. Let me make sure I've got the right bullet, sorry. "Increase R&D funding with the specific goal of improving the safe and efficient pursuit of hydrographic and charting tasks and with the parallel R&D goals of general ocean mapping technologies."

I'm wondering do we need to broaden those recommendations a little bit to make sure we're encompassing all of the R&D elements?

MS. BLACKWELL: I think if we could expand a little bit and include something related to coastal mapping shoreline. You know, in my presentation later today, I'm going to touch on some of the unmanned or the one unmanned system you're using for airborne gravity.

So there are things that it all fits together. I know you don't want to make it too long, too broad, to cover everything, but I think there could be a few key words that would help perhaps just make sure that we were included and

not go into too much technical detail.

I don't know exactly what those are right now, but I would say, you know, reading it again, and looking at maybe the shoreline or --- I don't know what the other word would be to cover the gravity.

MEMBER SHINGLEDECKER: So the short answer is yes, there is maybe a couple words we could find that'll ---

MEMBER SAADE: I don't disagree. I think trying to get us involved in there, I just, my only hang-up on it is benefits for NOAA and US industry, so the shoreline part of it back to the technology transfer to US industry.

And I know there are some gravity things that are moving back and forth between industry and what your group does. So that, if we tweak it a little bit, let's do that. But let's try and find and example that does point to industry usage, if we can do that. I don't know what comes off the top of your head.

MS. BLACKWELL: I guess I'm not quite

sure. I mean, most of what we're doing for research is something that we would want to have utilized by industry or have industry create so that we could utilize it for our mission requirements. I'm not quite sure I understand where the disconnect is with what you're saying.

MR. GEE: Can I comment there please, Lindsay Gee.

MEMBER SAADE: Go ahead, Lindsay.

MR. GEE: Yes, I think, just following on from those comments, and Juliana specifically, I think that's what we're saying, is that we want anything that's researched is being done, as Ed said, when it's of a great benefit, and it can transfer, we want that highlighted.

The other way is that any research should have a focus in ensuring that there's a structure in place to transfer that to industry. And as Juliana said, she wants some of the research to go to industry.

Well, we're kind of saying we agree,

and there needs to be a structure that ensures that it's does, and it's optimized, and can be done quickly and, you know, and that you sort of started that, some of the TRLs and all that stuff that gets done at CCOM.

And we're not trying to highlight that, we're just saying, hey, here's a success, and it seems to work. And it has a lot of benefits to industry. Can that be applied elsewhere?

So I would agree. That paragraph is --- that can be just, I think, the two sub-bullets are what we're mainly about. But the words of, you know, that can be improved to say sufficient pursuit of hydrographic, you know, generally, if it can be inclusive of NGS and CO-OPS as well, which I kind of think it does, because they support those activities.

But it's mainly about making sure that, you know, the research that gets funded doesn't just get used by NOAA. That's a benefit, but it needs to be used by industry for the

purpose of the research.

But what happens and the momentum that builds with the associated lab at CCOM is it's had much, much broader benefit that wasn't the intention of the initial research.

And so that structure that's there allowed it to do that. So it's a jewel.

You have to be successful for NOAA with money that, R&D money, that gets spent. But then you also want to have a structure in place that allows you to leverage that research for other use in industry. Thanks.

MS. BLACKWELL: So we're specifically looking at JHC and CCOM and the bullets under that. I'm going to take back what I said about trying to make it include other things related to NGS. Because I did not appreciate the fact that we were speaking to those bullets under that section.

And currently, while there's stuff that's going on that may, in some way, be associated with the things that we're doing in

the Remote Sensing Group, I think that's probably already covered under the language that's in there now.

MR. GEE: I would say that we're just trying to, you know, we're just trying to use CCOM as an example of a successful transfer of technology, not saying this is the only model. We're just saying that it was a success because they had -- the way they did it and the partnership with CCOM and JHC.

And so the recommendations are really saying, okay, here was an example. And we'd like to see research funding, make sure that you have an industry's, you know, intent in place, and a structure that allows it to be done rapidly.

That's more the sort of segue from, okay, here was a success, and here's how it --- can we go on and do that in other places, more generally, to support NOAA.

CHAIR HANSON: Ed, just I'd suggested a comment in writing here, emailed a few weeks ago. But one of the thoughts when it comes to

advocating for R&D is the alphabet soup of agencies that are involved in different parts of R&D. And since we've mentioned OMB in Congress and the tax there, I think we need to mention and emphasize collaboration with other agencies.

The reason for that is because, when you go to OMB or Congress, you start talking about hydrographic surveys, they start thinking immediately about the Corps, they start thinking about USGS, and not just NOAA.

And so if you're advocating for a big pull, you have to be sure and talk in bigger terms that they understand. Yes, you're talking about NOAA right now, because we're a FACA, but the success we've had in other coastal issues, in terms of advocacy for R&D, have come with the collaborative efforts, being able to say that the hydrographic, and in this case it would be a hydrographic community, is interested in this result.

We've had issues, collaborations with dune research, with near shore processes, getting the

Corps, NOAA, USGS, and some of the other groups together to look for efficiencies in the way they do their R&D.

And by highlighting the efficiencies, it's a lot easier to go advocate, to OMB particularly. That's the first question they ask. Are you doing that? And isn't there already enough money?

And so the first question becomes the efficiencies. And if you're not collaborating with other like-minded agencies, then that becomes kind of a --- puts you in a defensive mode really quick.

So whether or not you include it or not, just be aware of that as the group moves forward, that collaborations with other agencies are really going to be the key long term for R&D investment.

MEMBER SAADE: Okay. I get it. And I think it's a really good point. But I would just go back to the roots of all this, that it was, from my perspective, it was to try to

demonstrate that people's tax dollars go to something that actually comes back to benefit industry. That was the original intent for me personally to advocate for this.

Now, obviously it's morphed into some other things, and that's fine. But that was the message that I was trying to drive across, and that all the different parts of NOAA that we represent need to get out there and brag more about the fact that those tax dollars are really doing something good for industry.

CHAIR HANSON: Amen. And sometimes that's done in better context as a community as opposed to an agency.

MR. EDWING: So I guess I just wanted to remind the panel. And I'd sent around the invitation for this a number of months ago, but this past month NOAA held its second Emerging Technologies Workshop.

And, you know, the first time we had it, two years ago, it was just really -- mainly we just invited internal folks. It was a huge

success. The second time around, we expanded it to the private sector and invited academia, and other government agencies. The panel was folks from across other government agencies.

But, you know, this is looking at all different technologies for all of NOAA's observing systems. So this is kind of the other end of the spectrum, but I would just encourage the panel to kind of, you know, tie some of these sorts of efforts into that.

Because one of the purposes of that is to bring technologies before NOAA that we can look to infuse in the next three to five years. Presenting at the workshop is no guarantee of funding, but we are -- that is one of the -- we're inviting presentations, we are looking for those technologies that we think we might be interested in infusing in the next three to five years.

Now, EPA was there. He presented on the ASV strategy. Saildrone was there from the private sector about, you know, the gliders that

they have, and we had great participation. And we're going to be doing this again. I'm not sure it's going to be every year or every other year, but just to get it on your awareness. Thank you.

MR. GEE: Lindsay Gee again. And I think that's an area --- it's great. And I'd seen that, Richard. I was interested to see it, and it was kind of --- I wasn't sure whether it was --- I think, yes, I think I saw it when it was just internal. I didn't realize you'd opened it up.

But again, I think that's what we're saying in those last recommendations generally, is that industry must be involved in those sort of things. And there must be a way for that structure to be in place to transfer technology from industry.

Because that's, you know, two industries saw it, because then allows industry to obviously -- and it comes back to the same thing where we're saying about ASV, you know.

The oceans are a small place in the

world, part of the world for research technology. And all of us that try to make money on that business and to gain the momentum into that, it's kind of the broader use of technology.

And I think the partnerships between industry, academia, and government are essential. And what Ed is saying, I agree. He had original intent with this in that there was great benefit that came out separately. But it came out because of the structure.

And that's the way, I think, you know, we got turned around from the original paper, because it was saying it was too CCOM oriented. But this is trying to say, okay, yes, there was lots of things I did right. And there was, you know, collaboration through the industry partnerships.

And certainly, Andy can comment, you know, with CCOM/JNC. And there has been very much interagency. There has been a sort of forum for interagency development and research with some of the things that have come out of the

labs.

So I'm not sure how that would --- I'm sure we can fit a place in there for that, Bill, about the interagency. But again, my view is that, you know, how do we get things out quicker? Because when it gets out quicker, it then becomes a benefit, not only for industry and the economy generally, but it also benefits the agency. You should get use of that industry technology in a usable, non-research form. Thanks.

VICE CHAIR MILLER: I would say, with almost every paper we've done, we've had trouble putting in everything that everybody wanted. And everybody has their, you know, we try to, when we can we try to put in the word Arctic. And that makes Lawson very happy.

So I guess I propose --- I would advise people who are working on future papers or future products that the HSRP, you know, produces, that I think Bill's point is a very excellent one. And we should focus on the interagency collaboration as possible.

But in the interest of getting this paper finalized, I guess maybe does anybody think it's not ready?

CAPT ARMSTRONG: I think, as a suggestion, I think the panel and the Admiral then may have a comment on it.

I think that the panel would be within its structure to suggest that the --- approve the paper to go forward with some final editing just for clarification rather than change of content. It might clarify the JHC/CCOM as an example of the concept as opposed to the subject of the paper itself.

My sense is that's what you're saying, that this is an example of the process that worked as opposed to saying that, you know, go fund JHC. That's a great idea, but ---

VICE CHAIR MILLER: Well, indeed, we tried to do that in the last recommendation. They had had JHC in there. And Lindsay reworked it to basically say it's the structure that is working and, you know, it's an example.

I don't know. If you have suggestions, you know, we can incorporate a few. You know, we can incorporate some changes in it.

CAPT ARMSTRONG: So, I guess, my suggestion would be somewhere in Paragraph 1 or 2, or at the end of that, is maybe a little clearer statement that here's an example of what we mean. I think that's there but maybe just highlighting that a bit. I don't think that would --- maybe I'm missing the boat here, but I don't think that would change the content.

I think we probably can't go off and change the content and come back and sign it because of the character of the deliberations.

MR. GEE: I think, Andy, can I just comment then? But, yes, you're right. That was the way I --- hopefully, I was hoping that read like that. Because from the industry benefits, we'd kind of provided it more as a general benefit and then sort of said that, you know, one specific example of that application that may be there.

Yes, the intent, I think, was not to --- the intent wasn't not to fund JHC. It was to say that the structure had worked, and it was an example. And that was how I reworked the challenges then and the recommendations.

So I kind of agree with you. And hopefully, the panel agrees with the intent, and there's just minor editing that would be okay.

MS. BLACKWELL: This is Juliana Blackwell. So looking at a little of the comments that have been provided, and the last statement about using JCH/CCOM as an example, the majority of the language is about the center.

So it's more than just, I think, an example. It's the only example, and it's the majority of the paper. And I'm not -- it's not a criticism, I'm just saying it's really full of CCOM/JHC and not other things.

So maybe by changing the recommendations to be broader, it confuses the issue. It's confused me now that we've talked about in more detail with the group. So I'd just leave that as my

comment on the issue paper. Thank you.

MEMBER HALL: Just really quickly, I know that we had some internal discussions about this, especially Lindsay and I, about is it a sales pitch or JHC? We don't want to do that, obviously.

And I was trying to generalize it as much as possible. But without using the example of JHC, it is hard to point to generalities of what's good out there. There's an example out there.

So if we still need to do some work, kind of where we can generalize, we should. But I think that's why there's that disconnect perhaps, Juliana. I was concerned that it was a sales pitch and gave money just to JHC, understanding that the other centers that are supposed to be out there are not doing the same things, have not gotten the same funding yet.

