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
APRIL 18, 2017

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The Hydrographic Services Review Panel met in the Kimpton Hotel Monaco, Paris Ballroom, 1101 4th Avenue, Seattle, Washington, at 8:30 a.m., William Hanson, Chair, presiding.

MEMBERS PRESENT

WILLIAM HANSON, HSRP Chair
JOYCE E. MILLER, HSRP Vice Chair
DR. LAWSON W. BRIGHAM
LINDSAY GEE
KIM HALL
EDWARD J. KELLY
CAROL LOCKHART
DR. DAVID MAUNE
SCOTT R. PERKINS
CAPTAIN SALVATORE RASSELLO

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
DR. LARRY MAYER, Co-Director, NOAA/University of New Hampshire Joint Hydrographic Center

STAFF PRESENT

REAR ADMIRAL SHEP SMITH, HSRP Designated Federal Official; Director, Office of Coast Survey
RUSSELL CALLENDER, Assistant Administrator, NOS
MIKE ASLAKSEN, Chief, Remote Sensing Division, NGS
MARK ARMSTRONG, Geodetic Regional Advisor, NOAA/NGS
GLENN BOLEDOVICH, Policy Director, NOS
CAPTAIN RICK BRENNAN, Chief, Hydrographic Surveys Division
JIM CROCKER, Chief, Navigation Services Division
BEN EVANS, Chief, Coast Survey Pacific Hydrographic Branch
RACHEL MEDLEY, Acting Deputy Hydrographer
LYNNE MERSFELDER-LEWIS, HSRP Coordinator
ROLIN MEYER, Branch Chief, Field Operations Division, CO-OPS
TRAVIS NEWMAN, Marine Chart Division
AMANDA PHELPS, Budget and Program Analyst, OCS
JIM RICE, NOAA/NOS
E.J. VAN DEN AMEELE, Chief, Coast Survey Development Laboratory

SPEAKERS

JOSHUA BERGER, Governor's Maritime Sector Lead, Washington State Department of Commerce

CAPTAIN JASON R. HAMILTON, Commanding Officer, USCG Cutter Healy, U.S. Coast Guard

JEFF HUMMEL, Director, Sales and Marketing, Rose Point Navigation Systems

TRAVIS NEWMAN, Marine Chart Division, Office of Coast Survey, NOS

JAN A. NEWTON, NANOOS Executive Director; Principal Oceanographer, Applied Physics Lab, University of Washington

LIEUTENANT COLONEL ANDREW L. OLSON, Deputy Commander, Seattle District, U.S. Army Corps of Engineers

JEFF SIEGEL, President, ActiveCaptain

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

8:30 a.m.

CHAIR HANSON: Good morning. Can we all take our seats and we'll get started, almost on time. Too many excuses later on during the day.

Good morning, everyone. My name is Bill Hanson. I'm Chair of the Hydrographic Services Review Panel. I both call to order and welcome all to the Panel's Spring meeting.

It's great to be in the Pacific Northwest and the great City of Seattle. We can tell by the attendance here that it's been a while since we've been here and it's probably something we need to pay a lot more attention to.

My thanks to Panel members and staff for putting together a robust program. Our program also includes presentations by our Federal partners and NOAA leadership, who are well-represented, and as is the custom and our usual practice, we have presentations from spokespersons representing prominent, local and

regional organizations.

We'll do our best to stay on schedule, but we also recognize we're here for a reason, and we all want to contribute and we may have questions to ask. But we look forward, as you do, to making the most of our time here, as we have much to discuss and do over the next three days. So, let's go ahead and get started.

Let me begin by introducing Rear Admiral Shep Smith, our Federal Designated Officer and Director of NOAA's Office of Coast Survey.

During his 23 year NOAA career, he has advanced -- advances in start-of-the-art hydrography and cartography in commanding several NOAA vessels. A full biography on Admiral Smith is in your meeting materials.

Admiral Smith, it's an honor to have you with us as our Federal Designated Officer. Please share with us your opening remarks.

RADM SMITH: Thank you, Bill. Just a few housekeeping things first.

Emergency exits are in the corners of the room, and then you go upstairs. The bathrooms are back there.

So, we're honored to have such a robust group of experts here, but I did want to acknowledge the representatives of our elected officials in the room.

Up in the front we have Josh Berger from the Governor of Washington. I think Beth Osborne is here from Senator Murray's office, and is Anne Johnson from the State of Alaska here? Great. Well, thank you all for coming. It's a real honor.

I also wanted to acknowledge that there are a lot of technical experts here that we brought from the NOAA staff, that are -- that are here to answer questions, and I hope can be involved in the conversation over the course of the week, and we shouldn't hesitate to -- to reach back to them to -- for a little bit of context, when we get into some of the issues.

So, but first, let me introduce.

There's regional staff. Rolin Meyer from the -- is the Chief of Pacific Operations for CO-OPS. Mark Armstrong is the National Geodetic Survey regional point of contact from Oregon, and Crescent Moegling is the Navigation Services Managers and she's en route.

Mike Aslaksen is -- Mike is here from the Remote Sensing Division of NGS. This is -- a bridge program really, between NGS and Coast Survey. They do a lot of shoreline mapping that's critical to our charting.

New to his role is Captain E.J. Van Den Ameele from the Coast Survey Development Lab. E.J. has a long career as a NOAA hydrographer in marine operations. Happy to -- happy to have him join.

Jim Crocker at the Navigation Services Division is just two weeks into his current assignment. He's part of the group that oversees the NRTs and the navigation managers and the sort of public face of Coast Survey.

Travis Newman, who I don't think many

of you have met, is one of the Branch Chiefs in the Marine Chart Division and will be briefing on national charting plan.

Rachel Medley is here. She's a -- the Acting Deputy Hydrographer on my staff.

You probably all know Lynn Mersfelder-Lewis and may have met Amanda Phelps, who put a lot of this together.

We've got Sam Debow is here, also from Coast Survey staff, and many others.

So, those were the -- oh, I skipped over Rick. Captain Rick Brenna, Hydro Surveys Division.

Glenn Boledovich, who I think most of you know and Jim Rice.

So, I could keep introducing, but those are the folks that I really wanted to call out as being a resource for all of us to participate in.

CHAIR HANSON: Thank you, Admiral Smith, and appreciate you bringing folks here, because it certainly helps us with the

discussion, helps us reach conclusions, rather than just putting issues off for the next phone call, the next webinar. So, appreciate the participation.

Just for our Panel members and other speakers just to let you know how ground breaking and clairvoyant this group can be.

At our August meeting, August and September meeting last year in Cleveland, this group actually predicted the Cubs-Indians World Series, and also the Cubs win. Now, as a White Sox fan, that wasn't necessarily my choice. But that's the way things go. It's baseball.

So, lot of expertise around the table, and so, we appreciate the participation. I'm going to let the Panel members introduce themselves now, and I'll start off with Joyce.

VICE CHAIR MILLER: Hi, I'm Joyce Miller. I'm co-chair -- or I'm vice-chair of the HSRP and -- co-chair, but whatever, and I'm a semi-retired hydrographer. Spent almost my entire career in multi-beam mapping, and my last

-- I was last with University of Hawaii, and Dave.

MEMBER MAUNE: I'm Dave Maune from Dewberry. I'm a specialist with LIDAR SR photogrammetry and a little bit of sonar.

MR. EDWING: Morning. I'm Richard Edwing. I'm the director of the Center for Operational Oceanographic Products and Services.

MEMBER HALL: Good morning. I am Kim Hall. I am with the Brizo Maritime Consulting, which is my own independent maritime security non-cooperation consultancy.

MEMBER KELLY: Good morning. Ed Kelly. I'm the executive director of the Maritime Association in the Port of New York and New Jersey. We represent the interests of the commercial maritime industry in that area.

MEMBER SHINGLEDECKER: I'm Susan Shingledecker. I am vice president of Boat US Foundation. Boat US is the boat owner's association of the United States and our foundation educates boaters to be safe and to

take care of their waterways.

MEMBER THOMPSON: Good morning. I'm Gary Thompson. I'm the chief of the North Carolina Geodetic Survey.

MEMBER PERKINS: Good morning. Scott Perkins. Director of Federal Programs for the surveying and mapping. Consider myself a map-maker, as well. I like how you describe that, Dave. We measure the world from many perspectives. We measure success from yours.

MEMBER RASSELLO: My name is Sal Rassello. I am a cruise ship captain. I'm the end user of the NOAA products, and I cover the position of Nautical Director of Carnival Cruise Line in Miami.

MEMBER LOCKHART: Good morning. I'm Carol Lockhart. I'm the owner of a woman-owned small business, Hydrographic Surveys and Geomatics Data Solutions and my expertise is in LIDAR and multi-beam.

MEMBER BRIGHAM: Good morning. I'm Lawson Brigham. Professor at University of

Alaska Fairbanks. I chair a small working group here on the Arctic within the HSRP.

MS. BLACKWELL: Juliana Blackwell. The director of NOAA's national geodetic survey.

MEMBER SAADE: I'm Ed Saade. I'm the president of Fugro USA and the regional director for the Americas for Fugro. Fugro is the largest surveying American company -- marine survey and mapping company in the world, and we're one of the NOAA survey backlog contractors.

MEMBER GEE: Good morning. I'm Lindsay Gee. I'm a consultant from Portsmouth, New Hampshire, and we've had -- we're co-chairs of the technology working group.

MR. ARMSTRONG: I'm Andy Armstrong. I'm the NOAA co-director of the NOAA University of New Hampshire Joint Hydrographic Center.

DR. MAYER: And I'm Larry Mayer of the UNH, co-director of the joint hydrographic center and director for the Center for Coastal and Ocean Mapping at the University of New Hampshire.

CHAIR HANSON: If we can also have the

audience also introduce yourselves. We'll go around the room. The point of all of this is just so we can kind of know who is in the room and get a sense of the expertise and the breadth of knowledge and opportunity we have.

So, let's see, where do we want to start? Rachel, just because you're there.

MS. MEDLEY: Okay, Rachel Medley, acting deputy hydrographer. Thank you.

MR. BOLEDOVICH: Good morning. I'm Glen Boledovich. I'm the policy director of NOAA's national ocean service.

MR. RICE: Jim Rice. I work in NOS policy.

MS. PHELPS: Amanda Phelps. OCS budget and program analyst.

MS. MERSFELDER-LEWIS: Lynn Mersfelder-Lewis. I'm the purchase RP program coordinator.

CAPT. BRENNAN: Rick Brennan. Chief of the Hydrographic Surveys Division.

MR. CROCKER: Jim Crocker. Chief of

the Navigation Services Division.

MR. VAN DEN AMEELE: E.J. Van Den Ameele. Chief of the Coast Survey Development Laboratory.

MR. NEWMAN: Travis Newman. Marine Division. I'm Branch Chief for the area of west coast. We do all the nautical charting products for the west coast.

MR. ARMSTRONG: I'm Mark Armstrong. NGS Geodetic Region advisor.

MR. EVANS: Ben Evans. I'm the chief of the coast survey Pacific hydrographic branch. We do the quality control and preliminary compilation for the west coast surveys.

MR. MEYER: Rolin Meyer. Branch chief for field operations division under CO-OPS, the Seattle Pacific operations branch.

MR. ASLAKSEN: Mike Aslaksen. Chief Remote Sensing Division. National geodetic survey.

RADM SMITH: Mike, I've got a question for you. How many HSRPs have you been to?

MR. ASLAKSEN: A lot. Negative. Sam, where is Sam at? Sam, would know. Sam's the legacy here.

MS. ANDERSON: I'm Kym Anderson. I'm chief of navigation for Seattle District Corp of Engineers.

MR. DICKSON: Dorrel Dickson. Geospatial survey analyst for the Tulalip Tribes.

MR. HANSON: Eric Hanson with Portsmouth, Seattle and Tacoma.

MR. DASLER: Jon Dasler. Director of marine services at Dave Evans and Associates.

MR. BORBASH: Good morning. Matt Borbash. I'm the deputy assistant chief of staff for operations Naval Meteorology and Oceanography Command.

MS. JOHNSON: Anne Johnson. State of Alaska Geospatial Council.

MR. STEENSTRUP: Per Steenstrup. Hydrographer at eTrac, Inc.

MR. BERRY: Aaron Berry. Project manager for Kongsberg Underwater Technology.

MR. SIEGEL: Jeff Siegel. I'm the founder of Active Captain. I'll be speaking about crowd-sourcing later this afternoon.

MS. OSBORNE: Beth Osborne. Deputy state director for Senator Murray and director of our state outreach program.

MS. SCHALLIP: Michele Schallip. I'm chief of waterways management for the Coast Guard Pacific Northwest District.

MR. DEBOW: Sam Debow. I'm a contractor on OCS staff.

MS. NEWTON: Jan Newton. I'm an oceanographer at the University of Washington and director of NANOOS, which is part of the U.S. IOOS, and I'll be speaking about that this afternoon.

MR. JORDAN: Dan Jordan. President of the Columbia River Bar Pilots.

MS. DECKER: Lauren Decker. Oceanographer with RPS Evans Hamilton.

MS. HOWELL: Good morning. I'm Ruth Howell. I'm acting NOAA West regional

coordinator out of Portland, Oregon.

MR. GARTHWAITE: Martin Garthwaite. Fishboat.net. Developed a data acquisition device that swims like a fish, can go extremely deep and is very quiet.

MR. SCHROCK: Gavin Schrock. Administrator Washington State Reference Network. It's the statewide GNSS infrastructure network.

MR. BRIDGEMAN: Todd Bridgeman. Director of marine operations for NOAA.

MR. VEENTJER: John Veentjer. Executive director of the Marine Exchange Puget Sound.

MS. PELISH: Kathy Pelish. Co-founder of Salish Sea Trading Co-Op. We were pure shared effort at moving local goods by using wind and tides. It's on hold now, but we did not sail without checking the NOAA forecast. So, thank you, NOAA.

CHAIR HANSON: Well, thank you, everyone for introducing yourselves. That's helpful. We also expect to have two Panel

members join us via phone, Larry Atkinson and Anne McIntyre.

So, typically, we have very good participation by our Panel members. Obviously, coming from -- this is more for your benefit, Panel members, is that coming from all over the country, all the very diverse backgrounds. But coming to talk about these charting issues that are so critical, not only to our respective businesses, but also to the maritime -- marine environment. So.

It's now my pleasure to introduce NOAA's leadership representative, Dr. Russell Callender, to administer the oath of office for the HSRP's newest member, Lindsay Gee.

Dr. Callender currently serves as the Ocean Service's Assistant Administrator, with a 1,700 person ocean coastal agency.

Dr. Callender's and all the speaker's biographies are included in your meeting materials, on the web, for those on the webinar.

Dr. Callender, thank you for being with us. We're looking forward to hearing more from you after the swearing in.

DR. CALLENDER: Thanks, Bill. Lindsay, can you join us up front? We'll do this by the flags.

So, I, Lindsay Gee, do solemnly affirm that I will support and defend the Constitution of the United States, against all enemies, foreign and domestic, that I will bear true faith and allegiance to the same, that I take this obligation freely, without any mental reservation or purpose of evasion, and that I will well and faithfully discharge the duties, of the office under which I'm about to enter. I solemnly affirm.

CHAIR HANSON: Thank you, Dr. Callender, and congratulations, Lindsay. Yes, so, it's been a bit of a trail for you, right? We'll be expecting the book of how it came to be, but thanks, again.

We appreciate your willingness to

serve on and contribute to the Hydrographic Services Review Panel. We know you've already offered quite a bit and expect quite a bit more in the future.

Dr. Callender, you're going to provide us now with an overview of current NOAA and NOS issues. Thank you, sir.

DR. CALLENDER: Thanks, Bill. Actually, what I'm going to do is first of all, welcome everyone from my perspective as the head of NOAA's Ocean Service, and then talk a little bit about some of the dynamics in D.C. that are relevant, I think to this board, and give folks a sense of some of the activities that I've been doing in terms of outreach to the broader community.

So, I want to thank the HSRP for the opportunity to join you here this morning. As you know, hopefully you know, I share your commitment to the success of NOAA's hydrographic services today and into the future.

Lindsay, I want to congratulate you on

finally getting sworn in. So, we're able to pull it off. So, thank you, as the newest member of the HSRP.

My boss and Acting NOAA Administrator Ben Friedman was invited and was unable to join us. He expresses his regrets. I will say that in the conversations I've had with Ben to date, he is absolutely and positively a fan of the hydrographic services that we do, what NGS does, what CO-OPS does, as well.

So, we've got a friend in the Acting NOAA Administrator. He just wasn't able to come because literally, he's holding down the fort and there's not a lot of other folks holding down the fort right now, which I'll talk about in a moment.

NOAA leadership will continue to look to the HSRP for your influential ideas, your cutting-edge thinking and innovations that will help us improve and advance our navigational related programs and services.

Your thoughtful guidance and

recommendations will continue to aid us in delivering essential federal products and services now, and into the future.

I'm sorry I couldn't join you in the Cleveland meeting. I was on an self-imposed travel moratorium. I had some family issues that required that I stay at home. I understand it was a very successful meeting and I'm really looking forward to the dialogue today and through this part of the week that I can join you for.

I see that you have time on your agenda to hear from the directors of the Coast Survey, the National Geodetic Survey and the Center for Operational Oceanographic Products and Services. What I'd like to do is offer a teaser and sort of a heads-up in terms of what their remarks are going to cover.

Admiral Smith, director of the Office of Coast Survey, will talk about some of the changes to the way that charting is accomplished. He'll talk about the status of the national charting plan, including an update on the

constituent and public comments.

The focus on customer engagement will also be well illustrated by the public-facing story map for the fiscal year 2017 hydrographic survey plan. Once the field work begins, the public will be able to see the most recent acquisitions every week.

Office of Coast Survey is also emphasizing outreach and integrated -- integration in the use of un-manned systems for hydrographic surveys, by encouraging contractors to incorporate innovative technologies into their survey plans, and hopefully this kind of push and this emphasis can help to stimulate the entire industry.

Rich Edwing, Director of the Center for Operational Oceanographic Products and Services or CO-OPS is going to talk to you about the co-op strategic plan, their progress towards fulfilling it and the plans for the future.

I was really excited to see that this plan focuses on developing a more integrated

product suite that are really meant to be more responsive to customer needs.

Juliana Blackwell, Director of the National Geodetic Survey will update you on progress on the immensely important Gravity for the Re-Definition of the American Vertical Datum GRAV-D.

If you don't know, hopefully you'll be able to join NGS next week. They're doing a National Geospatial Summit in the D.C. area, to prepare the community for the changeover in 2022 to the new datums.

You'll hear more about the latest developments on the National Spatial Reference System modernization and coastal mapping activities during Juliana's NGS update.

So, let me talk a little bit about the budget situation and what's going on in Washington, D.C.

Can't help but notice that there's been a lot of changes since we last met. My staff have told me that there's been a national

election. Kidding.

So, we've had a lot going on and clearly with the transition, there's a lot going on in the news, as well.

What I will say, with any change in administration, there is typically uncertainty and some degree of fluidity about funding, funding priorities, policy priorities and this is -- this is nothing new. Part of it is just kind of working through that fluidity and the policy changes that are happening right now.

Currently, for this year's fiscal budget, fiscal year 2017, we're about six months in, and we don't have a final budget. We will remain in what's called a continuing resolution or CR, until the end of the month.

Basically, a continuing resolution is a Congressional stop-gap funding that funds the government to the previous fiscal year, so 2016 levels, until Congress can finalize their appropriations.

Congress is scheduled to come up with

the final appropriations by the 28th of this month. There is some discussion and back and forth on whether they'll actually meet that commitment or not. So, there is various scenarios that may happen with '17. But I am confident, we will get some type of appropriation fairly soon.

So, the next fiscal year 2018, that begins on October 1st, the White House has released a budget outline or so-called skinny budget. This proposal came out in March.

The preliminary budget proposal focuses on and emphasizes national defense, border security and immigration.

With those priorities as the backdrop, one of the challenges is, how do you fund that, and the intent laid out in this so-called skinny budget is to help cover those priorities from the discretionary budgets of the agencies.

NOAA's budget is completely part of that discretionary budget. That means to be able to fund the priorities that the President wants

to lay out there, some of the NOAA budgets, pieces of those NOAA budgets will decline.

I can't really talk about the details of what that looks like until the President releases those details, because essentially, this information is embargoed.

My understanding is that we will see the details of that budget in mid to late May. That date has slipped a little bit. It was originally mid May. Now, it's late May. It might go into June. We'll see when it comes out.

One thing that I do want to mention and point out to the HSRP members is, some of the language that was in this skinny budget actually points to the value of the surveys and mapping work that we do.

There is some language that talks about zeroing out about $250 million in a variety of NOAA grant programs that are mentioned kind of in general terms, but then it says, and I'm going to read this language.

It says, "These programs are lower

priority than the core functions maintained in the budget, such as surveys, charting," and there's a couple other things that they mentioned.

I see this as a great acknowledgment and a good window, in terms of what the President is thinking and where those priorities are vis-a-vis the mapping and charting of maritime commerce support.

So, let me move onto transition a little bit more.

NOAA sits in the Department of Commerce. You may have heard that in late February, Wilbur Ross was confirmed as the Secretary. There is -- he has not had a lot of meetings with NOAA representatives to date. He's really only had one meeting with the acting head of NOAA Ben Friedman, at this point.

Right now, he's focused like a laser beam on trade-related issues. He is looking for some quick wins, however, and I've heard that he has expressed an interest in aquaculture and

looking to kind of streamline offshore aquaculture in particular.

If you aren't aware, it's pretty interesting to note that the Secretary does have some business interests in shipping, including some interests in Suezmax tankers and so, clearly, he has an understanding of the value and the services of the work that NOAA provides and that many of you in the industry will resonate with, as well.

So, in terms of political appointees, there is not a lot at this point coming in. There has been -- I would call it a slow trickle, coming into the Department of Commerce. There is only two political appointees that have come into NOAA, at this point.

These two individuals, I met with last Thursday, had about a two hour briefing with them. They are a gentleman by the name of George Kelly. He's the son of a Congressman, Congressman George Joseph Kelly of Pennsylvania.

George is going to be the NOAA Deputy Chief of Staff. He's got experience in finance, real estate and public/private partnerships.

The other political appointee that we have in NOAA right now is a gentleman by the name of Eric Noble. He's going to serve as a senior advisor to the Under Secretary. He has a degree in meteorology from Penn State and a PhD in environmental studies from the University of Colorado.

From this background, you can see that neither of those individuals have really background in our issues. However, in the two hour conversation I did have with them, they did absolutely see the value of the mapping charting mission writ large.

We talked about the value of the -- of what NGS provides, National Geodetic Survey provides and the importance to infrastructure investments, particularly along the coast.

They understood the value of what CO-OPS brings, in terms of the water level

measurements that we do and those connections with industries, such as the re-insurance industry and the impacts of tidal flooding.

So, at this point, I will view them kind of as sponges to be able to learn what we do. I would see that -- say that the conversation was very positive, but we're going to have a long ways to go to really get them up to speed on our issues.

Other changes in NOAA in my realm. I'm probably more excited than anybody because now I finally have a Deputy Assistant Administrator. So, I'm going to be able to focus on one job instead of a job and a half or two.

A woman by name of Nicole Laboeuf, who has come over from NOAA Fisheries in January is going to be the Deputy Assistant Administrator.

I want to thank HSRP writ large and Bill and the team, for your work and your leadership on the issue papers. These papers have been extremely valuable for us in the transition. I think they're extremely well done.

The section talking about the actions for federal leadership or NOAA leadership, I think are right on and it's going to, I think serve us really well, to continue to use these resources and the valuable thinking that you put together. So, thank you very much for that.

I think your counsel and recommendations have really helped set the stage in the ocean service for a couple, fairly large things.

One is pointing out the far-reaching value and economic benefits of our work from the local to the national levels and secondly, made it abundantly clear that how individuals, businesses and communities rely on NOS data, tools and services to make decisions every day.

Because of that focus, because of where I think we are positioned with the new administration right now, I'm pretty confident that we are going to do well when the budget comes out in FY18. Well may be relative, doing well in FY18 budget might be flat, but I think we

will always have opportunities and I think we'll have opportunities with the Congress as well, that I'll talk about in a moment.

I want to briefly mention that as part of the transition, we took a look at the top-line priorities for the National Ocean Service.

If you recall in the past we've talked about coastal intelligence, coastal resilience and place-based conservation. What we wanted to do was to really take a look at those top-line, top-level priorities, to see if we could better communicate the value of what we do and really focus in more plain language terms on our top-level priorities, and these priorities are safe and efficient transportation and commerce, preparedness and risk reduction, stewardship, recreation and tourism.

So, there is a packet or a little folder in your packet. There's some outside that lay out these priorities. I urge you to take a look at that.

I will mention that we're not changing

what we do. I basically am trying to change the top-line messages. So, with the new team, with the majority in Congress, we can have an elevator conversation, describe very quickly what we do, in plain language, in economic-related terms, and that when the elevator door opens and they're ready to get off, they're going to invite us to continue the dialogue versus having the door shut behind us.

So, please take a look at that. I think I've been using these priorities in a lot of conversations on the Hill and they have played fairly well.

So, I've been spending a lot of time, now that I only have one job, focusing on engagement up and out. I've been spending a lot of time communicating our priorities and the value of what we do to constituents, partners, and stakeholders, including Congress.

Glenn Boledovich's policy team in the ocean service provided some amazing leadership and prepared an engagement strategy last

November, and I've been basically putting all of my efforts into trying to execute that engagement strategy.

So far this calendar year, I've had 21 meetings with members of Congress or their staff. I've made between nine and ten, I lost count, presentations to external trade and professional associations about what we do.

When I was up here in -- in the Seattle area in January, I met with staff from Senators Murray and Cantwell and Representative Rick Larsen staff. I've also focused on spending a lot of outreach to members whose districts have major ports in their states.

I've talked to staff from Lindsey Graham and Representative Clyburn about the support we provided in the Port of Charleston. I've met with Representative Buddy Carter's staff about the Savannah and Brunswick ports.

I spent a lot of time in the Florida delegation. I spent some time with Senator Rubio and Nelson's staff focusing on our work around

sea level rise, recurrent tidal flooding, flooding projections. They had a strong interest in the PORTS project and in the navigation portfolio writ large.

I talked about the importance of home-porting the navigation response teams, near Jacksonville to Representative Rutherford's staff, and talked to Representative Ros-Lehtinen from Miami, about bringing Miami into the PORTS constellation.