And we don't want to ignore them, but we also don't --- we want to show that really it's CCOM/JHC that's been what we want, or is

what we want to replicate, what we believe should be replicated. So I ---

MR. GEE: Yes, and I think --

(Simultaneous speaking)

MEMBER HALL: Go ahead, sorry, Lindsay.

MR. GEE: Sorry. And I think that's where the separation of --- this wasn't just funding JHC. And, you know, okay, they have been successful in the research.

What we're trying to highlight was there was a way with CCOM that was a part in the independent organization, sister organization, at UNH.

And the structure of that and the way that developed got other funding and then managed to have a mechanism that could spin technology out to industry, had a momentum, could get other funding and do things that were beyond, actually, the research specifically for NOAA.

And maybe we weren't clear enough about that. But that was Ed's intent. It's like

this really had little to do --- it was generated by the organization that was there, some of the original server, you know, the research was from the JHC funding, but then much of it came from the CCOM research which was separate.

And it actually leveraged this whole other industry in oil and gas that has had a great benefit that, you know, opened up a new method of exploration that, you know, came out of having a center and a structure like that.

And people asked us to look where --- well, other examples were there, so we could highlight in this issue paper and honestly couldn't say anything. So that was how it ended like this.

And I'll be just --- it'd be kind of --- and again, I think an issue paper of highlighting a place I don't think is a bad thing for the HSRP. It's like why can't we highlight success and say you need to convert this success into a broader benefit. Because it's a success, because it's a broader benefit for the economy

and other things.

Okay, sorry, I've got to go. So good luck with the rest of the meeting. And enjoy Portsmouth, my home town. Thank you.

MEMBER HALL: Thanks, Lindsay.

VICE CHAIR MILLER: I think I'd like to talk to Kim and Ed at the break. And I've got --- I've been sitting, talking to Andy. I've got maybe a few changes that might, you know, that might help with this problem. And then we can discuss it briefly right after the break. Do you want to --- Bill, do you want to break for 10 or 15?

CHAIR HANSON: Well, it's 10:45. To get back on schedule, so I ---

MEMBER MAUNE: I was thinking I might want to talk to Julianne too about some of the things that the Remote Sensing people are doing, which is really research and development, in my opinion, on developing the best procedures for doing different things.

One of the projects I know they're

working on is the use of differential interferometric synthetic aperture radar for mapping subsidence rates at the centimeter level. To me, that is an R&D effort that's separate from what you guys do. But it's certainly, in my mind, it's an R&D project that will benefit the nation as a whole.

MS. BLACKWELL: This is Juliana. So I think there's a whole other opportunity to highlight things like that. In trying to rework this issue paper now, to include all those things, would be detrimental to probably my health in suggesting that.

(Laughter)

MS. BLACKWELL: But taking that, and some of the interagency R&D that's going on that JALBTCX, the Joint Airborne Bathymetric lidar Technical Center of Expertise, JALBTCX -- I have to think about that one -- and highlighting those types of things, and maybe some of the other remote sensing things, maybe that's something else that we can look at as a separate paper.

CHAIR HANSON: Yes. I think there are several more layers of this that'll add on and be very beneficial. But it's kind of the point of conversation. I start it off and run with it.

We do need to take a break at this point. But just to mention to Joyce, we'll give you guys until the noon break to come up with something to see if we can finalize this. If not, we're here for another day. So there's still an opportunity to discuss. So let's make sure you get it right, and then we'll go from there.

We'll go ahead and break for now, nine minutes, 10:45 if our next panelist, Jeff, and Captain Brennan, you guys are our next panelists. Come on up, and we'll get you set up.

(Whereupon, the above-entitled matter went off the record at 10:37 a.m. and resumed at 10:49 a.m.)

CHAIR HANSON: All right, Dave Maune and Joyce Miller are co-chairs of the HSRP Planning and Engagement Group. This committee

has spearheaded HSRP's efforts to produce a series of one page issue papers with recommendations to NOAA leadership. I'll leave it to you.

MEMBER MAUNE: We've been discussing the issue paper on precision navigation for almost two years now probably. And then Kim stepped in and said that she would try to pull all the thoughts together, and I think she's done a very good job on that, so I want to turn this over to Kim to take it forward.

MEMBER HALL: I do want to note we did get a paper out because we did the ports paper which was the original precision navigation. So it hasn't been two years of this particular one.

And I do want to let you know, I know you guys have heard a lot from me today from this morning to this morning to now. But I wanted to show my commitment to HSRP that today is the day that we're actually closing on our new house and I am not there.

So my husband will be signing in

Virginia. There is a sentence that says something like my lovely wife has made me sign for her. And then he signs for me there, and then he signs his name.

So if we could all just have a moment of silence he's going to have later, I would appreciate that.

So I think we're pretty much at the conclusion of this paper. And I know I've heard from Lawson before, I've heard from Anne, I've heard some others. There are a couple little edits here and there from, I don't know just the setting and I've got those covered.

You know, things like the decimeter didn't make sense to focus because that's a weird thing to think about, so we decided, I just did the math and I didn't realize it's 3.9 inches or thereabouts.

So within a few inches of the sea bed. That makes a lot more sense to those of us who think in, not in metric. I know, I know. But I think for the audience, and that was a good piece

of feedback that we got from Glen actually of kind of let's make this a little bit more accessible.

And there's one place where I did not italicize precision navigation, so that has been fixed. So I prefer not to go through and do the little editorial changes because we will have the benefit of NOAA's eyes on that a little bit later.

So I wanted to open it up to the group. We've belabored it may be quite a bit in our working group talks. I know that I offered to rewrite it. I will say in rewriting it I did my best to take what was already there.

So this is not a complete rewrite. I begged, borrowed, and stole from previous papers. So I appreciate and want to thank everybody who had contributed to it. It truly has been a group project when it comes to HSRP projects.

So with that I'm just going to open it up, get a couple of comments, and hopefully we can all agree that this is ready for the editor

and ready to be put out.

MEMBER KELLY: Yes Kim, I would say I think it's where it needs to be at this point. So as far as I'm concerned, other than that minor insignificant typo type tweaking, it's ready to go in my opinion.

And many thanks for helping us to get there. It's been two years of continued progress, Dave. So I mean, we've finally reached the pinnacle of precision navigation papers.

MEMBER MCINTYRE: I would agree with Ed. And I think that Kim has done a great job in stepping up to the plate on this one. I regret that I wasn't more available towards the end of it. And I think it's ready to go. And thanks a lot to Kim.

MEMBER HALL: Go ahead.

MEMBER BRIGHAM: The genesis of this was the picture of this ship coming in. And I communicated, and I think it was December of 2014, maybe Admiral Gland will remember, to our Chair and Co-Chair, and I think Captain Rassello.

And I said, you know, reading in the paper about the largest ship ever to come to America, and I'm on this panel. And I said you know, we really should comment about, you know, size and precision navigation issues.

And then I learned that the ship cleared the Golden Gate Bridge by less than two feet. And I'm thinking of Rich, you know, and the precision of the thing. So I think it had a long history, and I think we're there. I think this captures a very technical subject.

But the whole idea was, the genesis was, you know, an issue that I was reading in the paper that I think HSRP had some influence over and at least have a topic to discuss. So I'm pretty happy with the paper and I think it captures the issue very well.

CHAIR HANSON: Great. And given the fact that almost every East Coast port on a weekly basis now is bragging about who's got the biggest ship coming in, right?

MEMBER HALL: Well, I think with that

we put a little, we're done. So I appreciate again everybody's help, and I will make sure that this gets to Lynne and the editors, and that we get it out. So do we need to do any kind of motions or --

(Simultaneous speaking)

VICE CHAIR MILLER: Dave pointed out that we're scheduled to vote on both these papers tomorrow. So we'll tweak the --

MEMBER HALL: They can go ahead and do that now.

VICE CHAIR MILLER: Okay. Shall we vote on the paper? All in favor of --

MEMBER MAUNE: If it's okay, we can. All in favor?

(Chorus of ayes)

MEMBER MAUNE: Any opposed?

(No response)

MEMBER MAUNE: None? Accepted. Thank you, Kim. And everybody that contributed to it.

MEMBER HALL: And just so you all know, since I'm taking over as the planning

engagement co-chair with my lovely colleague, Dave, I'm not going to be rewriting papers quite as often.

And I think this is what Joyce was able to kind of try to expend a little bit as she became the vice chair. So we are definitely looking for more people to help as we do that.

And I know that there's been some great volunteers out there. So you can hear less of me at the future meetings, please feel free to volunteer. Thanks.

MEMBER MAUNE: Is now the time to talk about future issue papers?

CHAIR HANSON: Works for me.

MEMBER MAUNE: Okay. I had one recommendation from Gary Thompson concerning the need for an issue paper on licensure or certification of hydrographic surveyors. I've talked to a number of different people here about it. We think it is important to address the training and licensure issue.

One of the things that I got from the

people I talked to is that we are not in favor of state licensure, but a nationwide licensure of hydrographic surveyors.

Now how we go about doing that, I really don't know. But perhaps this is a subject of an issue paper to address that topic. And I'm interested in feedback from others on that. Is that a worthy topic for an issue paper in the future?

VICE CHAIR MILLER: I'm wondering if we should first have, perhaps at the next meeting potentially in Miami, a panel on it because, you know, there's a lot of questions.

I mean, perhaps people on the panel do have the expertise. But there's a lot of issues there and it might be useful to schedule a panel. Carol, you have a comment?

MEMBER MAUNE: Carol?

MEMBER LOCKHART: I agree, sort of. I think we're not quite at the point where we need an issue paper on this. I think as a panel we need to discuss it. I don't know if it needs

to be a full hour and a half panel or anything.

But I think we do have to discuss it more, learn more about the bill, and then provide comments. But I'm not sure that we're at the stage where it's an issue paper.

VICE CHAIR MILLER: And it's possible that Glenn Boledovich is going to discuss that in his remarks to the panel.

MEMBER MAUNE: Go ahead, Kim.

MEMBER HALL: I just wanted to see kind of, I know this wasn't on the public meeting. But this morning during our breakfast, our working breakfast we started talking about a progress, just for the benefit of the crowd, for prioritizing subjects that we attack.

And it would seem to me that how we prioritize as subjects also gives us an indication of where we need the most current issue papers. So perhaps the cart before the horse right now until we kind of figure that out.

I know there's some things that are in the works like infrastructure, and I don't want

to stop people who want to be writing papers. But I think before we decide what the next panels are going to be and all that, we need to do that process of racking and stacking. And I think issue papers help us, that will help prioritize our issue papers as well, such that recommendation.

MEMBER KELLY: I would second that. From what I heard this morning, I think it's an issue we should approach. But I don't have any real background or interest or, I mean, the devil is always in the details on these things.

What are the pros and cons. And I think before the pane could endorse a paper, we need to get a lot more information on this. I think perhaps a panel or some further discussion in the interim would be the best way to inform the panel as to what the actual issues are, thus leading toward the issue paper where we could make a declaratory position.

But right now, I don't know anywhere near enough about it that I would feel confident

in, you know, supporting a paper right now.

MEMBER HALL: Maybe it's a column I add to that spreadsheet that we've got where we think it is, where we need more information, we've got enough information, we think there's an issue paper as we do the racking and stacking.

So I will think through that spreadsheet to provide a little bit more information on where we think things stand. But yes.

MEMBER MAUNE: And while Jeff Lillycrop is here this week, maybe I can use the opportunity to get his opinion on that topic when we're talking offline at some point, Jeff.

Okay, how would you proceed with the prioritization? Would you like to explain that for the general purpose meeting on what you had in mind?

MEMBER HALL: I mean, I think I just did. I mean, it's a spreadsheet where we have topics that we've all talked about and kind of see what sticks. And I will get that out to our

group internally to do kind of their individual prioritization.

And then we'll do some math on the back end and show people what the results look like, and then figure out how we want to move forward because I think specifically we know that things that we actually get tasked by NOAA to do need to kind of take some precedence, especially if there's any time crunch on getting that to them, whether it's a response to a strategy or something like that.

And we also want to take into account whatever local place we're going to and think through that. But I think right now we don't have the exact way that a spreadsheet is going to be looking at. It's a new concept that we just came up with this morning.

But the group agreed that we need to kind of do the prioritization of the topics.

MEMBER MAUNE: Okay. So future issue papers would flow out of this process?

MEMBER HALL: That's my

recommendation. If folks agree or disagree with me, I'm happy to go either way. But I think that helps us figure that out and time management.

VICE CHAIR MILLER: We had a previous discussion, or we had a discussion in the administrative session this morning. Kim, maybe you could just kind of give us an overview of some of the ideas that came out this morning.

MEMBER HALL: Sure. I've got to find the right notebook.

CHAIR HANSON: Just before you do that, Kim, Lawson had a thought.

MEMBER BRIGHAM: No, I was just going to -- we should be transparent. And so whatever issues we discussed, that we bring it out in the public meeting either today or tomorrow.

MEMBER HALL: We didn't go into a lot, we go into some detail which wasn't my intent this morning on some of the subjects. But really it was just throwing some ideas out there so that everybody had some representation on the things that were of interest to them and were of concern

to them and give a little bit of an insight to fellow panelists on what those issues were, including the licensure of hydrographic surveyors.

So that was one. Another one is infrastructure in terms of information infrastructure to support those kind of physical infrastructure given the current administration's focus on the term infrastructure. We want to make sure we've got a handle on that and some good recommendations for NOAA moving forward.

We also had education. So it was great to see yesterday the JHU and CCOM, how education is advancing because right now the throughput through universities for these jobs will not meet the requirement for jobs on the other end.

So there's going to be a huge demand for people to process this kind of information, as we talk about big data earlier this morning. So looking at education, looking at, as Ed Kelly put it, enhanced navigational assistance, so to

continue to look at ports and precision navigation.

Crowdsourcing, so incorporating non-authoritative data sets into the products that we have currently, kind of a forced multiplier. Autonomous vehicles, that's a continuing area of interest as we look further into that strategy that E.J.'s working on and other advances in technology.

Managing data, let's see, I don't want to forget anybody, offshore leases. So looking more about what does that look like for charting and the frontier. Disaster response, there's a gap between when the funding happens and when the actual, you know, incident happened.

So we laughed this morning, maybe not laughed, to our dismay realized that hurricane season is at the end of the fiscal year. How do you plan to keep money around just in case there's a hurricane. That becomes problematic in the planning process.

So really it's kind of a thematic

areas. It could either be by topic or by office. We're still kind of getting our hands around it, but wanted to just kind of throw ideas out there and now rack and stack to what do we want to hear next, what do we want to see next at the committees, what do we want to work on next.

So that's, does that work for you, Joyce?

VICE CHAIR MILLER: Yes. I think that covers most everything that we -- oh, a communication strategy we were also talking about.

MEMBER HALL: Right. And I think that's a little bit separate. I think that's more kind of an internal administrative thing. I don't know if that needs to happen in the public domain.

And I'm not trying to be non-transparent, but that's kind of how we communicate these issues that we have concerns about to internal NOAA because it is not our job to go external as the HSRP, but as individuals we

can.

So there was a request that we look at how we do messaging and communication and advocacy within NOAA to help kind of advance these issue papers. So the issue papers aren't just sitting out there, we're also following up with the administrator.

But again, I think that's a little bit of a different dog, and not the cats that we have over here that we're trying to herd. But definitely have note of that as something for the planning and engagement working group to work on.

VICE CHAIR MILLER: I think that pretty much summarizes it. And I think Kim's idea of hopefully we will get that pretty soon because issue papers will need to be drafted in the not distant future, if that's the way we're going to go with it.

CHAIR HANSON: Lawson?

MEMBER BRIGHAM: Yes, just a thought about hearing about education throughout my tenure on here. It seems like education and

licensure issues could be a pretty robust working group and just bring in a group of people.

You might have a panel first, but it does lead to kind of a theme for a working group.

CHAIR HANSON: Agreed.

MEMBER MAUNE: We're finished. I think you can move on to the next topic.

CHAIR HANSON: Great, with Rick Brennan. Esteemed panelists, did you guys have, it's a PowerPoint this morning, right? Okay. We've got bios in the package.

Glad to see you guys on the same panel together. And you could sit a little closer. So Captain Brennan, do you mind if we let the guest go first? Go ahead, Jeff. Welcome and thanks for coming.

MR. LILLYCROP: Great. On behalf of General Jackson who could not make the meeting today, thanks for the invitation and I look forward to talking to you about a couple of items. That's the slides? Okay.

I'm from the Corps of Engineers from

our Engineer Research and Development Center, and my role at ERDC is the Technical Director for Civil Works R&D. So all of the R&D that we do within civil works falls under me.

And within that, it's divided into navigation, flood risk management, and environmental. And I'm also the lead for the navigation research which is the largest part of our civil works R&D budget.

So I have a long term connection with the hydrographic services review panel. I think the last time I was here was 2015, and it's a day that I will never ever forget. But I can't tell you on the record, so ask me at break. There's a little teaser.

I would like to echo Bill's comments about collaborative research. We've got an initiative that was started in February 2009 I think, or excuse me, February two years ago, 18 months ago that I think is transforming the way the Corps and many other federal agencies and the near shore processes, costal research community

is really approaching research.

We've got a very collaborative effort within the federal sector, but also with NGO's academia and industry. And we saw it as a way of really pulling the community together to be more focused, to be more inter connected so that we had a louder voice, and we believe that it is transforming the research that's going on in that area. And I'm very proud of that effort, and have been involved in it.

Today I'm going to cover two topics, our eHydro initiative and utility crossings. These are two topics that were discussed when Admiral Smith and General Jackson got together the first week of May, and give an update on where we are with those.

Of course, our responsibility is civil engineering where the nation's civil engineers. We've got eight different civil works missions ranging from flood control to water management, emergency response, and others.

And of course navigation, and

navigation is our largest business line in the civil works portfolio. Within navigation we have locks and dams, and costal dredging. Those are primarily the two big areas.

We have over 190 locks on the inland waterways, and even including some coastal waterways. And coastal ports, we've got 1,000 that are authorized and about 13,000 miles of navigation channels. And our responsibility is to keep those costal channels at authorized depths.

We dredge about 250 million cubic yards of material a year, and that covers 150 to 200 projects. And about 59, 60 projects cover about 90 percent of the cargo that's moved through the US.

The other nine percent is covered by those top couple of hundred, and the rest, that one percent is spread across many of the other that make up the 1,000. But the bottom line is that we're resource constrained. We can't dredge everything that we want to dredge, we can't

maintain everything to the dimensions that are authorized.

And that has an impact on cargo movement. It disrupts cargo when ships have to light-load because of channels that need dredging.

One other thing that's kind of unique in the Corps is that we're project funded. So each of these projects were individually approved by Congress. And so the budget goes to them.

We don't have a centralized dredging budget. We don't have a centralized survey budget. We don't have a centralized lock and damn budget. Each project is a, sometimes a castle unto themselves.

And so when we try to do something from an enterprise perspective, it's a major culture change, and you'll see that as we move through my presentation.

I'll introduce eHydro as a good news story because I really believe that it is. Two to three years ago, and for the previous couple

of hundred years, we were providing NOAA condition surveys of our projects from our 22 different coastal districts in at least 22 different formats and forms, paper, digital, smoke signals at times. Just a whole range of data.

And Chris Lebow was a master at getting it all into chart production. But it's become more and more of a challenge. And so a few years ago my good friend Dave MacFarland and said hey, can you help us.

And so the eHydro application was born. And that application is to do four things, three of which were previously done, and one of which really needed to be done. And that is to provide channel reports to NOAA, calculate parameters, metrics that we use to report to Congress the condition of our navigation channels. And the third was to plot the data.

And those were all being done, and they were being done different ways at each project and by each district. And so we

developed an application that created a standard tool that allowed us to do it with a couple of data sets and the push of a button.

And then it also created the meta data, or the majority of the meta data that was really needed to help track these as enterprise assets.

So the eHydro application really combined three separate workflows into one. It made it much simpler, it made it standard across the organization, and it has been very successful in many ways in doing that.

We have over 24,000 surveys that are currently in our database. And that's been collected over the last few years which is phenomenal.

We've got every single district is using it. Some of them have used it once, some of them have used it over 5,000 times. So what we're focused on right now is getting more consistent application of the tool, making sure that the data that they collect gets moved into

it, and then gets the last step is appending it to make it accessible to NOAA.

And that's one thing that we've had a little bit of difficulty in, but we're working on that. I think the application again, if you look at our culture, is really moving forward at lightning speed given our culture. But we have a ways to go and we are actively working on that.

We've got right now some efforts to move it to the cloud to make it easier and faster. One thing about our Corps of Engineers internet system, it was really designed to move email around, not large data files.

And so moving it to the cloud we see as a way of significantly improving the performance for the users on the inside of our firewall. And that should improve the use of the tool within the Corps, and that will help provide the data to NOAA more rapidly.

But we have policy in place that says everybody is supposed to use it, and we are doubling down thanks to the meeting with Admiral

Smith and General Jackson on reinforcing that policy and making sure that it's being used.

And my understanding is one of our power users has been Galveston District. And with all the recovery work that's going on, they've been using eHydro to make sure that the data is getting posted quickly.

The other application that we are working on, another enterprise application that has great value I think to NOAA is PLOVER. It is an application to manage our pipeline and utility crossings data.

Up until now, it really has been every project maintains what they know. And about utility crossings and where this comes in for us is in our dredging.

We provide the dredging industry information on what we know is crossing our channels, but it's their responsibility to actually go out and validate so that they don't hit something.

A few years ago there was a pipeline

that was hit, a gas pipeline and it exploded. No one was hurt, but it could have been otherwise.

And so the Dredging Contractors of America have asked the Corps to help with identifying where the utility crossings are. And those are things that NOAA puts on their charts.

And so what we've done is taken an application that was actually being used, been developed in New Orleans and was being used. It was a good marriage of our permitting process, regulatory, and connecting with our operations folks so that there was a pathway to make sure that everything that was being permitted was being reported to our ops folks.

And so we've taken this application that had been used for several years, and we've turned it into an enterprise application. We've moved it up to our central processing center so that the databases can be larger. The speed should be faster. And eventually we'll move it to the cloud so that it has even better performance.

The intent is to have it deployed fully in the Corps in fiscal year '18. Right now it's being tested by Galveston District and Mobile District. And between those three districts including New Orleans, those are where most of the pipelines are in the US.

So we're really pushing its testing, and that should be completed by the end of this fiscal year, so just in a few weeks. And then we'll write the operations orders and the policy required to make it an enterprise tool and have it deployed nationally.

I expect since everybody's doing it differently, it will take a little bit of time to get it fully utilized, but it does have a lot of national interest at headquarters, national priority at headquarters. So we're hoping that it moves into application very quickly.

It's not intended to be a public database because of the information that's contained in it. But it is intended to be able to make sure that we're collecting all of the

information, we're able to provide that information to the dredging industry as we do normally now.

When we award a contract, we tell them what we know about is crossing the channel. And we provide that information to NOAA. And so this will allow us to do it much more standard, much more simply we hope, much more consistently.

So I think that's my last slide, and I would be glad to take any questions.

CHAIR HANSON: I think we might want to wait for Captain Brennan and we'll do questions together if you don't mind.

MR. LILLYCROP: Okay.