Had an opportunity to talk with Charlie Crist about how the PORTS program started in Tampa and the vital role that the PORTS plays into the Bay are economy.

Finally, I met with staff from Representative Diaz-Balart and Representative Rooney's office and talked about the coast survey plans for the approaches to Naples.

What I've tried to do is focus on not just connecting with the staff and members that we historically have had relationships with. I spent a lot of time and effort focusing on the

majority. Kind of one of my goals is to make new friends, and what I've found is that particularly talking about the maritime commerce portfolio, if you will, that that has resonated extremely well with every one of those members and every one of their staff.

Actually for the -- one of the first time ever, I'd have to pick on Juliana here, I got a request for a dedicated NGS brief. So, I must have to been able to explain it where they understood it, and wanted to get a follow up dedicated brief on NGS. So, I saw that as a success.

Another part of the strategy is really to connect with state and local stakeholders, as well as other coastal partners and representatives from industry and academia.

So, I've met with some of the Congressional relations folk from University of Washington, from Woods Hole, from Scripps, putting the messages out about our new top-line priorities and what we do.

I was down in the Gulf of Mexico at the State of the Gulf Summit, met with the Gulf of Mexico Alliance. I joined them for an industry breakfast and this industry included a lot of oil industry executives.

We're doing some things in the ocean service around National Marine Sanctuaries that makes some of the oil industry executives a little unhappy, and so, when I got up to speak, I was told, "You're really brave coming here, Russell," and again, I just reiterated that my goal is to make new friends, and so, it was a very positive conversation that broke the ice, and we were able to talk really about some of the -- the major gaps we have, in terms of coastal observations and the gaps that we have in the coast survey plan, as well.

When I was in the State of Texas, I followed up on something that I learned at the HSRP down in Galveston. I met with Texas Land Commissioner, George P. Bush. He's the Commissioner of the Texas General Land

Office.

At the HSRP down in Galveston, I first learned about this very ambitious plan to essentially protect the entire Texas coast with a series of sea walls, flood gates, a series of work to restore some of the Intercoastal Waterway, some of the tidal marshes in the State of Texas, and I wanted to have that conversation, really to talk about the value of the products and the services that we provide, the foundational information through NGS, through CO-OPS that are going to aid in that effort.

I also took the opportunity to talk about all the work we do in the Port of Houston and Galveston, even though that's not part of his port -- his purview, but he simply got the value to the economy of Texas.

So, one final series of thoughts. Everywhere I've gone, there has been an interest in infrastructure and investments in infrastructure.

In the outreach that I've done, I talk

about the value of our navigation and positioning programs, as we modernize infrastructure.

If you think about infrastructure and how we pay for that, there's a variety of possibilities to pay for that, which may include things like tax breaks, user fees or some other ways of re-prioritizing what we do.

I would suggest that if we're looking at modernizing infrastructure in this country, you need to go to where the people are and where the money is.

Roughly 40 percent of the U.S. population is coastal shoreline counties. A large percentage of the GDP, gross domestic product of this country is also in coastal shoreline counties, and I would submit that an infrastructure investment along the coast for bridges, for roads, for port infrastructure, I think is ripe and I think what we do in this room from the NOAA side and the private industry side, the federal side, kind of writ large, is going to incredibly valuable as we look at infrastructure

in this country.

So, a couple quick points and I'll wrap up. Bill is giving me this look like, "Okay, Russell, you're done."

I would say that you know, our mandates that we have are unchanged, but I think the way that we need to do business must continue to evolve. I think involving the HSRP and your advice, your wise counsel to us is going to help us evolve.

We've very proud of the partnerships with the private sector and it's really -- and we're interested in strengthening that relationship.

So, the whole idea of the public/private partnerships kind of writ large is going to be an area of growth I think for us.

NOAA continues to provide the foundational data and validated data streams that the country needs to navigate safely and efficiently. But we're looking for new opportunities where all partners can play to

their strengths.

So, with that, I appreciate the opportunity to sort of kick this off from the NOAA perspective. I know this meeting is going to be productive and I know like always, I am going to learn a lot, which I think will help me to be able to carry the message of what we do to Congress, to our constituents and stakeholders. So, thank you.

CHAIR HANSON: Thank you, Dr. Callender. I don't think that was really the look I was giving you, but thank you anyway.

Sir, are you going to be able to stick with us for a day or so?

DR. CALLENDER: So, I'll be here through tomorrow morning. There is this little issue of picking the next Two-Star in NOAA, that I need to be in on that conversation in person, which is on Thursday. So.

CHAIR HANSON: Okay, thank you, and we'll take advantage of the time we have with you, and thank you for highlighting some of the

things that you've taken away from our meetings as we go around the country.

Certainly, the regional discussions allow us to realize this is a very large country with a lot of diverse interests and as you try to wrap your arms around that and sell the NOS mission in Washington, you've got to wrap your arms first around where the work is really done, and so, appreciate the discussion.

DR. CALLENDER: Yes, absolutely, and I'm really kind of disappointed because I mean, for me, the conversation, the presentations are fabulous, but being able to go out and visit those folks on the ground that are doing the work and seeing the partnerships is really where I learn a lot, and I think it's incredibly valuable.

So, what we can maybe do is think about as we get some of our political appointees onboard is getting them out into some of those conversations as well. I think it will open their eyes.

CHAIR HANSON: Great, appreciate that, and thank you for also looking at administration changes and opportunity, because certainly the message is very clear and we offer quite a bit to the nation, as an agency. So, appreciate your work there.

That ties in now, as I wanted to introduce our next speaker, Joshua Berger, because we have talked a lot about things at the state level.

Dr. Callender mentioned his travels around the country. He also mentioned the Texas GLO, which is only recently realized that -- as a native Texas I can say this, has only realized that Texas has a coast and there's a lot of issues there that need to be dealt with, and they're taking it on.

So, it's an impact we can't have, and Joshua comes to us from -- I want to read his title, because I think it tells us a lot about the Governor's, Governor Inslee's commitment to the maritime industry, and it's the Governor's

Maritime Industry Sector Lead Office of Economic Development and Competitiveness, and that's under Department of Commerce.

So, that says a lot about what the Governor thinks about the maritime industry. You come to us, even though your bio is in the package, I will mention that as I learned, you're a licensed mariner and you come from the maritime industry, so, you bring up a very different perspective to government that I'm sure he appreciates, as well. So, thanks for coming today, Joshua.

MR. BERGER: Yes, thank you. Yes, the -- coming from industry is a lot. I am learning about state government, as well.

Good morning. Thank you, Chair Hanson, Admiral Shepard, the advisory panel and staff for the opportunity to open your meeting and welcome you to Seattle, Washington. Honored to have you here, and on behalf of Governor Jay Inslee, welcome you to the great State of Washington.

He often likes to say how our maritime industry plays a central role to Washington's diverse, strong economy, and that our working water fronts are sources not only of great jobs, a critical industry, but of technological innovation and resilience.

So, clearly a common theme and mission of NOAA's Hydrographic Ocean Services and the important function of your review panel.

I'll give you just a little bit of background and introduction, and thank Chair Hanson. You know, I do come from industry, worked as a licensed mariner in the tug and two industry, as well as the maritime workforce training and sail training industry, as well.

I've had the pleasure of sailing a number of traditional tall ships here nationally, and around the globe as well, and have been a long time user of your products and quick anecdote.

My youngest brother is about eight years younger than I am. He's going for a low-

level master's license and a six-pack license, so he can run some small boats round the Willamette River and dreams of charter captain in the Caribbean. Is studying for his master's license. He was up just this last weekend, and you know, he looked at -- we were looking at the chart of our home waters of Western Long Island Sound, where we grew up and he said, "God, it's so beautiful and logical. Really makes a lot of sense."

I was -- so, wanted to make sure to bring that forward, and I think he's absolutely right.

It's -- so, as a matter of introduction for, you know, my role and industry here in Washington State, it is a bit of a unique role, and it gives me the opportunity to talk about resilience, relevance and innovation in our industry, and what role that plays in our state's economy, and growing and improving jobs and prosperous communities, and certainly, your work and your products and what you bring forward and

how critical that is for us.

So, I am part of what's called the industry sector lead program. I am one of seven of us representing the -- and a -- the top seven economic sectors across the state of Washington, and it's interesting program.

We each come primarily from industry, and we work as really the liaisons from our industry, to the Governor's office, our State Legislature, other state agencies, as well as our federal partners, all with this mission of growing and strengthening communities and creating jobs with this mission around sustainability and resilience.

So, across our key sectors, and lots of places where we do a lot of cross-sector work too, some of which I'm learning more and more is relevant to your work, and we'll talk a bit about.

You know, just real briefly, we play in kind of these three realms. Our charter is really to help coordinate our respective

industries. As you can imagine and I'm sure know in the maritime industry, it's incredibly diverse, and we'll talk a bit about that.

So, coordination is a key function, as well as supporting and developing public/private partnerships, both on policy issues, as well as economic development opportunities.

We also work to do what we can to grow and support the business climate for our respective industries. Takes the shape of regulatory reform, tax incentives, you know, across the board, as well as developing a 21st century workforce, as we look especially at shifts in the maritime industry, how critical that is, especially critical that our industry is part of the conversation as our education and training workforce is continuing to develop.

So, you can imagine the various partners we're constantly juggling around this swirling sphere.

I think it's one of the more interesting jobs in state government.

Absolutely. So much so that there are a number of our colleagues in the state legislature that are vying for open positions. It's an interesting role.

So, what is the maritime sector? You know, we define the maritime industry here in the state and everything from paddle boards to container ships and everything in between, including commercial fishing and seafood, shipyards, all the support services that go along with that. As you know, many of those support services are dedicated. Consider a lot of the folks here in the room in the work that you do as part of that, and somewhere in between kind of military and government, and the support services around the mapping and work that gets done.

Here in Washington State we're pretty unique, in that it is incredibly diverse and continuing to grow and very supportive of our state's economy.

It's also incredibly complex and segmented, and so, working across those silos and

finding unified voice for the industry and where there is kind of this sub-sector crossover in many areas is a key function of what we're doing across the state.

Just a quick highlight of the impact. So, the maritime industry is really third largest economic driver across the state. It's over a $37 billion economic impact.

About 70,000 direct jobs, impacting almost 190,000 jobs across the State of Washington, and as the most trade-dependent state in the country, our port infrastructure complex is incredibly important.

One in four jobs in the state are tied to -- tied to trade with the combined Ports of Seattle and Tacoma now co-manages the Northwest Seaport Alliance, makes us somewhere in the realm of about fourth largest container in logistics terminal in the country.

So, critical part of who we are and how we define ourselves. As you can imagine though in a large state like this, there is no

Boeing like there is for the aerospace industry. There is no Amazon or Microsoft, like there is for the IT industry.

So, that work of coordinating across the industry and everything, from folks that are working on refrigerator down in Ballard, to mapping to folks that are supporting and engaging with our federal partners, there is an incredible amount of coordination that happens -- needs to happen across this diverse and quite inter-dependent industry.

As I said, there is kind of these three realms. This coordination, public/private partnerships is a key function of what -- of work that we do. We choose kind of our respective statewide trade associations, and kind of embedded in those here in the State of Washington, the Washington Maritime Federation was formed about the same time that the Sector Lead Program was stood up. This, giving the opportunity for coordination and connection across the breadth of the industry.

Lots of arenas which the maritime federation plays, so, you know, stand is -- and all transparency was the first director of the organization getting it stood up and then moved over into this role, but continue to play, each of the sector leads play a role in the advisory board or board of directors of our trade associations.

So, the maritime federation, especially for the folks here locally, as well as working federal, is a place of first contact into the breadth of the industry. You would often find, well, we need industry, stakeholder input to an issue and they'll go to somebody they know in the shellfish industry and say, "Well, we have input for the maritime industry."

Not necessarily out of, you know, any ill-will or miss, but not necessarily knowing where to coordinate, and the maritime federation plays a large role of that, as well as finding the key top priorities, whether they're policy priorities, funding priorities that go forward

that can communicate in one single voice, and I say when you have a shipyard that's fishing in seafood and support services and ports all walking in the room together, it's send a really strong message and the level of advocacy that the organization does.

Some of the examples of these kind of public/private partnerships and coordination that's relevant to a lot of the work that you do certainly, is our working connection with the University of Washington, in connecting with the both College of Environment, marine affairs and across the board is really key and important with our federal partners, as well, Army Corps, Coast Guard, a number of places, all playing a role in the priorities going forward.

We are in the process of a marine spatial planning for the coast of Washington State, looking towards the future of any potential renewable energy or ocean energy projects that could come to the shores of Washington State. We do feel that that is likely

way off in the future, but trying to get a jump on that in our Washington Marine Coastal Advisory Committee and I play a role in that, again, bringing a voice of the breadth of the industry across the state to that Governor's Council, and we utilize a lot of your services and a lot of that marine spatial planning that's taking place to help kind of shape what our policy priorities are going to be moving forward.

Another area and I know it's going to -- is on the agenda today is the relationship to the changing Arctic, and a lot of the work that you're doing in putting forward your priorities and thoughts, as we look towards, you know, mapping and charting that area.

Washington State plays an important role in the changing Arctic, in infrastructure development and in passage and supporting terminal, you know, certainly so just for perspective, about 95 percent of everything that makes its way on a shelf in the State of Alaska comes through the Ports of Seattle and Tacoma,

let alone we start talking about infrastructure development, parts, pieces.

I personally towed pieces up to Coast Guard station up in Kodiak based out of here and Seattle and Tacoma.

So, we play a vital role in that intersection and that pathway up to the Arctic. We also have a lot to offer as both in terms of technology innovation, infrastructure development. There is a lot of expertise in this area that we offer into what's going to be changing up there, is changing and so, it's a number of folks in the room had attended the Arctic Encounter Symposium that was here in Seattle just last week.

So, the role that my office plays in conjunction with the maritime federation plays in those -- that coordination and public/private partnerships is infinitely critical.

In terms of supporting economic development and the business climate for the maritime industry, there is a number of key

priorities that we're working on.

Protecting industrial land use is certainly important. Again, as we're the most trade-dependent state in the country and that -- this is important, not only for those here. If you know the -- you know a bit about Washington State, we have this kind of divider between east and west, the Cascade Mountains. There is sometimes a political divide, sometimes a cultural divide, but not so much in commerce, you know how critical it is our for cherries and apples and potatoes and all the agriculture, as well as even some of our small boat builders that happen over on the east side of the mountains, how critical the access to the ports are for those communities, as well.

So, this industrial land use and port competitiveness is a key issue statewide that we're having lots of conversations about.

Regulatory reform and infrastructure development. A lot of that goes hand-in-hand as well, as we look at aging infrastructure across

the industry and in our ports, a critical role it is that we remain competitive. Our key competition here is actually up in British Columbia, where a discretionary port, 70 percent of all that comes into the Port of Seattle and Tacoma is headed elsewhere. A lot different than LA/Long Beach where 70 percent stays right there to feed, clothe and house that population.

So, it's just as easy for someone, you know, CMA CGM to head up to Prince Rupert, as it is down to Tacoma, sort of critical role it is that we have, you know, clear pathways.

So, you know, when we're looking at larger ships that are coming, and the needs that are -- that the needs that are around all of that, it's critical that we have the partners, certainly with the work that you all do, to make that viable as the shipping industry has been changing so dramatically in the last couple of years.

Modernization of vessels, as well, and here in the slide it talks about the

modernization of our fishing fleet and certainly our fish -- the fishing fleet, specifically the North Pacific fishing fleet, you know, large part of the North Pacific fishing fleet up in the Gulf of Alaska and the Bering Sea is housed here in Seattle in Washington State, and it's about a $9.5 billion industry just to Washington State's economy, and the amount of jobs that that creates, and I think it's 40 percent of all the seafood on US tables comes from the North Pacific fishery, and how critical that is. We're fishing the most sustainable fishing ground in the world, with 40 to 70 year old vessels.

But not just the fishing fleet. We're looking at our Arctic or polar icebreaker vessels. We look at new vessels for NOAA, and I see that's a key priority for you as well, and re-capitalization of NOAA's fleet as well as the universities.

We're building new vessels up at Dakota Creek and Anacortes. We are -- we've got the Thompson in dry dock right now in Seattle,

certainly the Healy, Star and others are all based, you know, out of here in Seattle and our vast network of the maritime industry from our large shipyards to our electricians to the electronic service providers are all part of what we see as modernizing in the industry. So, all we do to support that is key focus.

And supporting the 21st century workforce, very key as we look forward to expanding and growing industry, as well as our own needs here in Washington State, in supporting diverse and economic equality.

So, you know, Seattle has the most cranes as any other city in the United States. I think we're up to 60-something. Chicago is next with 20-something. Economic, you know, boom here as well as, you know, housing prices, that goes along with that. We're also seeing continued income inequality, particularly with our rural communities.

Maritime industry offers as one as many, an important access to living wage jobs and

trade jobs that are critical, that are technologically advanced and are looking into the future, and so, all we do to connect that, to make sure the curriculum supports that is critically important.

A quick story about the port of port or Port Townsend. Small community up on the Olympic Peninsula. It's a Victorian seaport. It's you know, got a strong tourist economy. It also has a very strong maritime industry and marine trades.

The school district in Port Townsend sees the connection to the maritime industry so much so that it is looking at right now, moving all of its curriculum so that it's called the Discovery Maritime School System, so that each part from kindergarten on through high school has a tie into the maritime industry, whether it's arts, law, trades, operations across the board, there's a tie into what's happening in their community every day.

I was up there talking to the entire

junior and senior class about a month ago, about opportunities in the maritime industry, and I showed a video of a hydrographic survey ship and a young woman who had been working for NOAA for a number of years, and the amount of conversations that came back to me from these juniors and seniors in high school, and the opportunity was remarkable.

Young men and women that see this both in combining their passion for the environment, for technology and being out at sea, what a great place for that to happen.

I will say also on the workforce side is that we're working very closely with US Department of Labor and others, on this Military-to-Mariner transition.

So, as we have folks transitioning out of the military, there has actually been a great connection with NOAA specifically and the Army as well, in connecting these dots and doing what the crossover is and coming out of the military and into civilian work both, you know, whether it's

MSE ships or NOAA, across the board. We're doing a lot of work to make sure that connection and transition is seamless.

The other thing I just wanted to put out is about the focus on technology innovation here in Washington State.

We do see ourselves as global leaders in maritime technology innovation and best management practices. We're developing partnerships across University of Washington, Applied Physics Lab, our national laboratories, PNNL and everything from electrification of vessels to ballast water treatment systems, underwater and unmanned systems. So much innovation is happening here in these partnerships. We see ourselves as leaders and we're developing a long term strategy for what technology and innovation and how we continue our role in leadership there and I see that going hand-in-hand again, with a number of your priorities, so much so that I'm working cross-sectorly with our information technology sector

lead, as well as our aerospace sector lead, in supporting an Unmanned Systems Advisor Council to the Governor and to industry, as we're trying to push forward, our support and work in unmanned systems from space to the bottom of the ocean.

You know, all in all, just kind of a brief overview of what we have to offer here in Washington State, the importance of our maritime industry, the importance that the Governor has called out in our maritime industry, and that will continue to support, you know, the important necessary work of NOAA's hydrographic function, and while reading over, you know, most of these recent issue papers, it reiterated to me exactly how much of the fate and growth of our industry here in Washington and across our nation's waterways and waterfronts is so highly dependent on NOAA's National Ocean Services, and so, highly dependent on the role that the panel plays to communicate that value and certainly set priorities and seek implementation.

So, again, please consider the State of Washington and our local industry partners in this process, and wish you great rest of your meeting. Productive. Thank you.

CHAIR HANSON: Thank you, Josh, well that hit all the high points, and I know there's a lot of meat there. We could probably ask questions for a couple hours here. But I understand you're going to be able to stick around this morning.

MR. BERGER: Yeah.

CHAIR HANSON: Okay, great.

MR. BERGER: Thank you.

CHAIR HANSON: We'll see if we have time for questions at the end. We're pretty sure you'll be around during the break, and I'd like to catch you there and talk a bit more.

MR. BERGER: Yeah, great.

CHAIR HANSON: State's role in maritime cannot be over-estimated certainly when dollars are tight, coming back from Washington, Governor's role in this and this whole discussion

is extremely important. So, congratulations on your role there.

MR. BERGER: Yeah, thank you.

CHAIR HANSON: Next on the agenda, we have a presentation by Captain Jason Hamilton. Commanding Officer of the US Coast Guard Icebreaker, US Healy. It's home-ported right here in Seattle.

Captain Hamilton is an Icebreaker sailor who has completed multiple Arctic, Antarctic, and Great Lakes ice-breaking missions. He's also a judge advocate who has served with distinction in various legal officer positions.

In the interest of time, of course we have the bio in the package again. Captain Hamilton, thank you for your service and I suspect along some way, we will get some Lawson Brigham stories.

CAPT. HAMILTON: Well, Lawson will probably provide those at the breaks, but maybe I can interject a couple as we go along. I don't know.

Chair Hanson, Admiral, doctors, captains, colleagues, thank you for allowing me to come down here to meet with you today and to talk a little bit about the Arctic.

Again, seeing shipmates that I've sailed with and captains that have been mentors, it's really an honor to be here with this group, and particularly, doing it here in Seattle, Washington, the gateway to the Arctic is, as Josh already alluded to, how important Seattle is and to getting to the Arctic and what happens there.

The Coast Guard Cutter Healy, it's been an honor to be the captain now for almost two years, and a ship that's named after a revenue cutter captain who, quite frankly, was operating in the Arctic and off Alaska, basically as soon as the United States acquired it.

So, it's -- again, it's a privilege to be here with you today and I'm going to talk a little bit about a user's perspective, some of the products I get both from NOAA and our other interagency partners and how that helps become a

force multiplier for us while we're up in the Arctic.

Because again, if you look at the Arctic strategy and where the United States fits within the Arctic, it really is about broadening partnerships, working together, whether it be our interagency groups, whether it be with the state or the local bureau, or whether it be with our international partners.

So, with that, we'll see if I can get this to operate. User error. There we go. I might have to point. We'll see. I'm going now.

All right. So, this is a slide that has a picture of Healy and some of our capabilities.

So, when we talk about icebreakers and the polar ice-breaking fleet, and when I say fleet, that's kind of a stretch, but there are two of us.

There is the Polar Star, which is the heavy icebreaker, which just got back from McMurdo, and her mission is basically to go down

and break in the McMurdo science station, and she has been doing that annually. She's approaching -- she's right at 40 years of age now, toward the end of her service life. In fact, 10 years beyond what service life was written as, but that's how we operate, both in NOAA and the Coast Guard.

But the Polar Star is the heavy icebreaker. She can break up to six feet of ice at three knots, and she can back and ram into and break up to 20 feet of ice. It's really an amazing technological break-through back in the 70s.

Now, they basically cover down the Antarctic. We cover down the Arctic. So, when we talk about in the high latitudes, what vessels does the United States have operating up there, the Navy does not play in that space at all, at least on the surface.

So, when we talk about in the Arctic itself and when you get up into the ice, it is, it's Coast Guard Cutter Healy and while this

talks about our primary mission focus, which is supporting National Science Foundation objectives, at all times, the Coast Guard is military, as well as interagency.

So, when we're up there, we're conducting all of the Coast Guard's 11 mission sets, and our capabilities that we can break up to 4.5 feet of ice at three knots and while we're rated to break up to eight feet of ice, I can tell you that I've seen us break well over 10, and that was certainly necessary as we got ourselves all the way up to the North Pole, not to -- not in the distant past.

So, when we talk about our navigation system, we have an electronic chart display and we've got DGPS. We've got three systems, one for navigation and then we've got the POS MV and the Seapath, which are GPS systems for our bathymetric survey systems.

We have large format printers onboard that we can utilize to expand on the products that we receive, so we can get them both

electronically and then print them out.

It's a -- you know, the charts we receive are critical to what we do up there and we're much appreciated for those

This is a -- the picture that you see in here is the Healy Seamount, which was discovered using our multi-beam back in 2003 and Larry, were you onboard for that?

Okay, so, again, we've got people who have been on Healy a lot longer than I have in the room, which is why it's -- it's -- you know, I can leverage Larry if necessary, as we go forward here.

But again, when we talk about movements forward, our multi-beam echo-sounder, when operational, and operating correctly, really does an exceptional job at providing these 3D maps for us and again, 288 simultaneous beams it puts out there. Constantly running and collecting data.

So, again, what we're doing these 11 mission sets throughout the Arctic, we've got all

sorts of equipment onboard that are collecting different types of data for the science community, and this goes into a repository and can be requested at any time, and when we look at the -- you know, the charts and where we're at, at the moment, and again, you have chronical data, very substantially in your latest periodicals, but again, it looks like only about three percent of the Arctic marine corridors are surveyed to modern standards.

So, at least having this multi-beam echo-sounder gives us some background and information up there.

This is a picture of us, as well as with the PARS study, which I'll hit on a little bit more in the next slide.

But it's basically, we're looking to create a corridor up there for deepwater traffic that it's clear what at least what the hazards are underneath the vessel, and we've done multiple bathymetric surveys of this Bering Transit Corridor using our multi-beam and in 2014

and 2015, we had eight different sonar transits, each time we go north, we offset it about 1,000 yards, so that we could cover as much area as possible, while headed up to our missions, and over 5,000 miles of data has been collected at this point.

So, the PARS route survey. This is a picture of it. Essentially, you're getting yourself from Unimak up off the Seward Peninsula and then all the way up through the Bering end of the Arctic, and it's been a great interagency effort between the NOAA and the Coast Guard, and again, the intent is to try and deal with those hazards, to minimize the risk to the mariner in this seaway, because the traffic is increasing and as we go further north, as the ice recedes, we're just going to see more and more of that.

In fact last summer, when I was moored up in Seward, we had the Crystal Serenity directly next to us, and most people in this room are aware of that ship and the number of people it had, and it went up and over and through the

Northwest Passage. So, something that the entire interagency was -- was looking at closely, planning for and just like we are with the -- with the smaller pleasure crafts that are going up there.

I can tell you last summer, I saw 17 -- I had 17 different interactions with vessels that quite frankly, that's almost like reinforced sailing vessels. I mean, these are small craft, really not ice-capable up there operating.

So, the more we can do to chart up there and to have products that they can use to avoid the hazards, the better it's going to be.

Another -- when we talk about the PARS, one of the things I also wanted to highlight is as you work something like this, it's not just the operational side and putting the charts together, but the diplomacy and the legal end that's been going into this.