CHAIR HANSON: And it's not that Jeff doesn't have a lot more to talk about. We cut him off at this timeframe.

MR. LILLYCROP: He told me ten minutes. I was like are you kidding me. I have lots of opinions.

CHAIR HANSON: The standard 50 slide Corps deck. That's tough to cut it down there.

So appreciate all that work. The PLOVER as you know is very important to us.

And as a dredger who started on my very first contract hitting a water pipeline under LA Harbor because it was poorly marked, finally after all this timeframe we might have a better solution. So glad to see that. Captain Brennan?

CAPT BRENNAN: Good morning. So while I'm waiting for the slides to come up, I was asked to brief on two topics. One was on the fleet replacement plan, and the other was just on our precision navigation effort.

So I've got really only three slides, one of which is this one. So just to touch base on the fleet plan, we currently have received two installments, an initial $80 million and a follow up of $50 million to begin the process of regenerating and reinvigorating NOAA's shipbuilding program.

So currently this is the, you know, the status of where we are at with that. So we

have established an interagency agreement between NOAA and the Navy because in the past it was the Navy who actually did the building of our ships and administered that program through the Navy with liaison from NOAA to the Navy.

Well, the Navy didn't build it, I guess to be clear. But they administered those contracts for us. They were built by private industry.

So right now, getting that interagency agreement completed was the first step on that. The second step is finalizing the request for proposals for the preliminary design.

And so there right now, the platform acquisition division within OMAO is expecting to complete that process somewhere late this year, early next year, calendar year.

And once they get those proposals back, they expect to select two, and those two will go forward developing preliminary designs. And then at some point after the review of those preliminary designs, the Government will down

select to one.

And so we're looking at for that second phase, you know, to be occurring between 2019 and 2020. So if anything, that should show you the relatively slow pace that shipbuilding in America takes today because it's a very long, very process driven process within the federal government.

So none of this is going to happen too quickly right now just because of that process to get the agreements in place to review the proposals and to move forward. So on that, that's the current status of that. And well, after we're done I guess I'll take questions on that.

Precision navigation, if I could I would like to just recap precision navigation, at least from the Coast Survey perspective. And I think this is, I think the other offices would agree. And I'm sure if they don't, they'll comment.

But you know, precision navigation in

my mind is as much a way of thinking as it is a national program. Right? So really we're talking about higher accuracy, high accuracy, high precision data products and quantifying the uncertainty of those measurements in the data so that they can be used.

And we just had an underkeel clearance workshop on Friday with some underkeel clearance software vendors. And that's really what they're looking for.

And that was the key of the Long Beach project that we did was not only having, you know, tide measurements or bathymetry measurements, but having those measurements have a quantified uncertainty with it because ultimately they're doing a statistical analysis for every passage of that ship to see what the probability of grounding is.

And driving that probability towards a, you know, 97.8 percent probability of not grounding that vessel. And so that's where they go. And you only get there by knowing what the

uncertainty of all of your various measurements are.

So in the world of hydrography, I think that's a fairly standard understanding because that's what we do with all of our measurements. But I think in the world of commercial mariners, that's a new concept for them.

And so that's where I think we as the professionals and the service providers and the data providers need to be moving forward.

And then the other guiding principle for precision navigation is really that the whole is greater than the sum of the parts. Right? So when I take Rich's operational forecast systems and tide measurements and I marry that with our bathymetry.

The mariner has something better than what they have right now because they're able to get both forecast and real time actual water depths, not just water depths relative to data, which is a big thing.

Whether you're having less water or more water, being able to know that and plan for that is what we currently hear from mariners and where we want to go.

So moving forward with our current funding, we are moving out on a couple of initiatives. So one of those, we're maintaining the existing project that we have in Long Beach right now.

We're getting new data in occasionally from the port. We're adding that in to the database that we're maintaining for Long Beach and providing new products and refining those products.

So it's taking a while, but I think the pilots there, you know, just got a new portable pilot unit system, and they're actually utilizing the data more than they were within the first two or three years that that project was underway.

And so we're actually just now beginning to get feedback from them on, you know,

does this look better or does that look better with regard to the data that we're supplying. And so we've actually been tweaking that deliverable to them to help it get to that point where they really like what they see.

And actually, we'll be having a meeting on that this week to talk about that. So that's one that's been in play and it's continuing.

The other one is moving to the Mississippi, the largest port complex in the world, and certainly the most congested waterway in America right now.

And so we're going to be surveying that. To the Corps of Engineers, as we found out this year, surveys the Mississippi River every ten years. And that's for their hydrodynamic modeling purposes.

And so what we are going to endeavor to do, you know, funding permitting is to try and do the same thing, survey it every ten years, but interleaved in between the Corps' ten years.

So ultimately, that very critical waterway would never be out of date by more than five years, and that data would be interoperable with the Corps of Engineers.

So that would be a win-win for that waterway, and both of our agencies if we could make that data available to each of us and use it for navigation.

So to that end, we're going to begin this next field season with mapping from Baton Rouge South. We believe right now that we can probably get about half of that done with, you know, under existing funding and task orders.

If that funding were to be increased, we could theoretically do it in a year. But we think at the current rates that we can probably get about half of that surveyed.

And so the intent is to not only do the bathymetry but also try and get shoreline infrastructure through laser scanners and other techniques to provide a full re-baselined assessment of the river for use and then we can

put that into navigation products.

And then the other project that we've got that we're just beginning, and this is on the heels of new surveys, there is in the Port of New York re-scheming the whole chart scheme. That's going to begin in New York.

And so what we are doing is to build a bathymetric database for the mapping and charting divisions, production branch c, which is basically the New England region. So from south, just south of Sandy Hook all the way to the Canadian border.

So building a database within that region that would support high resolution navigation products, and also support the re-scheming of our chart scheme and getting higher resolution bathymetry into that as we do so.

It also lays the foundation for providing S102 which is IHO wonky speak for gridded data products to the mariners in the future. So we can't provide gridded data products or that next generation of S57, S100

product without having that in a database. So we're beginning that now in this region that we currently are sitting in.

And let's see. I think I've hit everything. I think that's it on the precision navigation. Yes.

CHAIR HANSON: Okay.

CAPT BRENNAN: Done. I'll give you your time back. Same issue with Captain Brennan. He has a lot more to say, but we cut him off. And the idea here is to have the panel ask a lot of questions and engage. Admiral Smith, do you have something you want to start off with?

RDML SMITH: Yes, if you don't mind. Thank you. Thank you to both of you, particularly to Jeff. I get to listen to Rick a lot. But I really appreciate you making the trip up and reflecting back on our joint meeting with, which is really an ongoing engagement around these issues.

The high point of the focus meeting with General Jackson, we really appreciate the

time that he took personally to engage with that and to make the trip to Silver Spring to do that. So we're excited about such a great partnership going forward to work on some very tricky issues.

If you don't mind, I would like to reflect a little bit on some of the, some of your points. First of all, we couldn't be more excited about eHydro.

It's the critical foundation, although it was designed for to support the charting practices in place at the time when MacFarland first envisioned it with you, it is also the foundation for future charting practices and better ways of charting channels.

One of the real themes here is that, you know, the old channel tabs which is the way we did it on paper charts a number of years ago are really not very well optimized to support, you know, nuanced navigation choices in our ports.

And so we want to come up with a better way of doing it. You know, consistent and

regular access to channel condition information is the absolute foundation of that. So we are really excited about the possibilities of the future and improving charting as well. So thank you for that.

So internally as far as one of the challenges we've had is can we get these channel updates published fast enough. And we're also really excited about eHydro for that because, you know, as we get closer to nationwide use, we can begin to automate on our side.

You know, simplify our processes and automate down to a single type of source goes out in maybe a short list of different ways to as it gets incorporated in the charts and published out within the week. So we're very excited about that.

On PLOVER, I can't even read my own handwriting here. Oh, that's a four. You probably know we're envisioning building a whole new suite of larger scale charts, mostly in coastal areas. And those are the same areas

where this type of permitted infrastructure is most prevalent.

Again, a stable database will allow us to go back not just to our original interpretation which was in the context of a particular suite of charts, but go in in a larger scale and to capture that infrastructure in a navigationally meaningful way for anchorages and other things. So we're very excited about that.

And we would also invite the Army Corps to help us figure out the best way of charting that information. You pointed out that there's the nature of that information is if we do it too precisely it actually makes us vulnerable, makes that same infrastructure vulnerable.

Or it could have false precision. Well, you said it, it was right here. I'm going to anchor right here, right? And that's not what we want either. That's an invitation the Army Corps to let's figure out how this really ought to be charted, when and in what circumstances.

The last thing I wanted to comment on is it's worth noting, and you touched on it a little bit, the survey standards are a topic of discussion that was a real concern of this panel. And sort of consistency of survey standards was also a live topic for our conversation.

I don't want to, correct me if I mischaracterize but it's really clear that the Army Corps surveys for a lot of different reasons. And sometimes those reasons aren't completely compatible with a navigation, you know, survey which is fully suitable for navigation. Sometimes it's not. It's a quick and dirty we just want to check this and that sort of thing.

And we're jointly committed to being clear about what we consider to be the proper use of that data and being clear in the way that we distribute it so that users can understand what it is that the surveys are intended to be used for and what we think is reasonable. So thank you, Jackie.

MR. LILLYCROP: Okay to comment? Okay to comment?

CHAIR HANSON: Please.

MR. LILLYCROP: Okay. Yes. Thank you. And I didn't say anything about the surveying just because that's more a work in progress. I understand we're trying to get you together with our new chief of operations, Tom Smith who will help us continue those discussions.

We did go back and check all of our district offices own multi beam systems. But that doesn't mean that every project gets surveyed with a multi beam.

Our goal obviously for most of our surveys is to identify where shoaling is occurring in a channel and estimate a volume so that we can budget for a dredging activity? And so as you say, not all of them are conducive to some of the surveying data collection that would be needed to identify a hazard or remove a hazard.

But we're looking at how we can do that effectively and try to be involved in those activities, and do it from a, obviously as efficient a process as possible because every dollar that is spent surveying is a dollar less spend dredging.

And so that was one of the nuances of being project funded, all the money goes into one pot. And so if we survey it takes funding from the dredging. And our goal is to keep the channels as close to authorized as possible.

The other activities, we are trying to reinforce. And it is a change in requirement in the first activities behind the development of the eHydro.

And I think a lot of it is educating our workforce to understand that the requirement has changed, that they play an important role in overall marine transportation and to understand what is happening with their data when they, you know, push that go button.

And I think we'll get there. It's

General Jackson's commitment, but it's Mr. Smith's and everybody involved in the eHydro application. It just takes a lot of inertia sometimes, or a lot to overcome some of the inertia. And we'll get there.

On the PLOVER, I really do think that we've got an opportunity to be more comprehensive in our understanding of what is there. And one of the problems we've had is that again, these have been done by the navigation managers in each district.

They keep track of what's in their channels and what's crossing them. And when they retire, a lot of times that knowledge disappears.

The information does get sent to the contractors, but that's in a contract and it says this is what we know. A lot of times it's cut and pasted so it may be a couple of years old and not truly the most up to date.

So we're trying to improve the process to make sure everything that's new is getting recorded, and also record what we know before a

lot of our senior workforce moves on to their golden years or wherever.

But it's been, it's really been a very interesting social engineering experiment to get some of these things going. And we'll continue moving things forward. And I appreciate your talking to General Jackson because I think that got things moving again. So thank you, sir.

CHAIR HANSON: Other panelists?

VICE CHAIR MILLER: I have a question for Rick. Rick, I'm assuming you said the AGOR design. I'm assuming they're using the basic ride Armstrong design, is that correct?