It's been a well-over 10 year effort. In fact, it was a handshake back in 2007, between the then PAC Area Commander

Vice Admiral Worcester and his Lieutenant General courter-part over in the Russian Border Guard.

So, back in 2007, they said, "Hey, let's look at surveying this."

Well, as governments do, about three years later, the Russians are like, "Well, why are you surveying us? We don't want you to do this. We don't want to be a part of this. This is going to put us in a place that we don't want. We want complete autonomy."

So, we, as a government, continued forward with this and now, we're at a point where we've put it out for notice and comment, and for three months, and then we're hoping to go to the International Maritime Organization by 2018 to propose it there, and we've given ourselves some diplomatic wiggle room with it, by having that corridor over by Russia, that we could essentially choose to negotiate with Russians or not.

So, again, when we talk about the diplomatic side, that's as critical as the

operational piece, and when I look at the people in this room, I thank you for continuing those efforts on our behalf as mariners.

One other area that we are interacting with the Canadians on right now, in a similar fashion is the North Slope PARS, which is in its infancy right now. But when you talk about diplomatic and legal issues, when we talk about the Northwest Passage and trying to get agreement with one of our closest partners, you know, we're never going to I think, settle the international vice inland issue through the Northwest Passage, but we have such good relations with the Canadians that I think we'll figure out a way to survey up there and come up with a good route that we can work for the mariners and the operators, which is what I see as critical as a ship captain and a person that would have to respond to some of these events.

Other interagency efforts. We have a working group at headquarters, that's been working on ocean and coastal mapping, helping

fulfill the ocean and coastal geospatial data demands.

In these pictures, you see the Spar, which Commander Schallip back there, had commanded at one point, as well as a wave glider and some of the displays there.

But again, the intent there is to maximize the minimum, because again, there just aren't that many vessels up there operating. So, the more we can use equipment, even on Coast Guard vessels, to provide input, we're trying to do that.

Back to the Arctic strategy and interagency and cooperation and looking at states and locals, as well as industry.

This is a picture of a Search and Rescue Exercise we conducted back in 2015. So, not last summer, but the summer before and in that, we launched an unmanned aerial vehicle from Dead Horse and then transferred control of that from the shore side to the ship, used it to the find the person in the water, in this case it was

a dummy, Oscar, and then vectored in the ConocoPhilips helicopter, working with the North Slope of Alaska, as well as the Coast Guard 60.

So, what I'm trying to show there is again, the interagency cooperation that is necessary up in the Arctic, for multiple different reasons.

When we talk about support that we receive, you know, many are well aware of the charting side, but as an ice operator, one of the things that I have found particularly critical is satellite and satellite imageries, and the National Ice Center, which is an interagency-run center that's in Silver Spring, co-located with NOAA, you've got NOAA, the Coast Guard and the Navy, that operate this National Ice Center, and the products that they give us are absolutely critical, because when you look at ice-breaking the number one rule is if you can avoid it, do so.

The number two is if you aren't going to avoid it, find the path of least resistance,

which means find the area where the ice has receded the most. Find the first year ice. Find that path of least resistance, and these products really do it.

If you can see that, this is -- this picture it's color-filled, but you can see the open water and you can see how the ice gets to the multi-year level in different locations, and quite frankly, when I'm with Larry or the other senior scientists, this is really part of our planning process that we do each evening, because we need to maximize our time on scene to complete whatever the research projects are that we're doing.

Here is another product and with this, you can see that it's -- again, you can see where the open water is. There is ice analysis that's put into this, to show you where the different types of tents, again, whether it's first year ice, whether it's multi-year ice, because if you don't get that product and you're left to yourself and your visual devices, I have this up

for a reason, because last year in our first mission, we didn't get satellite imagery for the first five days, and during that time, we had what you always had in the Arctic, which is low to no visibility.

So, we're heading up and we found probably the biggest pack of multi-year ice you could find, and we then spent four days backing and ramming at significant -- significant wear and tear on the vessel, significant wear and tear on the captain, as he's interacting with the scientists as to why aren't we where we're supposed to be yet, and in -- quite frankly, it came down to not having the imagery when I needed it to make those operational calls.

So, Larry will probably recognize this slide, because it's when we were headed up to our dredge, and again, the satellite imagery helped us get all the way up to 82 North, quite frankly expeditiously and without this, it wouldn't have been expeditious and it allowed us to, in a -- quite frankly, less than a three week period, get

all the way up there, complete a dredging mission, as well as all of the mapping that we were scheduled to do, and the year prior to that, what this satellite imagery did, along with the historical data, was allow us as a ship to find the path of least resistance up to the North Pole, and as a country, surface vessels, Healy has been there and one of the Polars has been there.

In fact, talk about Captain Brigham's stories, he was the first. So, we'll give him that, at least on the US side, when he was on Captain of the Polar Sea, but we were the first unaccompanied last summer, and that was -- or two summers ago, and again, the products and imagery and everything else that was presented to us is, quite frankly, the -- what enabled us to do it, and again, being here with NOAA, it's always good to highlight the science piece of what we're doing, and this is a -- these are pictures from our mission last summer, the first mission was Chukchi Borderlands.

Dr. Russ Hopcroft was the principal investigator and the pictures on the bottom left is basically what we'll call a pock mark area. As the climate is changing up there, we have areas with methane gas, which have created new areas that we're not certain exactly what's going on and/or what type of life is there, and we had a remote operated vehicle that we were able to take down to the sea floor, and we were able to discover two new forms of jelly-fish and a benthic ctenophore.

So, really quite frankly, exciting times on the ship and it's always great to work with our interagency partners too, to go to the end of the globe and make these new discoveries.

Again, back while we're up there, not only are we sampling, doing all of the different data sets that we can on the ship, leveraging it as best as possible, we're also giving our input to the Ocean Prediction Center and I've got our box up there because again, we're usually the only ones operating up there, that are reporting.

So, it really helps the models, and we certainly appreciate the models and look to have the interchange and exchange back and forth to try and get it right.

So, our future efforts, what we're looking at doing is as best as we can, to try and incorporate all these things into one display because as an operator right now, you're looking at multiple things, whether it's your ice radar, whether it's the satellite images, whether it's the ECDIS itself.

So, ideally, if we could get data fusion where we have as much as possible with the weather, the ice, the data from the coast pilot in one place, and working with the National Ice Center and our research and development center, to try and bring that along.

Now, I'm really walking into shoal water with Dr. Larry Mayer in the room, but I'm sure everyone here is familiar with the ECS and the project and how it's been going on for the last decade.

But it -- I would be remiss if, in talking about icebreakers and the value we bring, if I didn't talk about the fact that again, with that -- with our multi-beam, we're able to collect that the data that's necessary to put this plan together.

This picture, you'll see, has the pink areas are where we're expecting that we'll be able to show the Extended Continental Shelf, and the Extended Continental Shelf if basically where we're demonstrating that our continental shelf goes beyond 200 nautical miles. I think of it as basically, a modern day Louisiana Purchase without the purchase. It's us demonstrating that through this bathymetric and seismic data.

This was our third mission. Again, it was with Dr. Mayer. The pictures on the bottom are the Alpha Ridge where we went up and we did a couple of dredging operations and back to -- again, the Arctic strategy and the cooperation, not just inter-governmental, but with our other partners, in this case it was with Canada, and

Canada does quite a bit of work for us in the Eastern Arctic and in this case, there was an agreement at the Arctic Ministerial that we would conduct a couple of dredges for them up at 82 North and we successfully were able to grab a few rocks off the bottom for them, for their ECS submission.

Why I talk about that is, when you look at the Arctic Nations, and you think about the United Nations convention on the law of the sea, the Arctic really is a place where we work -- quite frankly, we have a legal framework. We've worked generally, fairly well together.

There are areas where we rub, but we -- we work cooperatively up there, and this was a case of us doing that with the Canadians.

These were the legs that we ran for the bathymetric mapping last summer, and if you look at it holistically, and this doesn't include the data from last summer, but over the course of the program, we have data for an area larger than the size of Texas, and we have seismic data from

LA to New York over three times.

So, again, all this information now is being collated at a NOAA facility in Colorado with the Department of State team to get our submission ready, so that we can demonstrate what we have up there.

So, with all of that as some background and the Coast Guard, where we're at with icebreakers, we talked about only two of them at the moment.

So, organizationally and budget-wise, in the -- the current fiscal year budget, we're looking at $150 million if it gets adopted and that's through the Department of Defense.

What we've done with the icebreaker money this time is like Healy's acquisition. We've now moved it from a DHS acquisition over to DoD, which seems to be at the moment, a pot that's more reliable.

So, we're hoping that the -- that it stays at the $150 million, which is the great start, and what I can tell you, we've already

awarded five contracts to those five shipyards.

So, there is activity and there is industry involvement now. It's -- it -- it's getting really good forward momentum, and in fact, I've had members of those shipyards onboard, and this afternoon, I'll be going to see another Congressional delegation to talk about this.

But bottom line is, we'll looking at having the studies completed from one of these ships -- from all of these shipyards within the next year, and hoping to have the contract awarded by 2019, and the first icebreaker delivered in 2023.

So, again, it's been great to be here with you this morning and to talk a little bit about ice-breaking, and I want to thank you for the interagency cooperations and partnerships that we've had over the years, and as a Coastie, it's a great privilege to work with you.

CHAIR HANSON: Thank you, Captain Hamilton, and of course, again, more -- a lot of

meat there to be sure to have about two hours' worth of questions, but we have to move on for right now. Will you be able to stick around with us a little bit this morning?

CAPT. HAMILTON: I can stick a little this morning.

CHAIR HANSON: Okay, thank you very much. They'll be a line up to talk to you. So, thank you again, and thank you also for mentioning the interagency cooperation.

Certainly, just a few months ago Admiral Shep was at a hearing alongside the Coast Guard and Corp of Engineers talking about the various surveying and charting missions, and as Congress looks to explore the under-gap that Admiral Smith has coined and hopefully, you copyrighted that phrase, but it's all important discussion to have, to see how we can be more efficient with the dollars we get.

So I'll introduce Lieutenant Colonel Andrew Olson from Seattle District. He's actually seven months onboard with the Corp side

of the Army. As you give your presentation, sir, I just want to thank you for your service and I notice Kosovo, Afghanistan, Kuwait and I'm sure there are many other missions and thank you for your service. Thank you.

LT. COL. OLSON: Thank you, Bill. Good morning. It is great to be here with you and it's a pleasure to be included in the group here.

My friends call me Andy. So, we've introduced ourselves. So, I'm Andy, all right.

So, I'm the Deputy District Commander for the Seattle District here. Colonel Buck is elsewhere today and sent me to represent him.

I'm here today with my chief of navigation, Kym Anderson, and we both want to just thank you for inviting us, and for the opportunity to participate and really, for the continuing collaboration that we all experience with NOAA and others.

So, while the Corp of Engineers is a globally recognized leader in civil engineering

and sciences and other things, today we'll obviously just focus on that navigation mission that we have, and particularly, that's where we have a lot of inter-dependence with NOAA.

So, here is the mission. Safe, reliable, efficient, effective and environmentally sustainable waterborne transportation systems for the movement of commerce, for national security needs and for recreation.

What in the world does the Army have to do with this, when you read this mission statement, right? I've asked myself that. I presume some of you have.

I just think back to Lewis and Clark, right, they were basically Army engineer officers, navigating, mapping and from there, we had West Point, the first engineering school in the nation, and things just progressed from there, right? So.

Anyway, going back to 1824, that's when the first laws first authorized --

authorizations from Congress came, funding the Corp of Engineers to improve safety on the Ohio and Mississippi Rivers, and several ports.

So, navigation was really the first civil works mission that the Army Corp of Engineers ever had.

Locally, our navigation mission stretches throughout the Puget Sound, up around the Peninsula and down the coast of Washington.

We maintain our own survey based our of Hoquiam and you know, they perform routine surveys and particularly provide support to our own dredging operations.

In The Puget Sound, we operate the Puget, and you can see the picture at the bottom of the slide. The Puget tools around the Sound and the harbors and picks up the snags and the hazards that are sometimes floating out there, keeping things safe for everybody.

It also serves as a backup skimmer for the Coast Guard and participates in routine drills for that, and the next one is actually

scheduled for June 6th.

Our Dredged Material Management Office works in concert with the EPA and with the Washington Department of Natural Resources and Ecology as the multi-agency dredged material management program, assessing dredged material's suitability for in-water placement.

We maintain federal navigation channels with high and moderate use channels dredged on a more regular basis. There are other channels that are low use, that don't get -- don't get so much attention.

Our program today includes 23 active channels and that supports several ports. The amount of work we executed in fiscal year '16 was uniquely large, but that was due in large part to end-of-year funding and particularly to repair some storm damage of revetments.

This fiscal year, and Dr. Callender mentioned, we're still under that continuing resolution authority, which kind of limits the work that we can do to just kind of regular

routine type of dredging.

I guess a summary here with this slide would be that, you know, dredging has just become more difficult as time has gone on. The costs have gone up and the funding has not, and in addition to the costs, there's several constraints.

You look at constraints on the beneficial reuse, constraints on where that dredged material can go, and then we have protected species that sometimes limit the time that we can operate, time and places.

So, when you put all that together, it's just a little bit more difficult, and when you get all these factors it's really kind of imperative, it becomes obvious that we have to figure out a cost effective way to do things as much as possible.