CAPT BRENNAN: They're using the basic specifications. So that's the distinction is that we don't own that, NOAA does not own that design. They own the specifications for it. And so there could be multiple different designs that meet that specification. And so that is an interesting nuance that, you know, that I think is certainly worth pointing out because we don't own that design that was, you know, that resulted

in the Sally Ride and the Armstrong.

VICE CHAIR MILLER: And a follow up. Has there been any more clarification of what the ship is replacing, or, you know, what the end usage for the ship will be.

CAPT BRENNAN: At this point I don't believe that it has, they have named a ship that is going to be decommissioned and replaced by this first vessel.

But what was clear is that it was, it really didn't meet the needs for our hydrographic program because it would not have the capability to carry launches.

And we would not, at this point given the funding and the timelines that we needed to move out on that we would not be able to change those in any, you know, those requirements in any meaningful way to incorporate the carrying of launches on that.

So it has to go forward as-is which means that it's going to most likely replace, you know, one of the other vessels like the Sette.

MEMBER MCINTYRE: This is more of a comment than a question. But for Jeff, I really wanted to thank you for your work on the Columbia River. We live and die by the Army Corps surveys.

And to speak to what Admiral Smith says, it's a lot of times those surveys really aren't calculated for navigation. But that's what we use them for, so I'm excited to hear that the agencies are working together to improve and also just clarify what information that we're using right now.

I won't say that we cobble together, but we look to a lot of different sources for information, and to our PPU units in order to navigate. And it would be really nice to see that streamlined, and then again just verified so that we really do know what we're working with.

And also just wanted to reiterate that we really value our relationship with the Army Corps of Engineers in the Columbia River region. That's a fantastic group of people that we work

with.

CHAIR HANSON: Okay. Well, without other panel questions, I have a couple, I have one. Could you guys each give us a quick update on what's going on with the disaster response maybe in Florida. Or in the southeast, in the Gulf.

MR. LILLYCROP: Lots.

CHAIR HANSON: Okay, so that saves a lot of time. Thank you.

MR. LILLYCROP: No, in Houston we've got, I think all the channels are open now. There was a lot of surveying, a lot of Corps and NOAA surveying, contractors.

So that was really a great response. I think in Florida it's a much bigger problem, certainly much more geographically spread out.

And they were beginning already yesterday, we were getting calls. I know JABLTX is looking at, has already been called to fly the Florida coasts to look at the amount of erosion from the federal projects.

And so I mean, it's spun up there. At headquarters we're now working 24 hours. It was, after Harvey it was more like 12 or 16. But now they've gone to a full 24 hour schedule.

So the main thing is identifying the hazards in the channels and getting the channels open, the fuel, getting the fuel to south Florida and the Keys.

You know, then just the regular assessment of federal projects and all of the debris and ice and water and sometimes blue roof missions that the Corps is involved in. And that's all worked through FEMA and the multi-agency organization. So we're really support to FEMA.

CAPT BRENNAN: So we've wrapped up our initial response to Harvey in Texas. We will have a longer term response because the initial response, you know, was to support the Corps of Engineers in opening the federal channels, and it was necessarily focused on shoaling.

But there's also an object detection

requirement that we feel is necessary, and that's a longer effort to do that because it's a, you know, the resolution that we need to survey those channels to is significantly greater.

And so TJ is bound for the Houston area anyway was going to be surveying the approaches. And we're working on retasking that right now to go back and ensure that we've got object detection coverage in those channels to support that longer term initiative.

With regard to Florida, we've got NRTs on the ground. We had a team that was transported via a Coast Guard C-130 into Miami yesterday, and we're out mobilizing a mobile survey kit on to a, I'm not sure E.J. was a police, a sheriff's vessel.

And they were out helping to survey the approaches to Miami and the harbor yesterday. We've got other NRTs that are moving in as weather permits. And we had a number of contract assets that were standing by, some that were already slated to be working in Florida.

So we had an eTrack task order that was just getting ready to get underway down in the Fort Meyers area anyway. So they were going to be going in, and I have no doubt that that, you know, that the original project area that they were going to be doing is going to be retasked and retooled to do some response efforts in that area because, as we know, that was an area hit particularly hard with storm surge, et cetera.

And so we've got at least two NRTs down there now, and we're waiting to get the final assessment from the Corps of Engineers before we send any contractors in.

But we have at least five contractors with available money left on their existing task orders. So no new money required that we are standing by and ready to recommit to recovery if needed.

CHAIR HANSON: Well, certainly appreciate all your joint efforts and your collaborations. Certainly disaster response is

when you find out how well you're set up. And lessons learned from those efforts afterwards are always helpful as well.

So thanks for -- oh do we have -- go ahead.

MEMBER HALL: So quick follow up, Rick. So that money you said that we have to -- is that taken away from other tasks that they were going to be working on, or is that just left over on the contracts? So, are we losing out on other charting or other, I'm sorry, survey because they're now going to be doing disaster relief?

CAPT BRENNAN: Yes, that is not new money. So that is basically us redirecting our existing funding away from the other priority areas that we were surveying to do the disaster relief --

(Simultaneous speaking)

MEMBER HALL: Just wanted to clarify. Thanks.

CHAIR HANSON: Okay. All right, well

thanks to both of you for your discussions, and look forward to future comments and discussion, joint discussions as well. Thank you. We'll let you go.

So did we get anywhere with the next issue papers? Are we going to defer?

(Off-microphone comments)

CHAIR HANSON: Okay, fair enough. Fair enough, we've got another day. So now it's time for public comment. As always, open for comment from the audience present, or from those listening in on the webinar.

(Off-microphone comments)

CHAIR HANSON: Do you need a microphone? We do have a question from the audience.

MR. NOLL: I'm going to step back from the speaker. This is Guy Noll. I would like to make a comment related to the Navigation Ready Nation that was kind of the theme I saw underneath the discussion about recreational boaters in particular, and how the robotic

systems, the autonomy of navigation could help recreational boaters be more safe.

I think that's a really valid concern, and something that would be helped by better infrastructure, relating back to Larry Mayer's comment yesterday about how port infrastructure should be part of the discussion of what makes autonomy ready.

And I think connecting that to what recreational boaters are doing would be very similar in an incremental fashion to what the automobile manufacturers are doing with say lane keeping or automatic braking, that sort of thing.

And I would like to hear what the panel and maybe Captain Brennan say about how that could help push the focus forward for autonomy in general.

CAPT BRENNAN: Well, I think if we can get our ports instrumented to provide us the information that we need to just get the commerce moving, I think that would be a good first step.

And certainly, if there was any way to

get some sort of a network positioning system put in, even better because I think the same thing that could serve to position and track unmanned vehicles, you know, that are out doing some tasking in support of mapping the ports and maintaining the ports, that that could certainly be used as well for pleasure boaters to the extent that some common standard of positioning them was adopted.

RDML SMITH: I would also like to respond, and not to, there's actually a lot to pick apart usually in Guy's comments, but he referred to Navigation Ready Nation which is really a comparison of the challenge that's before the navigation community to what the weather service took on a few years ago with what they're calling the Weather Ready Nation.

And I think there's a body of thinking that the weather service did that is really relevant to our community. And I guess I will work with our staff to circulate a couple of those thought pieces from the weather service

because, you know, if you did a search and replace for a few key words in those, it would read really true for particularly with coast survey, but I think all the navigation services.

So thank you, thank you Guy, for bringing that up.

CHAIR HANSON: Other questions, comments? Rumbling stomachs, okay. Very good. We'll close the comment period and we'll go ahead and adjourn for lunch. HSRP members will have a working lunch, and we will adjourn here at 1:30 p.m. for updates from Rich Edwing, Juliana Blackwell, and Admiral Smith.

This afternoon's session will end at 2:30 when the panel will then visit the U&H research vessel. So bon appetite.

(Whereupon, the above-entitled matter went off the record at 11:52 a.m. and resumed at 1:35 p.m.)

CHAIR HANSON: Well, since our panelists are ready, without keeping you guys longer than we need to, why don't we go ahead and

get started on this part.

Good afternoon, welcome back. In the next hour, Rich Edwing, the Director of Center for Operational Oceanographic Products and Services, Juliana Blackwell, the director of the national geodetic survey, and Admiral Smith, the Director of the Office of Coast Survey will provide us brief updates on the projects and services their offices provide and recent progress.

Rich, I believe you're up first.

MR. EDWING: Okay. All right, good afternoon, everyone. So I'm going to just talk about some of the accomplishments from this past year and where we're going in '18. Good time of year to do that given we're getting ready to change fiscal years.

And I'm using the NOS roadmap, the priorities, first two priorities to kind of group these.

So under safe and efficient navigation, and you may recall from the Cleveland

meeting which was two years ago I talked in some depth about the updated, the international Great Lakes datum, so I won't go into real detail on that.

But that is a seven year project, and we did begin it this year. We've got a kind of bilateral plan kind of in place. And I think a big improvement this time around over last time around was I think I mentioned, back then it was no seasonal gauging done, you know, during the last update.

The NLON that exists kind of reached a national requirement to seasonal occasion helps extent it to the local ports and harbors.

But we were fortunate to get some funding through the Great Lakes restoration initiative. You do five gauges up there. And so those are in place right now. This is the location in, where is this, this is Manistique, Michigan. And there is four other locations scattered around the lakes.

So TCOON in Galveston. You probably

recall hearing about the Texas Coastal Ocean Observing Network, that's a somewhat unique partnership that involves federal, state, and local partners.

But that partnership had been disrupted because of some issues with funding mechanisms, and the network had largely gone unmaintained in 2014 and most of 2015. Things got figured out.

But in that process we became, our role changed in that we became the operator of the network. We get transferred funds to operate that network, and we got that network back up and going by the end of fiscal year, actually by the end of 2016 calendar year.

And one kind of big enhancement that happened during that timeframe was four new Sentinels of the Coast were established. There's actually six of them along the Texas coast. I'm going to point out that after Katrina and Rita, we established four of them along Mississippi and Louisiana.

Those went into operation just in time for Ike and Gustav to hit and collected data during those. And so when a couple of Corps Engineer stations, TCOON stations got wiped out in northern Texas, they funded the establishment of two of these stations to our standards, and they became joint stations.

And then actually the Texas General Land Office got a federal grant to build these four new ones along the southern Texas coast.

But the Corps puts in a lot of funding for these because right now, for each of the six major federally maintained channels in Texas, there's a Sentinel of the Coast standing at the entrance to each one of those.

And then I've spoken about this in the past. We continue to transition our primary water level sensor technology away from acoustic to microwave. That's acoustic on the left, microwave on the right.

We did 15 this year. That actually exceeded our plans by about three. And we're up

to about 50 Enron stations that have been converted to date.

You've seen this graph before, and most recently in Seattle where it was very relevant. We just completed, just really just recovered the last deployment of current meters up in the Puget Sound.

And then the green dots just show you the progression. This was the largest survey we've ever done, 138 instruments. I'll embarrass Carl Kammerer back here. He's one of our instrumental people who's always involved in the planning and execution of these surveys.

And I'm just going to, when we reinvigorated this program in 2006 we had an, I'll say, unacceptable attrition rate of current meters. We put a lot out there and wouldn't get back as many as we would have liked. And it was a lot of lessons learned and engineering development that went on.

And out of the 138, Carl told me, there's one less lingering one that we're hoping

to get back. But if we don't, we will have only lost one out of 138 deployments which I think is very, very good.

And so again, this data will update tidal current predictions in some new locations, or in old locations for navigation and safety, and also for informing models. And here's just a picture of one of the deployments. That current meter looks pretty clean, so it's not a recovery.

Another improvement was down in Tampa, the Weather Forecast Office, the Weather Service a number of years ago kind of started an innovation research effort, and funded them to give them some additional resources to do a number of things.

But one thing they did is they came up with this model overlay if you will that we've now integrated into our Tampa Bay hydrodynamic model. And what it adds to our already existing forecast information is specialized weather forecast information at these points along the navigation channels.

It provides waves and visibility forecasts where that's unique to our suite of models, no one else has that done. And so it's a very nice example of integration of capabilities between the Weather Service and the Ocean Service.

And I can tell you particularly the visibility forecast, wherever I've gone, ports are asking for visibility forecasts because fog is a big issue in a lot of locations. And of course we provide visibility sensors through our PORTS program. But this is a new capability they're very interested in.

Our PORTS program, I'm allowed to say that word, right? So we actually -- one time? It's like twice. Anyway, we added one new port to Matagorda Bay, Texas, and actually it's going live this week. It did make it through the storm, so that's good news because that one has been in there under development for a number of years, had its ups and downs.

But then a number of major

enhancements to some other ports. We added air gap sensors to Charleston and Delaware Bay, we also added salinity sensors to Delaware Bay and Chesapeake Bay port systems.

And just to make the point, you know, we're adding more ports but there's always a lot of work going on to maintain the existing suite of systems.

So under the preparedness and risk reduction theme of the roadmap, last year we had put out beta, beta versions if you will of our dashboard, our Coastal Inundation Dashboard. We operationalized them this year in these three different regions showing on the bullet here.

Again, the inundation dashboard is a way to show past, present, and future conditions when a storm is coming. It's a static graphic, but when a storm Is approaching the coast, those little balloons there will start pinging when we start to detect water level starting to rise.

But then you can go in and you can go back and you can get past information like what

was the record water level ever set at that, you know, what's the nuisance flooding rate, what are sea water trends, all that sort of information.

It's going to show you what, you know, the realtime data, and we'll also bring in the hydrodynamic models. At one point, or at some point down the road we're going to integrate the quick look project into this because that's what gives you the real time conditions.

So we're continuing to enhance this. This past January we realized, NOAA released a sea level report. It was an interagency report with Dr. Billy Sweet in my office was the lead author on it. But it kind of broke new ground in two different ways.

This was the first report to kind of lay out ways of doing regional sea level estimates whereas in the past, people were waiting to see how the nearest tide gauge to get the trends from. If it wasn't nearby, you didn't have the information you needed.

This marries up tide gauge and

satellite information to provide regional efforts of sea level rise. And it also updated the, you know, the ranges of sea level rise going into the future because they didn't want to put out this information without updating the extremes that were, you know, the signs are just starting to see.

And then a year or two ago we put out these high tide bulletins. Somebody mentioned, this is HSRP where I learned about in King Ties, that's kind of the common term for the, or perigean tides, the more technical term if you will.

But these are predicted, these are normal occurrences of high tides. But this is when the highest ties are occurring if you will, and they always seem to take people by surprise, and we get a lot of calls and stuff.

So we started putting out a product to try to, you know, alert people in advance that these are coming. And actually it's been a really big, it's been a very popular website and

seems to be, you know, helping with that issue.

And then also there's an annual high tide flooding outlook that we do for kind of that recurrent tidal flooding, the nuisance flooding that I've spoken to you before in the past.

Again in Cleveland, you know, I noted I think back then we had just released our, updated our hydrodynamic model, and I had noted that that was needed to put out the harmful algal bloom burden. And that occurred this year where that was fully transitioned over from National Centers for Coastal Ocean Science which kind of developed the model. It's being supported by GLERL with observations.

But that went live this July. It immediately did detect a balloon that was occurring. I think there had been a seasonal forecast by NCCOS had forecasted a very significant season this year, not necessarily record setting but significant.

I don't think that's quite turned out that way, but however if it happens, they're

well-protected with, or well-formed I should say with the bolt.

And so a big thing we've been doing in recent years is trying to enhance our ability to do with patterns by building some tools and stuff for ourselves, but also for our partners. And this is to expand the NLON, you know, the ports, all sorts of things.

So one thing we did, and this was in conjunction with NGS, we did water level training. This was when it was at the Smithsonian facility right in Chesapeake bay. But this was to the Research Reserves association.

Up until now we've been kind of working with him individually, trying to help then with their geospatial data needs. It's been pretty inefficient. And so now we've kind of signed some agreements with a research reserve systems to do a train to trainer sort of approach and let them kind of, train key people and let them kind of then take care of the entire network. And it was over 35, I thin, research

reserves in existence.

And then also we put out online data calculations too. And this allows people to take their own data and put it calculate title datums. That data doesn't necessarily have to be to our standards, which was kind of an obstacle before. So this is now available as well, and we've been providing training on this as well.

So I thought talk a little bit about Hurricane Harvey, this is just one piece of the quick look tool, I mean, if you can't really show the whole thing on a slide. This is partway through the storm.

You know, again, thanks to the TCOON Network, very dense network of gauges along the coast there. TCOON ports and Enlon together.

And one thing we started last year, during last year was we came up with a graphic to kind of display what were the highest water levels observed because that's information that people want, like, right away.

And it's actually won, a good

government tweet award because this got tweeted out. But you can see here Manchester Texas which I'll try not to take Jeff's head off here.

(Off-microphone comments)

MR. EDWING: Yes, right there. So that experienced the highest water level. And here's the graph from there. And you can see that water level, just it rose, just hung up there.

And of course this was due a lot to the heavy range and a lot this is flood induced flood, you know, elevation. Not so much storm surge.

And then I kind of have a bit if a neat video one of our IT people put together. And all of those numbers or things streaming across from left to right, these are data requests to our website. Okay?

This is one minute during Harvey. And on the right column, that's all of our different products and services. You can see ports in quick look and things.

And every time you see is number, I think it's 200 pops up, that means that request has been successfully, you know, delivered.

So we talk a lot of data management. It's kind of hard to visualize sometimes, so I thought this was kind of a pretty cool, you know, visualization of that and I thought I would share it with the panel.

So every once in a while you'll see a 304 in there which means there was some issue. That was probably Bill Hanson trying to use the website.

(Off-microphone comments)

MR. EDWING: Asking for port information, no doubt. So, segueing to looking forward to '18. And again, up in the Great Lakes, so we've had some minor success with getting some outside funding, and we did get a little more GLRI funding to do some additional gauging up there.

But we're really going to make a big dent in seasonal gauging up in the Great Lakes

for both IGLD and VDatum, is using some of the VDatum money for gauging to do, you know, the Great Lakes at the same time.

And I have to extend my thanks to Juliana and my co-directors or tri-directors. And actually it was I can't give the credit to Shep, I have to give it to Gerd.

At the time they agreed to accelerate the Great Lakes because the Great Lakes were kind of far down the road. But by accelerating the gauging we were able to kill two birds with one stone. So that's going to be the big deal.

Current surveys, you saw we're just finishing up a really large one. Moving forward we're having to trim down a little bit on our current surveys because of, you know, level funded budget.

But we have a nice small project up here in Kachemak Bay, a partnership project with the National Center for Coastal Ocean Science. You know, probably some moderate navigation benefits. It's obviously not a big commercial

area, but recreational and fishing certainly.

But they needed information to run some models there because they're having issues with harmful algal bloom breaks, outbreaks and needed hydrodynamic information to better understand that.

So we're going to be conducting that survey with them, in conjunction with them, sharing some costs and things. That's at Kasitsna Bay Lab.

And then we have a survey planned for south Texas. You can see the locations here, kind of a moderate sized one. We're actually probably going to have to revisit whether we can do this one or not because we always do a recon a year in advance.

And given how much conditions have changed, we're not certain whether our recons are still valid. So we're kind of reevaluating this one.

Ports, five new ports, Miami in FY '18. Miami you're already well aware of. Corpus

Christie, and the nice thing about Corpus Christie is that's the last of the top ten seaports in the US to have a port system.

Port Everglades which is just right up the coast from Miami. Kind of a nice little story there. The Port Authority is funding this for marine transportation purposes, but it was also put in by, it was a lot of support from the South Florida Compact to get this in for sea level rise and resilience efforts. So it was a collaboration down there between those entities.

Kings Bay, Georgia is for the US Navy. They have, they bring nuclear subs in and out, and we want to make sure that happens safely.

And again, going back to the Cleveland meeting, you heard there was a lot of concern about three current meters. We've been operating up there as a legacy with an earmark about those going away.

And at that meeting we announced that one of them had been made into a ports courtesy of Cary's association. So that one found

sustainable funding. Now Toledo, Ohio has found a home with the pilots up there. And so we're down to getting one moved over.

For modeling, and again this is another nice collaboration story. We're upgrading our New York, New Jersey forecast model and actually bringing in the very good hydrodynamic model developed by the Stevens Institute at NIHOPs I think it's called.

But you can see there's our kind of image that we've been using forever, kind of to kind of show a whole estuary. It's very outdated. You can see the vast improvement that folks will see in the delivery of that model and as we implement that next year.

And then also we're going to be transitioning to Gulf of Maine hydrodynamic model. I don't have a graphic of that, but that's another case where that's needed to enable a potential harmful algal bloom forecast model up in that area as well.

So I think this is my last slide. And

again, there's a lot of things going on right now in NOAA, kind of bringing some things together.

Something called the Integrated Water Initiative, and that's where when we talk to people about water levels that we're talking about total water level. So tides, that's the storm surge if that's going on, that's waves, that's freshwater input.

And so a lot of work we're doing here in CON-OPS is being picked up and brought into that. One specific example is this capability we're doing through the Coastal Inundation Dashboard where you can go in and show what people, here's a location before flooding and then there's a location at a certain level of flooding showing you what it might look like because again, even getting people the above ground forecast that the Weather Service is now using it, maybe hard for them to visualize that.

We're continuing with a lot of training courses. And again, this is in conjunction with NGS. So very appreciative of

that. And then there's a, kind of a big modeling unification effort. There's a lot of planning going on here, but the first step is a CON-OPS concept of operations as we're looking to add river forecast models to our hydrodynamic models, some of the off shore weather service models. So that's in progress.

So I think that's it. I think we're holding questions to the end, is that correct, Bill? All right.

MS. BLACKWELL: Turn mine on. Okay, if we can load up the NGS slide deck. First of all, just start off as this is loading up, just to recognize a couple of NGS employees who are not able to be here today, one being Mike Aslaksen who we normally have here at the HSRP meetings. He's back in Silver Spring busy overseeing the emergency response damage assessment, imagery, operations that are ongoing.

NGS was tasked by FEMA through a mission assignment to collect imagery over Florida or along the Florida coast as well as

Georgia and Alabama.

So we started doing this collections yesterday. I had up on the screen when you came into the room the image of an area there that's been collected by operations are underway.

Imagery is being posted on our webpage and made available to FEMA and others. So I'll have some slides of some of the previous imagery from other storms in my presentation. But I wanted to make sure that you're aware that we are working on that.

Also, Dan Martin is our geodetic advisor for the northeast region. He's based out of Vermont and he had planned on being here this week. But a project of ours got delayed in Colorado and he had to go back out there to finish his operations up this year.

So he was not able to be here. But there is an advisor for the northeast. And hopefully get to meet him next time we're up this way.

So some updates for what we've

accomplished in FY '17. It's one of the highlights I'll go through quickly and then as Rich did, just some outlooks for priorities for FY-18.

The first thing I want to say is we continue to work on our outreach and education and communication for the scientific work that we're doing. One of the things that was in badly need of repair of update was our homepage.

And so we've taken a first draft of reorganizing our web content and bringing the homepage up to date to help orient new web users. We know that the folks that come to our website regularly know where to find things, so we're probably irritated them a little bit by changing things. But hopefully having things grouped differently will bring some new users in and enable them to find information easier.

Under our science and education or training and education depending on where you click on it here in our webpage, there's a whole lot of information that is available that I just

want to let the members know that it's out there.

I want to also say there's an optional homework assignment because we've were talking about datums tomorrow morning bright and early. If you want to get a jump start, you can go under the science and education or training and education areas and look for science and education, you look at educational videos.