One point on that is, you see the bottom of the slide, eHydro is something I want to introduce to you today. It's a good news story. It's a recent -- just came online this

past year in 2016.

It's a cost effective way for federal agencies to share survey data with each other, but also with the public.

This slide shows a detailed flow chart, kind of explaining how that whole thing -- how eHydro works.

So, you're taking the framework for the channels that we have, the actual survey data, putting it together and you've got a lot of outputs, and a lot of different customers that use the different types.

So, obviously we like -- we're very concerned and interested in the condition plots that go along with different projects, and then we have NOAA reports and the channel indices.

So, this information is then available on the internet. You can pull it down in these different formats, and like I said, for the public, as well as for the agencies, and it comes in -- you know, some of it is PDFs, documents that you can easily print.

So, if you were to see -- let me get to the next slide here.

If you were to see a boat out there taking a survey, you could realistically expect to see those -- to see that data available to you, as a member of the public, about six or seven days later. That's how fast it's happening.

So, I'll say that the data generated by USACE is limited to what is collected in support of a federal channel, but the data is also incorporated by NOAA in the chart development.

Current status of implementation for these surveys and this data is that the large to moderate ports have been posted from the last five years, and we're currently working on the smaller ports and the due date or the expected date is about 2018. This will be more of a complete collection.

There's a website here for you. I also found it myself, just tooling around on our

public website. You can click, you know, 'navigation' and it's an obvious button in there. So.

So, it's been mentioned, but this -- this CMA, CGM, Ben Franklin, right, which visits Seattle last year. It's 18,000 20-foot equivalent unit ship, 52-foot draft, and highlights the fact that vessels are getting bigger, and as that happens, this navigation mission becomes more and more critical, increasing the clearances and increasing our understanding of the bottom, to ensure safe navigation. I'm skipping a little bit.

So, I guess I'd want to shout-out to NOAA for the various products that contribute to our mission with the navigable waterways of the U.S. All these products here you see, I just want to highlight the fact that, you know, we're also a user. We provide and we use, and we support each other in that. So, thank you.

Some of you are probably familiar and have heard about a study going on with the

Seattle Harbor. I just wanted to throw that out there as a tidbit, if some of you are interested.

Basically, we're looking to see if the authorized depth can increase down to 57 feet. So, it's looking at alternatives for navigation improvements to both the east and the west waterways, that you can see there on the left and right.

The authorized depth of the Federal Navigation Channel in the west waterway is 34 feet, and existing depths range from 50 to 60 feet, so that would be a big improvement there in the depth.

In the east waterway, it's authorized at 51 feet on the north end, and the south end is authorized at 34 feet, currently, and both the widths of those waterways is 500 feet in both cases.

So, where we're at with that as a far as a time line goes. You see the Draft Feasibility Report coming out last summer, and looking to finalize that here in the coming year,

and hopefully, we'll get authorization and appropriation to go ahead and design and construct in about 2019. Of course, that's subject to Congress, right? So, don't hold your breath, but we'll hope.

All right, I just want to highlight to another case of great collaboration that -- the Hylebos Waterway down by Tacoma.

So, maybe you're familiar with the story. A rock barge, barge carrying rip-rap, big rocks sunk in this waterway and posed kind of an obstacle.

With the sunk there, it changed things. People had to offload a lot and could not -- could not draft as deep and were limited to high tides and so, there's a financial interest there, in getting that cleared out.

But in this case, you know, the Corp of Engineers, the Coast Guard, NOAA worked closely together. We established a Virtual Aids to Navigation, that was near instantaneous, where you know, through the GPS

and things, you get the alerts and notice, notice of the hazard, and then in the meantime, we're able to work -- work the issue of getting the stuff actually removed, and you can see the time line of how it worked out.

So, a success story, and it's a pleasure to work with the Coast Guard and with NOAA, and it's been highlighted in multiple cases now, but just wanted to share that with you.

It's also a good example of the benefit of electronic management of the navigation charting information.

So, Bill, I know you're going to ask me. I'm going to be around for a couple hours. But Kym Anderson will be here all day, and she's -- her information is here, and that's why her information is there, because you'll get farther talking to her, than you will to me.

But I'm -- I appreciate this -- appreciate the chance to be here. Thank you for allowing me to participate.

CHAIR HANSON: Thank you, sir, and

actually we do know Kym and we know where to find her, so thank you for that, as well.

Thank you for the presentation. In terms of the deepening project, it's an interesting project, but with the Congressional representation that Washington enjoys, particularly Beth and Senator Murray's group, I think the odds are pretty good that you'll see some support for that. So, good luck with that project.

I think I'm going to pull Chairman prerogative here and extend us for a few more minutes because this is -- one of our premier panels and we want to take some time to take advantage of them if we can.

Go ahead and open it up to the Panel for a few questions.

MEMBER PERKINS: Scott Perkins. Captain Hamilton, I'm curious, you mentioned, you know, the dilemma of not having the -- you know, the remote-sensing data that you needed, you know, to navigate the ice in a timely fashion.

Do you see onboard, unmanned aerial vehicles as your self-sufficient solution for that going forward, or do you think the dependency upon satellite, you know, remote sensing is, you know, with the launch of all the small sats, which solution is going to be more cost effective for the Coast Guard and give you what you need when you're at the helm of that vessel?

CAPT. HAMILTON: Both. So, there is the strategic.

So, ice-breaking is strategic and tactical. Strategically, you're trying to look out 10, 20, 200, 300 nautical miles ahead, and your satellite is going to give you, you know, gives you that data and information that is helpful there.

But we used to carry helicopters and we had a polar operation division. So, when I was the operations officer on Polar Star, that helicopter, and quite frankly, the German icebreakers, all the icebreakers that are up in

the -- in the Arctic -- well, I shouldn't say all. Many carry helicopters and they give you that tactical kind of closer in view up over the ice.

We don't have those at the moment. So, I think the UAS is going to be the solution for that tactical close in range and that's something over the last two summers, you know, you saw the SAR-X where I said we had the Scan Eagle.

We'd also worked with NOAA with the PUMA. We're figuring out what that UAS is going to look like for the internal, but I don't think shutting down the satellites is an option, and I personally think that's something that's got to stay there, and I think it's a both, not an either/or.

MEMBER PERKINS: Thank you.

CAPT. HAMILTON: Thank you, sir.

MEMBER BRIGHAM: I've got a question for Andy. The release of the eHydro data is not just a table of numbers, correct?

LT. COL. OLSON: Right.

MEMBER BRIGHAM: And so, when I see, and I've looked at it, what I would consider a chart, I wonder that we now have two kind of charting agencies of the United States, and how the release of that data and how it correlates with NOS.

I'm just interested in the process of how, because I would say for Boulder, that what I would take down in that picture is kind of my chart.

So, I think there are -- I mean, it's not necessarily for you to answer this directly, but to me, it's a new challenge.

LT. COL. OLSON: I don't know, Kym, do you want to just go ahead and --

MS. ANDERSON: That nexus of multiple data sources is something that we've been working on with NOAA.

Sorry, I thought I was talking loud enough.

So, that nexus of multiple data

sources is something that we've been working on with NOAA and with pilots for a while now.

I think where we're at right now is, you have to look at the date of the information, and it really does depend on the user.

So, from the Corps' perspective, we have the responsibility of providing that information for the navigation channel, and that's why it's our intent to post that as near real-time as possible.

So, a pilot or a boater can pull down both the PDFs like we talked about, as well as the xyz data.

At the same time now, we have NOAA being able to pull down, I'm not sure how frequent, and they use the same information to then update their charts.

So, sometimes you would actually see something on our website before it had gotten onto the NOAA charts.

Then you also have the ports themselves, if you're a pilot, for example, I

don't know, Columbia River pilot. The ports will have their burden areas mapped separately and that won't be on there.

So, it's knowing all the different data sources and how to plan your trip.

MEMBER BRIGHAM: It's really a coordination between the two agencies and it's the timing of the release of these products.

MS. ANDERSON: Yes, and I don't know Chris, if you can say how often you guys pull from it to -- I think it's like, we get the call at least once a year, if not twice a year.

MR. NEWMAN: Various districts do different things, that's another problem within the Corps, is some districts send us their data. They push it to us. Some districts tell us to pull their data off the website at certain intervals.

So, I can't really answer what is done in the Washington District, but we do -- we do pull it off and apply it.

I'm going to touch on this -- some of

this. This is good discussion on the national charting plant, also.

MEMBER SAADE: This is Ed Saade. Is there any method to include industry or the public in being able to upload the data, or is this software available? Is it public domain software for others to get involved?

MS. ANDERSON: Not to download. You can pull stuff off, but you can't put stuff on.

MEMBER SAADE: Is there any reason not to start to think about including others besides federal agencies?

MEMBER PERKINS: Ed, may I -- may I add onto that?

I went and visited the Portland District three years ago, after we got introduced to eHydro at an HSRP meeting. So, I went there and I met with the programmers, Mike Boulin, specifically, inside the Portland District.

It's a very complicated, you know, GIS toolset that they've developed to aggregate the data and automate the chart production process,

so they can get that near real-time data back out, publicly facing in those printable PDFs.

You're asking, I think, a very important strategic question, that I think remains unanswered or unclear, on can that eHydro toolset, and the intellectual property that's been developed by Army Corps, specifically Portland District, is that to a state and a point to where it can be rolled out and be -- have further beneficial use, by both the public, the private sector and other agencies.

Mr. Olson, in your comments, you mentioned the use of eHydro by other agencies, and so, it would be -- as a follow up, I don't expect you to pull it, you know, out of the thin air this morning, but it would be interesting to find out.

I know there is a community of practice established for eHydro within Army Corps of Engineers. They have a monthly user's meeting.

But has that group, in the last four

years, since I looked at it closely, has that expanded and are other agencies, you know, using it and is that eHydro toolset something that can be expanded for the inland navigation system, you know, beyond just ports and harbors?

You know, there's been a -- there's been a good investment, right? Army Corp has done really good work making that product fit the need for that specific application, you know, but can it -- can it be taken farther, you know, and more beneficial use from that investment?

LT. COL. OLSON: Great question. Great point. I don't know. I'm going to ask Kym again. Do you have any thoughts on that one?

MS. ANDERSON: Yes, so, I know they did just have an eHydro conference last week, where they -- and that was part of the discussion.

I know the focus has been on getting all of the information that we collect on the system first.

So, again, it's in infancy, you saw the deadline, by 2018. I think once we reach that

milestone, then we can start having those conversations, both about if other parties want to use it, as well as other mechanisms that could be developed to advance the usefulness of it.

CHAIR HANSON: Newest member, Lindsay Gee.

MEMBER GEE: Yes, Lindsay Gee. I've got a question for Mr. Berger.

You mentioned in your -- I think it was just near the end of that, you mentioned about autonomous system, and it was -- I think you said from the air to the sea bottom.

But I wondered whether that included actually, autonomous vessels operating in the states waters, and not maybe for research and observation, but actually just operating vessels autonomously.

MR. BERGER: Yes, I think rather than saying the sky is the limit, the ocean depths are the limit for that.

There is a core group of folks who are -- and I'll speak particularly on kind of the

maritime and marine technology side that are collaborating quite closely, both in directly to the marine technology and the marine science base, but also on the commercialization on a lot of that technology.

We have companies that are spinning out of the University of Washington's applied physics lab. We have the development of a statewide strategy around technology, as well as the -- looking at the development of a commercialization test center, an innovation center, and incubator for that.

So, you know, the work that's happening around autonomous vehicles is extensive and I think at this point, it's kind of gathering what we know, gathering kind of the IT side of that, gathering kind of the manufacturing side of that.

There is great support and interest. Some of that is moving -- some of that is moving forward on particular products, and some of that is pretty nascent, as well.

CHAIR HANSON: All right, at the risk of having a very short tenure as Chairman, I think I need to say thank you to our panelists. Thanks for getting us off to a great start. It's a star-studded group here and a lot of things to think about over the next three days, and you've really kicked us off well, so thanks again.

I think I'll try to get us back in here at 10:30, if we can just take a 10-minute break please. Thank you.

(Whereupon, the above-entitled matter went off the record at 10:21 a.m. and resumed at 10:35 a.m.)

CHAIR HANSON: It's just like when you throw a party, everybody congregates in the kitchen. So, everybody is back at the coffee pot.

So, thanks for this morning. Our final speakers for this morning are the directors of NOAA's navigation-related services programs, Center for Operational Oceanographic Products and Services, otherwise known as CO-OPS, National

Geodetic Survey NGS and the Office of Coast Survey OCS.

Complete biographies are included in your meeting packages. This morning, I'll be introducing each, then they'll present, and then we'll invite questions at the end of the last presentation.

If you want to ask a question sooner than that, write it down. But we'd still like you to ask it later. So, thank you.

First speaker, Mr. Rich Edwing, a man about town in Washington, D.C., because I know I see him everywhere.

Director of NOAA Center for Operational Oceanographic Products and Services. Rich has held many positions of increasing responsibility within NOAA, and as director of CO-OPS, he oversees the 24/7 operation of providing physical oceanographic information to mariners and other users.

Rich also serves as an advisor to the American Association of Port Authorities, Harbors

and Nav Committee. Rich, thanks for being with us.

MR. EDWING: Thank you, Bill. So, while we're waiting for the slides to come up, good morning everyone, and there they are.