Okay, these are five minute type videos on datums, why are we changing the datums, all sorts of cool little things. So even if you don't have time tonight to do that, please take a look and do some, give us some feedback on the videos too. So I hope that those are helpful.

Other big outreach event that we had this year was our geospatial summit back in April. I know that I've mentioned this in the past HSRP meetings. I just want to follow up and say if you weren't able to make it or if you're interested in seeing what that was about, the information, the presentations, the videos of the presentations and a summary report are all going

to be available on our website if they're not already.

We had over 400 people attend, a number of individuals from federal agencies as well as state and local agencies and private sector. We had a number of speakers that reported to us, you know, what they thought the good things were about the new datums as well as some of the concerns that they had.

So we got both, you know, we got all sorts of feedback there during the event as well as afterwards from a wide range of stakeholders.

We're going to continue to use that information to help us with our outreach and education, and maybe some pilot projects to help particular agencies with their workflow data question issues as they come up as we move forward with their NSRS modernization effort and update to the datums.

You've also heard me talk about GRAV-D a number of times. So I'm going to give you a quick update on that just as a refresher for

those who are not familiar with it.

GRAV-D, Gravity for the Redefinition of the American Vertical Datum is a project that is underway and began in 2010, to be completed in 2022. It will be the basis for the update of the vertical datum that we are currently proceeding with.

This new gravity based vertical datum will be accurate to about the two centimeter level where possible. And this is something again that we're replacing NAVD 88, the current vertical datum of the United States and hope to be able to have that available by the end of 2022.

We did have some preliminary socioeconomic studies done on our efforts, and we have been told that this new vertical datum will result in an estimated $522 million benefit to the nation once it's implemented. And those are old numbers.

So the beauty of this is that being able to use GPS or GNSS equipment to get an

accurate height, a relevant height for folks to use for their surveying and mapping efforts is something that is really going to transform the way that we do elevation, collect heights on all sorts of things geospatially.

I want to mention in keeping with the theme of unmanned or autonomous vehicles, some of the things that we're doing on the gravity side which is this, what you see pictured here, the Aurora Centaur is a optionally piloted aircraft.

And we used this operationally for the first time this year to collect airborne gravity data. The project lasted about one month. We flew out of Winston-Salem, North Carolina and collected data over western North Carolina and eastern Tennessee.

And this data were used to fill in with the GRAV-D effort again, you know, marching along, collecting all the coverage over the United States and our territories as it showed on the previous slide. We're about 63 percent complete with our data collection efforts and are

on track to finish by 2022.

Also want to mention that the Aurora Centaur was basically came out of a small business research innovation effort. And we have now completed Phase 1 and Phase 2. So now we are in this operational aspect of using this craft for collecting GRAV-D.

It really has the potential to increase our efficiency, to reduce costs, and also to improve the data quality. We were really concerned about whether or not we would get good data on a craft of this size, and we found that it really performed extremely well. So we were very pleased with the product from that data collection.

Also as part of our GRAV-D effort is validating what we're doing from the air. And so one of the ways that we're doing that is through these Geoid Slope Validation Surveys.

It's a combination of geodetic surveying techniques that we perform in a particular area and do all of our, you know,

geodetic wizardry to it to make sure that when we look at everything, we do see and can validate what we're getting from our airborne gravity.

This is the third of three planned surveys. This is almost complete. This is the project that's underway in Colorado that's keeping Dan Martin from being at this meeting today. But it again is giving us that competence and ground-truthing of our GRAV-D results.

This project is in the most challenging topographic area. Again, anything, just about anything in Colorado is going to give you some challenges with the elevations out there. But over 221 miles of survey project area and 4,000, over 4,000 elevation, 4,000 foot elevation change, and we've had great success in collecting the data.

We still have a lot of number crunching to do, but we're most hopeful that we'll get some good results out of that.

We know that the GRAV-D and the accuracy that we get for the new datum may be not

as great in the higher elevations as it will be in the flatter areas along the coast.

But really, where the elevations count the most is where things are most flat, as we've seen most recently in the Houston area and now in southern Florida and along the Gulf. So I'll give you some more updates on that after we get that information processed.

This is just a number slide to give you an idea that we're on track with doing our standard operations for collecting shoreline information, making sure that we are able to get ports updated and in analyzing the changes in other ports and continuing to update our shoreline product.

You know, most of this is for the benefit of the nautical chart, but all this data is available, whether it's the imagery data or the lidar data, it is available through our website and through Digital Coasts. So there's a lot of other uses for the data that's being collected.

So anyhow, we're basically meeting our metrics or exceeding them from what we had planned for this year. Kind of the standard numbers that we do every year.

In addition to those operations, there's always opportunities for something new and unique. This past year we did some lidar work in the Florida Keys. This was in support of the US Coast Guard Navigational Safety request, safety for their fleet and also for updating of the nautical charts in the region.

Some of these areas had not been surveyed since the 1900, 1930 timeframe. So we were able to collect near shore information using the lidar, topography lidar. And I think I would say about 258 square nautical miles, it seems like it's probably more than that but that's the numbers that I have, but that information has been delivered to Digital Coast.

It's not going to change by itself. There we go. For the first time NGS has been able to resolve some imprecisely positioned

charting dangers using the topography lidar. So you know, for water to be surveying in, the ability to see where some of these things are and to work with Office Coast Survey to help resolve exactly where these things are based on the old charts and where they should be plotted on new charts.

So you can also see the types of resolution that you get on the dry side as well as the wet side and using this capability. So some beautiful images here of the Fort Jefferson and the lighthouse on Loggerhead Key and Dry Tortugas.

And I know you can't see it very well, but being able to look at the water side and pick out that, those objects whether they're wrecks or whether it's vegetation, et cetera, to create opportunity to use this system and be able to update information and make that data available for others who are using it.

For example, for looking at coral related habitat mapping work, et cetera. So

there's still I think some lidar data that's being processed. We're hopefully going to complete that here soon and make that also available through Digital Coast.

And now just a few slides on the emergency response imagery. Earlier in this fiscal year, back in October of 2016, hurricane Matthew was a late, later in the season hurricane that we responded to, tried to match up some of the imagery here of the before and after.

So dramatically you can see where the change in the shoreline was and what was there before and is no longer there.

I know it's a little bit difficult to see on the large screen, but I do have the URL that's here where you can find all of the NGS imagery. If you go on that webpage you'll see it's listed by storm, by hurricane.

If you click on that, brings up a nice little viewer and you've got to kind of zoom in to the areas that you're looking for. And if you keep zooming in and click on some of those

buttons there, it will show you different information. You'll get a good view of whatever area you're looking for in that part of the country.

So the few pictures here for hurricane Harvey, again this is, well it was the latest hurricane when I put the presentation together. It's been superseded obviously. And so that's information there, the before and the after, kind of toggle back and forth.

So this is, having that before imagery really brings home, you know, what's changed. And so we've done the aerial oblique imagery and collecting things, you know, in blue skies and then having that available and have it all geo-referenced so that we can do the comparisons to what's changed afterwards.

That's another before and after type of thing. And on our website, you're able to see the before imagery as well.

So the information for Irma is also posted in our storms webpage, so you can click on

that and it will get updated on a daily basis for what's been collected.

Switching gears a little bit, just to talk about some decisions that have been made in collaboration with our international partners as well as through our stakeholders here in the US, we've come up with a framework for modernizing our new reference frames.

When I say reference frames, you can think datums so it makes it easy on you because we all know that, you know, datums are us, datums are NGS. So I don't want to confuse it too much, but we're calling them reference frames. In some cases a datum and another, and I'll explain that some more tomorrow.

But for the purposes of the modernization effort, we are actually creating new reference frames in four different, on four different plates, the North American plate, the Caribbean plate, the Pacific plate, and the Mariana plate.

And so we have four different names

for those reference frames. And if you think back to the whole tectonics thing and how things move over time, they're moving in different directions slightly and at different rates.

And this becomes important when you're trying to position things over time and trying to compare things that were positioned in different epics, in different years and different survey projects. And just to see what the change is, what are the changes and what you think it will be like in the future.

The other datum that we are changing is the vertical datum. We've got this whole area that we are looking at as far as creating a new geo-potential datum. Think of vertical and NAVD-88.

But we're doing this for the US as well as all the territories. And so we're expanding this. We'll have a model that's available for us to be able to use for this entire area.

The areas that are outlined in white,

yes I know it's hard to see here, but those are the GRAV-D areas that have been collected. Again, GRAV-D being the base new data set that's being used for this effort.

And we've got a name for this one as well, the North American Pacific Geopotential Datum of 2022. Again, we'll talk about that just, you know, briefly tomorrow. But the idea, this is the replacement data for NAVD-88.

And then I have one slide here just to talk about what are our priorities for FY'18, some of them at least. The big outreach event we have planned for next year is really an industry day talking with vendors, you know, in the GPS side as well as the GIS side and other entities about how do we work together to get the best roll out for the 2022 datum, the modernization efforts and other ways that we can partner.

We've got a plan for updating the VData in the New York Bight/Long Island Sound area. There's work underway now, but the FY '18 we expect to be able to have that model released.

We've got a project underway right now in Guam and the Northern Marianas to collet some additional data so that we can help define the movement on the Marianas plate for 2022.

And then we're taking a fresh look at our CORS program and redoing our project plan for that, or program plan for CORS. So we've got that effort underway and expect to have that complete in FY '18.

We are also conducting a socioeconomic study of our regional advisor program. And then our current ten year strategic plan that we're five years through, we're doing a five year refresh on that. So that might be something that we will ask the HSRP to weigh in on when we get to a, you know, second draft stage to share with you all to see if there's anything in there that you think we could improve or clarify.

And then lastly I have here to perform a 3D nation study. It's a joint effort. Ashley's going to talk about that some tomorrow. So just if you wanted to let folks know that

we're involved in that effort. And with that, I am finished. Thank you.

RDML SMITH: Pretty straightforward.

MS. BLACKWELL: Yes.

RDML SMITH: They do what they think they would like to do. All right, well I'll go ahead and get started because my first slide is just a title slide anyway.

But I did want to, in my presentation today I'll start off as my colleagues did, with a little bit of an update on Irma and Harvey. And then I'm going to touch on the progress we've made on the four major areas that we've talked about for the last few meetings for coast survey, the National Charting Plan External Data Source Policy, the Autonomous Roadmap, and the Hydrographic Survey Priorities.

In a sense we've already talked about some of those, so I may be able to go fairly quickly. And then I'm going to introduce two additional topics which probably won't be ongoing but I did want you to be aware of these programs

or they're across NOAA. And it's with the Now Coast and Total Water.

So let's see. Working? Yes. All right, well that was that. So hurricane Harvey response, we had a number of NRTs down there and focused primarily on Corpus Christie and Houston Galveston. They did a few other side trips for specific, not wholesale resurveying but for specific reported problem areas in some other ports and the intercostal waterway.

But the main effort was in Corpus and in Houston Galveston. So we had NRTs there. And we also were redirected the David Evans and Associates and their vessel, the Blake, to from a routine survey that they were doing for us to go over and help in Houston Galveston. And they were there for a week or two contributing greatly with a little bit larger vessel to some of the approach work.

As we discussed earlier, that was a redirection from an existing contract. We didn't have any additional money that we were able to

bring to bear for that.

Hurricane Irma, this was now ancient, but this was at the time I was putting the slide together this was what was happening in real time. And clearly, huge impacts on Florida.

This is more or less up to date. I think there's been a couple of movements since then. But this is essentially right as the storm was hitting. The ports that were closed, and they were closed all the way from Panama City all the way around to Savannah, and where we had the NOAA assets and our contractors positioned.

And I don't know, you can probably see the little, do I have a pointer? We staged most of our folks out of the DRC, Disaster Response Center in Mobile where it seemed early on as if they were going to be really far away.