So, this morning I think kind of the common theme between the three directors that we'll be talking are strategic priorities. I think Juliana and I are kind of talking about our strategic plans and the progress we've made, and where we're going. Think Shep is talking about maybe some new strategic priorities he's putting in place as the new, you know, director of coast survey.

So, this is actually a good time for me to talk about our strategic plan, because we're really kind of halfway through executing it, and actually, we developed this a little early and put it in place maybe in FY14. So, I'll be talking about, you know, that time frame, really FY14 until now.

Our four main goals are -- the first

one is customer service. It's really about, you know, making sure we provide great customer service to our existing suite of users. You know, identifying new users out there, and monitoring and measuring how we're doing with that.

Our Integrated Observing System goal is really about integrating the observing system that I manage, or my program manages, our NWLON, our Currents Program and our PORTS program.

But also, integrating with external partners, whether they're other federal agencies or local partners.

Advanced products and services is just continuing to evolve our -- our suite of products and services to meet emerging needs, but also to again, as I think as Russell mentioned, to integrate those, again, not just internally within CO-OPS, but also with outside third party applications like ECDIS and AIS and those sorts of things.

Then finally, our human capital

infrastructure title we try to build the best workforce in the nation, as a lofty goal, and this also focuses on our IT infrastructure.

So, I'm going to move through this. Again, it's by the goals and roughly by the objectives we have in the plan. I'm not holding strictly to that, to try to tell a little bit of a story.

On this slide, I'm not going to list all the customers, you know, our traditional customers, you guys are all pretty much familiar with those.

But some of the new ones we've identified over the last few years is the Reinsurance Association of America and some water quality boards. These are organizations we didn't really know used our information or how they used the information, and they didn't really know who we were. So, building those relationships are important to both sides.

In terms of direct customer engagement, a few years ago, really in parallel

with the LA Long Beach project, the offices put together, or actually contracted for an engagement strategy document, kind of a user's manual for us to use, which now is guiding our future efforts, and the LA Long Beach project, I think you're well aware of. You know, we talked about this at past meetings. We're pretty much, I'll say done with that one, we still are doing some things there, but it's really up to the Port of LA now, to kind of get the under-keel clearance forecast model into place with the data that's been provided.

But since then, we've now taken the lessons learned from that, we've gone down to the Gulf of Mexico in the last year, year and a half, we've been doing an intensive and extensive outreach to all the different users down there, to figure out what requirements they have, what unmet needs.

Is there a very specific issue, like the Port of LA Long Beach had, or is it a lot of smaller things?

We've kind of completed that effort and are now, you know, we put those requirements together and are seeing what we can do with that, and really complementary to that, but somewhat separate, coast survey and CO-OPS, with the help of the GCOOS, which is the IOOS RA down there, held a modeling meeting, where we brought together both coastal modelers and the response community.

You know, the response community had the requirements. The modelers were developing models for whatever reasons, but brought everybody together to see how we can call work together and how we might be able to leverage what's going on down there with the modeling community for our operational forecast systems.

So, where we're going next is again, well, like I said, well, what's our next steps for the Gulf of Mexico?

One of the major needs down there was -- there's a gap between our models and the Corps river models. We need to kind of close that gap.

That's just one example.

Our modeling meeting down in the Gulf was very well-claimed and successful, so we're going to be doing more of those. We're in the Delaware Bay area next, and of course, we're always looking to identify new user groups out there.

One thing we've done in the last few years is, we've established a dedicated and technical assistance capability. Before it was just, you know, trying to use bits and pieces of different people's time to help folks throughout the organization. But we have an employee who is dedicated to doing nothing but going out and training folks, developing all the materials, which you know, range from workshops to PowerPoints to videos, and of course, this is more on the gauging and the observing system side.

But the whole idea is if we can, you know, train people to do this work, more is going to get done then if we try to, you know, actually

do it with ourselves.

On the product side, of course, we also have to help people understand how to best use our products. So, and we do this through a variety of ways.

Work through the IOOS RA's, you know, they have a lot of expertise and they can be a great extension of, you know, what we're trying to do, with helping people to understand how to use our products and services.

We're engaged with the Corps of Engineers in their natural and nature-based engineering, helping bringing the geospatial foundation that we provide, along with NGS inclusive to that effort.

The South Florida Compact, which is an organization of Southeast Florida, you know, counties and local governments, trying to deal with the sea level rise. We've worked with them a lot, to help them understand how to use our products and services for that purpose.

Just this last January, we released a

new report which is using satellite altimetry to come up with regional estimates of sea level rise.

Up until now, you've had to have an end-launch station in the vicinity to be able to come up with a good sea level estimate. This reports lay out all the technical background of how it got there, but we can now come up with these regional estimates. Folks who don't have an end-launch station nearby can come up with information that they need for planning, but they need to know how to use that information. So, we've been doing a lot of outreach on that.

Of course, the nuisance flooding, there's been a whole series of reports on that, and this has gotten a lot of media attention, but again, we're there to help people -- how do they apply that information to their planning efforts?

So, in terms of measuring how we're doing, I think like NGS, I'm not sure if coast survey uses this, but ForeSee is a company and they put the surveys up on your site and they

collect -- they ask the questions and collect all the information and kind of come back to you and advise on what needs improving. So, we've been using them for a number of years.

They also report back to us, something called a customer satisfaction index, that top green line are our scores over the past few years. That middle line is the average score of all the federal agencies that use ForeSee to collect information in the websites, and that lower line is the private sector. All the private sector companies that use ForeSee.

So, you know, so far, we've been doing, I guess better than the average, but of course, we always want to improve that.

Some of the other website improvements we've been doing are the confused GIS capabilities, their websites and products, and just last week, we rolled out a new homepage, which was in direct response to some of the recommendations that ForeSee made to us.

People were having a little trouble

navigating and finding stuff. So, hopefully, this new homepage will help improve that. But we're going to have to continue to monitor that and see.

So, in the future, we're going to continue. Now, our next step, really the homepage is really just step one. Now, we have to start, you know, going down into all the other parts of our website, which is our window to serving up data to everybody, to make changes there, do some of the product integration that Russell mentioned, as well, improving functionality and taking all that input and making it a reality.

So, moving into the observing systems, and again, we're looking at kind of what can we do with the -- you know, the observing systems under my program's direct control, as well as partnering with other people.

Certainly, from an NWLON we're really looking to enhance and expand. So, we're doing a lot of partnerships with people to fill gaps in

the NWLON. There is a list of folks there in that first bullet. This first graph is not very good, but the little pin up in the upper left there, that's Turkey Point. That's a Natural Estuarine Research Reserve off the Hudson River, got a lot of gauges down there in New York Harbor, but nothing up the river, and there's a gap there for us.

We're working with the research reserve to get a gauge in there to our standards, and we've worked with a number of other research reserves. What we're trying to do is work with them now, collectively as a system, and not as one-offs, because we can't really afford to do that.

This is Unalakleet, a gauge that the weather service funded up in the -- up in the Arctic, to fill one of the many gaps there. I think I spoke about that at a meeting or two ago, so I won't say much more.

I've also spoken about our efforts with USGS. I think this is probably our most

promising effort because that's another federal agency that's along the whole coast, where we're working -- making progress on our project on the Northeast Coast, to integrate stations there.

Now, in terms of enhancement, and it's probably a little hard to see here, but in 2005 and 2006, Katrina and Rita really wiped out almost all of the stations, the tide stations in the Gulf. As we rebuilt, we have just not put them back in. But we've hardened them. So, next time around, we're going to do better.

They're not really marked here, but there's now 10 Sentinels of the Coast in the Gulf of Mexico. There's some others of our stations that are on these kind of elevated piles, as well, and where we have stations that are inland or up a river or somewhat of a protected location, we've also hardened them by elevating them up on steel frames or doing other things.

So, this is the Gulf, where we've also made a lot of progress, as well on the east coast, and these are probably the two most

vulnerable areas of the network.

Other things we're doing in working in conjunction with NGS, we're co-locating CORS at some of the stations, to help tease out the land motion for sea level rise information, and we've also completed a low cost gauge study, where what I asked my engineers to do is, I said come up with the most simplest, cheapest tide gauge you can do, to our -- that still gives us data to our standards, which really is a sensor and a data logger, right, and then just start adding things on to mitigate risks, and one thing might be, well, if you want that -- actually, you don't want to have to go there and get the data. You might want to add a communication system.

If you want to avoid data gaps, you might want to add a backup sensor. If you want to avoid this risk or that risk, you might want to add -- and if you mitigate all these risks, you really almost have built yourself an NWLON station, which meets my requirements.

But other people don't have all the

same requirements I have. So, this gives them all the options and lays out the philosophy we have and how we operate an NWLON station.

So, in terms of moving forward, we're really trying to work more now in this local-to-national integration of networks, both at NWLON levels and other levels. We put out a tiered data policy, which defines three kind of main tiers of data accuracies and collection rates for meeting different kinds of applications.

One thing I'm going to try to do with this gauge study is go out to industry and say can you build a product line that kind of allows people to add all these modules, and maybe you can even put in some of my software which has it to my formats.

If they see value in that, that's great. It's going to make it easier for me to work with folks and then kind of help build this local-to-national integration.

The PORTS system. We're up to 28 PORTS. We've got kind of five more in progress.

I'll say we've put a pause on the system right now because it's been too successful a program. We're kind of over-scribed, we're at a capacity to take on more. I'll talk a little bit more about that in a minute.

But we're still able to make some improvements, you know, and I've got -- that's just an air gap sensor. But we can still bring in data and new products from other systems, like the IOOS High Frequency Radar Systems. This is in San Francisco Bay, but we've done this in New York, New Jersey, Chesapeake Bay and I think we're going to Delaware Bay next to do that enhancement.

But the future priorities for this system is one thing I've been trying to do for a lot time is to get the PORTS data out and integrated into AIS. It's really on the Coast Guard side of the fence right now to get done. They're like this close to getting it done, but they've got some IT security issues they're trying to work their way through, but I'm

hopeful, I've said this before, I'm hopeful it's going to be soon.

Then we're working on what's the new business model for the PORTS system? As I said, we're kind of at a capacity, under the existing model. So, we're looking at different alternatives of how we can maybe get that back on a sustainable path.

Current surveys. You've seen these before. So, just in the last few years, we done a couple of small surveys, Casco Bay, which is in Maine, Cape Fear in North Carolina, and this year we're doing the last year of our Puget Sound survey, 138 deployments overall, and finishing that up.

I'll say this five year plan is where we're going next, but as we speak, this is being revised because the budget is really not going to be able to support this plan right here. So, now we're going to have to kind of move some of this stuff to the right.

Of course, it's always important to be

continually identifying and fusing new technology into observing systems. You know, I've spoken about our transition of the microwave water level sensor into our network. We're making great progress on that. We're doing about 10 stations a year and starting to see some of the benefits of that.

Now, we've got about 40 or 50 other stations converted. This iridium aids the navigation current meter system. This is where we put the current meters out on the Coast Guard buoys. By going through iridium satellite, we're able to eliminate the shore based station because we're using line of sight radio before, and that really reduces the cost of that system dramatically. It also increases the reliability, because we were having problems with the line of sight, and you can also put these buoys further offshore now, because you don't have to worry about the line of sight, and the Port of Miami, we have the -- the new Miami port system is taking advantage of this.

Hermit is just the name. It's not an acronym. I'm not sure why I got the name, but that's our underwater system that we developed for up in the Arctic, to try and get long term measurements up there. We've been successful in doing that, in terms of getting at least 18 months of data under the ice, which is great for predictions and datums. But that's the extent of it. I'm sorry, I've been -- I should be scrolling through.

So, that's the iATON. That's Hermit, at least that's the little buoy that's above with the sled with the pressure sensors is on the bottom, and then another tri-office project was the GPS buoy where -- and this has gone into operations and we can deploy these. Right now, they're being deployed mainly to support hydro surveys, mainly up in Alaska, where it can be very challenging to get tide gauges established on rocky low shores, and this is much easier, much more cost effective, but could be used other locations as well, and probably for our VA

project.

So, other things we're working on for the future is we're adding that real-time capability to Hermit, because that's what people really want is that real-time capability. That's why there was that little buoy in that previous picture.

We're looking at how can we leverage GPS, to really kind of modernize what we do in the Water Level Observation Network, and NGS has provided great support. I really appreciate what Juliana and her folks have done with this, although we're really just starting the effort, but one thing is integrating a GPS sensor with a water level sensor. So, it's self-monitoring its stability and maybe we can eventually sunset our benchmark network in that area.

Also, we're getting the land motion out of that as well. So, there's a lot of things, I think a lot of efficiencies we can achieve with that. So, we're looking at that, and again, I've talked about, we're pretty

confident we can get wave information out of the microwave water level, and we know we can get the current meters, as well.

So, it's dual-purposing sensors that are already out there, and getting more information out of them.

So, moving into the advanced products and services.

Under the coastal preparedness area, we've been putting out a lot of reports with what I talked about earlier. We've developed this Coastal Inundation Dashboard, which I believe I've briefed the Panel on. That's still a work in progress, although it's gone operational in a couple places.

The Storm Quick-Look product is kind of encompassed in that. But will eventually be totally integrated into that. But the dashboard really brings together historic data. It brings together the real-time data and it brings together the forecast data and it can also bring in, in the future we're hoping to bring in

partner data, to really provide a comprehensive overview of what's going on when the storm is approaching the coast.