And we're really happy actually that they were that far west because they were clearly outside of the path of the storm, but not as far as we thought they were going to be.

We had the day after the passage in

Miami we got a C-130 flight with our MIST kit and a team to go down and they staged on that police boat down in Miami. And today they're on their second day of survey work already in Miami.

And since it's a fairly small port, you know, it's going to be, we'll be able to make a pretty big difference there.

The two NOAA ships that we're working in the southeast, they were working off of Savannah and Jacksonville. They went back to Norfolk to get out of the path of the storm, and the Thomas Jefferson got underway this morning and will be, and is steaming south to work approaches to Brunswick.

We also have an NRT as of this morning in the interior parts of Brunswick, and another NRT in Tampa. The Army Corps, I don't think we know the full extent, maybe Jeff does, of where, oftentimes the Army Corps had their people in their boats are right in the path of the storm.

And so they sometimes are affected themselves in their ability to respond just as

the rest of the port is. But I do know that in Tampa, one of their larger vessels is available and is doing a bunch of the approach work in the outer channel there.

And I understand there are Army Corps survey units working in some of the other ports as well. But that part doesn't trickle to me as much as where the NOAA folks are.

But at this point it looks as though we're going to have between our in-house assets and what we can redirect from contractors that are in the area, we should have enough capacity to meet the survey demand this week, as we understand it today.

I did want to pass on a little note that we got from one of our absent members. This is from Sal Rassello. He wrote and said just to give you an update, Miami has been tremendously hit by Irma. I'm sure you're watching the news.

On a positive side, I am fine, running a backup operation center from Philadelphia with a small group of people. So he's not down there,

he's in Philadelphia.

We have all the ships outside Port of Miami, Port Everglades, Port Canaveral waiting from NOAA for a complete survey. People are desperate to go home if they will find it. I hope NOAA completes the job soon. Sal.

(Off-microphone comments)

RDML SMITH: You got a new one?

(Off-microphone comments)

RDML SMITH: All right.

MEMBER HALL: He wants to know if it's going to be clear today.

RDML SMITH: All right, well maybe we won't do this in real time. So yes, okay. I think that's enough on Irma.

The National Charting Plan, thank you all for your 13 pages of comments on the National Charting Plan. We're counting that as one response, but clearly the most thorough of any of the ones that we got because it was aggregated.

But we did get 280 other comments as well to our open comment period, which is great.

Many of them were responding to really a misunderstanding or a rumor that got started that this was, we weren't going to do what we said we were going to do, this was a stealth effort and we were going to cancel all the paper charts next year, as soon as the final ECDIS requirements came into place.

That was just a rumor. And really we had never had that intention. But we did end up having to do a lot of sort of PR damage control as a result of that. And some of you helped with that, so thank you.

Let's see. So ultimately on that particular issue, our thinking right now is we have a suite of charts. It is serving its intended purpose and we plan to maintain it until they're no longer necessary.

On the other hand, we don't probably plan on making any new paper charts from here on out, designing and laying out new paper charts.

For our work going forward, we'll be re-scheming and building a lot of new coverage in

ENC and perhaps in raster-derived formats. But it will be all for electronic purposes and not for paper use, direct paper use.

Now we also will be demonstrating soon, it's sort of already out but in a sort of soft release a method to be able to take direct from our database and make something that looks an awful lot like a paper chart from directly in the area in scale and blue tint level and units that you want.

So that's not going to take the place of real paper for some time. But that is a method by which you could get something on paper, and we'll be demonstrating and getting feedback on that soon.

So this is based on product on demand technology from Esri. So quick hat tip to guy in the back of the room for that.

The next, we currently plan to have a revised final draft by the end of September on the national charting plan which will incorporate all of your comments. And we will be discussing

that in public at the industry day that we have planned for the Annapolis Boat Show.

So I hope you can come to that, Susan. This is something we've done in the past where we will bring in not end users but all the chart systems manufacturers and repackagers and that sort of thing.

So everybody from MapTech to Garmin, et cetera, who use our charts and build value added sort of products and services on top of that. So we're excited about that and we expect that to be a lively discussion as well.

Externally sourced data, we have been making great progress on this. We challenged ourselves at the beginning of this fiscal year performance cycle that we would have 30 percent of the surveys that we put on the chart would come from external source.

That is they were not commissioned or paid for by NOAA or Coast survey. They may be other parts of NOAA. And where it looks like right now we're going to make that at 32 percent.

So we're almost here at the end of the fiscal year, and Captain Brennan will be providing an update on that tomorrow I believe, and so I don't want to steal his thunder. But we are, we've very excited about that and we're planning on, you know, perpetuating that in years to come.

Unmanned systems, we got a great brief on this yesterday, so I think I will not belabor it any further.

Let me comment just briefly on the sail drone because I don't think we talked about that. And that's really a partnership with the Pacific Marine Environmental Laboratory, PMEL in Seattle and with the sail drone company themselves.

We didn't put a hydrographic system on there, but there was a fisheries echo sounder which the sound went all the way to the bottom and came back. And so we're able to get some level of bathymetry out of it in just a single beam sense, which is fine for that type of

reconnaissance.

But that sail drone did a, I can't recall how many day but full season --

(Off-microphone comments)

RDML SMITH: How many?

(Off-microphone comments)

RDML SMITH: Three month deployment to the Arctic. And they were not doing, they didn't lay out their track lines for bathymetry that would be relevant for navigation.

But there are some places where that could go that would be helpful to us. And so we're going to continue that partnership with PMEL. We don't need to take it over, they're doing a great job.

But we're just, you know, sort of one mission area that they're looking at for that type of platform technology.

Unmanned systems, this was another we're not only doing things ourselves but really engaging with technology and industry. And this is a picture from the industrial consortium day

that was here at UNH associated with our annual review. And got a great turnout of some of the best thinkers in the industry and some challenging topics and challenging conversations and again, helping to figure out where we are and what we need to do next.

Hydro surveys priorities. We are continuing to refine the hydro health model which we are using to inform some of our near term choices for where we survey.

We haven't released it fully yet, partly because we haven't fully documented it yet. And until we expect a lot of questions, and until we can have a good documentation set to go with it, we're not releasing it.

But it's, that's really about a risk model for AIS carrying deep draft traffic. And that's not the only reason to survey. So we have in a sort of complimentary way looking at discrepancies. And then looking at a broad interdisciplinary mapping, finish mapping the USEEZ as a big challenge.

I was listening this morning during the brainstorming to see whether you all would, were interested in supporting big ocean mapping like that.

And I didn't hear, and I was curious to hear that I didn't hear it. But it's something that's worked, working, and it clearly needs to be a big, interdisciplinary effort to out together a challenge, sort of a challenge mapping campaign at that scale.

And then lastly we're, we've got a lot of effort through precision navigation and similar efforts for not only surveying but also delivering some next generation navigation products in ports and approaches so that we can make better use of this full resolution multi beam that we have available to us that it's simply not honored in even a comical way in the channel tabulations that we put out now for ports.

So Now Coast. Quick show of hands, who's ever typed in Now Coast and used it? Got

about half around the table here, about half back there.

So that's your second half of your homework when you get on the internet is to take a look at what's in Now Coast. It is, we've been doing it for 15 years or so, yes about 15 years.

So this is one of the earliest sort of portals if you will for information, and one of the most mature. It is maintained out of the Coast Survey Development Lab. And in fact the programmers for it are stationed here in Durham at the Joint Hydrographic Center. And they're well integrated.

There's a huge amount of weather information that is now in some cases best portrayed and best disseminated through this portal. And so the Weather Service is a huge partner now for this.

And as a result, it's gotten really, you know, top priority billing at the Integrated Dissemination Program, IDP, and has really high priority with the Weather Service.

And so anyway, it's a sort of bewildering amount of information available there. But it has proven to become to be really popular. So this is historical web statistics.

Oh, and there's a mariner view as well that brings up the charts and other things that are more relevant for navigation.

Clearly this is the same type of exponential curve that you see for many things on the internet. But it's certainly very clear for Now Coast. And given where the peaks are, we can get a little bit of an idea of when people are using it and why.

You know, clearly all the storms and wildfires and, you know, earthquakes, eclipse even they saw a bump associated with the eclipse. So that's anything else I should cover on that, you know, think, E.J.?

CAPT VAN DEN AMEELE: There's a comment that Sunday was the busiest day ever, and yesterday was the second busiest day ever in terms of traffic.

CAPT ARMSTRONG: I was on it about eight times.

RDML SMITH: And the numbers are what, 20 million page views a day?

CAPT VAN DEN AMEELE: Yes. During Irma it was about 25 million per day, 450 a minute.

(Off-microphone comments)

RDML SMITH: We do see it excerpted on the media sometimes, but I don't know that there's an active promotion for it. Go ahead, E.J.

CAPT VAN DEN AMEELE: I don't have a microphone but, there are a lot of state and local emergency management-type agencies that actually, they built their system using input and feeds from nowCOAST. So they might not be using nowCOAST directly, but they link into it --

RDML SMITH: I'll summarize. A lot of emergency managers are using it.

MS. MERSFELDER-LEWIS: I'm so sorry, but we are at the end of our time. There are

other things going on this afternoon and tonight.

RDML SMITH: Total Water? We're doing that too.

CHAIR HANSON: Yes, sir. Mr. Kelly?

MEMBER KELLY: I've got one aimed at Rich. I am a huge fan of everything coops does. I mean, and just your talk just emphasized what you're doing for safety and navigation and societal issues.

Can we expect to continue expansion of what you are doing considering that every time you add a new system, you're taking on maintenance and support obligations, or is there some place where we hit the wall, where we can't continue to proliferate these types of things, because I'm thrilled with the way it's going but I'm just concerned.

Are you going to get internal funding or support, or can this continue to move forward is really what I'm asking.

MR. EDWING: Okay. Well, thank you Ed. And just for everybody's context, it's a

cross share program, public/private partnership.

MEMBER KELLY: I love everything except the funding program.

MR. EDWING: Yes, I know, I know. But where the partner pays for the establishment and maintenance of the local observing infrastructure and then we're funded through the President's budget to do the program, administration, and data management.

And so I'm going to say the Ports program is becoming a bit of a victim of its own success. We've seen over the past few years a very steep increase in the number of ports requests, just not for new ports but for expanding existing ports because in a lot of these port office, one and two centers but they keep adding on.

And you've heard me say in some past HSRPs that I could see the day coming when we might reach, you know, the limits of our capacity. And that's really where we're at now.

You know, you saw there was, well, it

was really just one this past year, but that's because a couple of these other ones slid over to the right. But we're at the point now where as new partners approach, and even for the major enhancements existing ports we're having to say well, we're kind of putting a pause on those because our capacity, there's an internal O&M tail for me as well in terms of contracts and agreements and even just the data management end that we're really at the point where we need to get some things figured out before taking on more.

Things have gotten out of balance internally with the budget. So thank you.

MEMBER KELLY: Because they're a huge success and there's obvious economic and societal impact that these programs bring to the table. So I think we'll have to take a look at, you know, how we can continue to move that project forward. It's just huge public exposure. And again, it's worth a lot of money to the safety of life and to economic stimulus.

**CHAIR HANSON: All right, we're out of here, guys. We got a 2:45 catch a bus. And we will reconvene the public meeting tomorrow morning at 0830.**

**(Whereupon, the above-entitled matter went off the record at 2:38 p.m.)**

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# C E R T I F I C A T E

This is to certify that the foregoing transcript

In the matter of: Hydrographic Services Review Panel Public Meeting

Before: National Oceanic & Atmospheric Administration

Date: 09-12-17

Place: Portsmouth, New Hampshire

was duly recorded and accurately transcribed under my direction; further, that said transcript is a true and accurate record of the proceedings.

Neal R. Gross

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Court Reporter