We've put out a new High Tide Bulletin product last year because when king tides, perigean tides, were, you know, occurring along the coast, people were getting concerned, you know, seeing minor flooding, what's going on?

So, we start putting out advanced information. This is coming. Don't be worried about it.

So, again, future priorities. Again, it's really continuing to educate and work with people on sea level rise, how to prepare for that. Particularly, this new regional sea level capability that we come out with, and it's continuing that dashboard expansion and enhancement. It's operational in three areas right now. We want to continue expanding that to other areas and adding the additional features on.

We've got the IGLD update coming. We

talked about this at the Cleveland meeting we just had. We've got the bilateral plan completed between Canada and the US. We've got a small amount of funding to do some seasonal gauging and we've actually started a data collection effort. It's a seven year effort, and this year was the first year.

So, as that moves along, in the future we need to, you know, start to educate people and communicate out what this is going to mean to people. But we also have a tidal epoch update coming.

Every 25 years, we'll look to see what kind of changes there's been in the sea level, and do we need to make adjustments to our tidal datum, so that they're still relevant, and I'm going to -- I'm going to guess pretty confidently here that we're going to have to do that.

Vdatum, our main role is to do the tide gauging surveys to reduce the uncertainty in the models. We've done a couple of multi-year projects in the New England Northeast and the

Pacific Northwest the few last years. A couple new models have been rolled out in the areas there on the slide.

Kind of again, reducing that uncertainty. I think it also expanded their geographic coverage, as well, and that's what we'll continue doing, going into the future, more surveys, but also we're going to dual-purpose some of those up in the Great Lakes, to also meet IGLD requirements, as well.

So, we've invested a lot in recent years, in kind of modernizing and taking some of our water level -- actually all of our normal water level processing algorithms and tools, and getting them up onto a website, so that partially, it's because allows our folks to telework and kind of access these tools remotely, but it's also, we can allow other people to come in and use these tools to process water level and come up with some other products.

For people who don't have data to our standards, we've put out a stand alone

datums calculator, so they can put their data into that and come up with a tidal datum. That was -- it's been an often requested tool that we've delivered.

Then another tool that's been delivered is a MAPTITE product, and again, this was a great collaboration with NGS, as well as our Office of NCCOS, within NOS, the Centers for Coastal Ocean Science, and this is as tool that brings in land elevations, tidal datums, frequency innovation, different plant types and allows you to design your own restoration project, because different plants like different elevations to survive at.

So, really one of our next big steps, and again, this is all again, goes back to the local-to-national integration of networks for water level. So, I need to enhance my system to be able to take in data to other standards. Tier B and Tier 8 -- Tier C standards to be able to process those, as well. Right now I can't do that.

Forecast models. This is our -- this is the old paradigm of forecast models which was mainly building smaller, estuary-specific models. There was about 13 of them, but we realized that was not a very good paradigm, so we came up with a new paradigm, which were these larger, offshore models. We built those first because they provide the boundary conditions and then they also include the models that nest up into the estuaries, much more cost effective to maintain and it will actually allow us to get to full CONUS coverage in five years.

All these models are operated over the high performance computers at the National Centers for Environmental Prediction with the weather service.

So, in the future we've got -- there's a few of them that still need to be upgraded to the newest model engines. So, we've got to do that. There's other NWS enhancements that we're bringing in like down in Tampa Bay. They've developed the capability to forecast fog, which I

hear about all the time when I talk to ports and harbors. So, get that done down there and maybe try to start replicating that in other areas.

On the west coast we got a big -- the west coast model is also experimenting with simulating real-time data. All different kinds of data, bringing that in. First of all, just seeing if we can do it, and second of all, seeing if it actually improves the forecast at all, and depending on how that turns out, maybe starting to replicate that enhancement to other places, and you heard last, at the last meeting up in Cleveland, GLERL is developing an ice model, module -- ice forecasting capability for the Great Lakes. So, we'll add that in.

Ecological forecasting. The Gulf of Mexico forecasts have been around for 10 years or more, but we've made a lot of improvements to them and they're much more efficient to produce now, which allows us to take on bulletins in other areas, and so, we're working with NCCOS who has been developing the Lake Erie one. We did an

initial operating capability last year and in a month or two, we're going to move over to the full operations with that, and then we'll start working on Gulf of Maine next.

So, human capital and infrastructure, and in '14 and '16, we did some very extensive internal org -- you know, health surveys, just asking employees a lot of the questions on what could be improved, you know, looking for ideas.

Actually, that was -- those next three bullets should have been indented a little bit. Those are kind of three main areas that came out of the first one. But for both of these, we put together action plans and we're working on those, and really our next step is going to be to go back this next time around, and monitor. Now let's measure how well we've done on that, how we actually answered the mail.

I've got diversity inclusion down there. There's been a major effort in NOAA, I'd say over the last couple of years to really pay more attention to this. There's been a new NOAA

strategic plan put out. Russell has been a huge driver I think behind that, as well as within NOS, he has kind of launched several diversity inclusion initiatives within NOS.

So, again, you know, we need to measure the effectiveness of what we've done internally to CO-OPS, and also make sure we're fully behind Russell and the rest of NOAA in supporting those plans.

We've completed our Reliable Operating System which is really our project management system, but it's got thousands of standard operating procedures documented behind there for everything from putting a tide gauge in to processing data to do other things.

We have our KEEP training program. That's a knowledge, enhancement expertise program. That's kind of in-house university, which kind of has a level one, level two, level three, if it's for new people coming in and how can they progress up from an entry level person to kind of a master expert in the areas, we teach

them all the stuff that those, what they learned in college. But that's specific to CO-OPS.

Environmental compliance. We've all made a lot of progress and put good environmental compliance programs into place the last couple years, with a little encouragement from Russell.

The last thing is sustainability road map. That's where engineering divisions, we're really going back and revisiting all of our observing system protocols, procedures, everything we can do to try to find efficiencies and maybe better ways to do things.

On the IT side, we've rebuilt our database system and it had been a collection of all these legacy systems, multiple, many databases, down to two now and it makes programming much easier.

We've built an R&D sandbox capability. People can go in and you know, kind of test and play around with new products and things, without you know, threatening to crash something on our production severs. We do still have some legacy

Fortran code and things that need to be upgraded. So, we're working that, and cyber security is just an ongoing, you know, priority for the -- for everybody, really.

So, we're going to conclude with the grand challenges slide, and again, this goes back to what you've seen. But we've just like PORTS, we've got, you know, we've and an exponential increase really in demands for water level information, and in some cases, they're asking for that water level information and gaps I have in my inlet system, and that kind of allows me to work with them at one level and maybe, you know, contribute something. In other cases, they're just trying to solve a local sea level or storm surge or habitat restoration or issue.

We can still provide some maybe help and expertise and that's mainly what our technical program is for. But at some point, we want to try to get these all kind of working from top to bottom, so that as a storm approaches, we can reach down and grab the lower level data and

put it together for some specialized products.

I'd like to -- the partnership challenges. It takes a lot of time and effort to work with folks, because there's lots of different kinds of hardware out there, software formats, all sorts of things, levels of understanding. It just takes a lot of time and I got 180 people in my organization and we got a nation to serve, so just, you can kind of do the math here. So, it's a big challenge.

Then this sustainable business model for ports. It's an over-subscribed program at this point, and we've got a new administration and they've got some ideas about how to approach things in terms of who does what, monetization is a big term with the new administration. So, we're looking at that.

So, we're putting together some alternatives that we need to, you know, consider and then pick one to try to keep this program on a sustainable course.

So, that's really the end of my

strategic plan, sort of briefing. I just have two slides here at the end, and we all have something similar in our presentations.

So, just kind of this just tries to illustrate how we partner in terms of managing our programs, both in terms of just, where does the money go, in terms of contracts and things, or who are we working with?

This doesn't really show you who we're working with, but it shows you where we're working with other entities to get stuff done.

So, just very quickly, that bottom one, the data collection, I got my three observing networks. You know, two of them are base funded and we do a lot of that really with in-house assets. But also, a lot of that goes out the door in contracts. That's that little yellow shading, and or also partner with people to get those things done, which is the red.

The PORTS is you know, primarily a partnership program, and that provides all the data, right, and then comes up. So, we're buying

a lot of equipment from the ocean technology vendors down there.

Then you move up into the product development, you know, we bring all the data in, we quality control, we process it and then we start putting it out as kind of products, and I tend to bin those into three main areas.

There's our historic data, those long data records, you know, predictions, data, sealable trends, there's that box on the left, real-time data in the middle, forecast data, the models on the right, and we put all that information out there to be used. You know, in a lot of cases, it's just used directly by folks.

But the third tier is how do we distribute that? Well, for tide tables some of the -- and the predictions, those are the -- the tables are published by the private sector. We don't publish anything hard copy anymore.

But really, the rest of it goes out over our website to a variety of ways, but that's what enables all sorts of third party

applications, research models, reports, the whole spectrum of things, and of course, the major societal benefits at the top and the traditional safe and efficient marine transportation and then coastal preparedness.

This just shows kind of in terms of dollars going out the door. On the left there is appropriated dollars. You can see 30 percent of the appropriated dollars goes out through contracts, different kinds of contracts. Five percent is used to buy equipment and the rest goes to, you know, FTE salaries, rents, telecommunications, those kinds of things.

Then the right-hand side is all the reimbursable dollars. We get primarily through the PORTS, our PORTS partners, but other partners, as well, and you could see pretty much all of that goes out the door either in terms of contracts or buying equipment. So, I guess we're holding questions for the end.

CHAIR HANSON: Yes, sir. Thank you, and actually, we need to take a two minute break,

I understand for a reboot of the system. So, the conversation was here, so stand by.

(Whereupon, the above-entitled matter went off the record at 11:08 a.m. and resumed at 11:13 a.m.)

CHAIR HANSON: All right. I want to get us back on track here.

Now, Rich, you have to do yours over, right, during lunch? Roll the tape.

I'm going to do a brief intro here. Juliana Blackwell is director of the National Geodetic Survey. As such, she is responsible for the financial, administrative and programmatic performance of NGS, the lead federal agency for positioning activities -- positioning activities in the nation.

Ms. Blackwell serves as Chair of the Federal Geodetic Control Subcommittee, of the Federal Geographic Data Committee, exercising government-wide leadership in the development and improvement at geodetic surveying specifications, methods, instrumentation and data transfers.

Thank you, Juliana.

MS. BLACKWELL: Thank you, Bill. Okay, so, similar what Rich did, I'm going to walk through some of the strategic goals that we have at NGS. I've briefed on these before to the Panel.

So, some of the information for the public is not going to be as apparent, because you don't have the background on it, but a lot of this information is available on our website.

But for the purposes of updating the Panel members on some of the recent activities, I'm going to go through these slides rather quickly, and also point out some areas where we have partnerships and how we're collaborating with other sectors to get the work done.

So, if you will just bear with me, we'll see if we can get this to work. There we go. Here we go.

So, NGS has a 10 year strategic plan. We last updated this in 201, we're about midway through this. We have a long going effort to

modernize and improve the NGRS the National Spatial Reference System, and that's -- it was one of the reasons why we did this out for 10 years, because we knew that the plans that we had were going to take a while and we wanted to get everything written down in one place, but we also realized that with the ten year plan, you've got to kind of check in at midpoint, at least and do some course correction.

So, what I'm going to do is step through the main three objectives that we have, our support, the users of the NSRS, modernize and improve the NSRS and expand our stakeholder base, and I'm not going to spend too much time talking about the development of the workforce and the organizational components of it, which I have mentioned on other occasions, but for the due to the time limitations, I'm just going to stick to the first three objectives.

Just to refresh everybody's memory on what, you know, we do here at NGS, providing the spatial reference system is what provides the

coordinates, the heights, the gravity, the deflection of the vertical, all the components of positioning for mapping and charting purposes, for the nation and our territories.

So, anything having to do with taking information from GPS, GNSS systems, knowing where you are in reference to other things, it all, although it might get your data from GPS, it's all relevant to where you are on land, and NGS provides that frame work, that underpinning of positions for all surveying and mapping and geospatial needs.

So, this is important again, for things like transportation systems, intermodal, not just maritime. We do a lot of work in the FAA, airport survey data, again with navigation and certainly coast to coast with our land surveying community and GIS users, and anybody that's doing any sort of construction and update on infrastructure, as well as monitoring changes that happen over time, because as we all see, things are dynamic and in some cases, more

dynamic than others.

But things change and we need to make sure that we have accurate information for positioning purposes, no matter where you are, and that's the basis of what we do at NGS, is provide that framework for the nation.

So, I'm going to give a few little samples of some of the data and information that we serve out and what we've accomplished thus far this year, to support the users of the National Spatial Reference System.

So, just the six month point here, some products that we've delivered so far and the magnitude or the volume of products that we've delivered, over 1.6 million survey mark data sheets have been distributed through our website.

We track these things on a monthly basis. Some of those are just through downloads. Some of those are whole areas of information that are downloaded. Some states download the data on a regular basis, so that they can update their databases.

We also have over 19 million CORS datasets that have been downloaded, and the CORS, in case you're not familiar with it, these are the continuously tracking stations that serve as the most accurate survey points for the NSRS. These are stations that Rich talked about having some of those co-located with our NOAA tide gauges, NWLON stations, so that we can track what's happening through GPS, as well as monitoring what's happening on the water.

But from the geodetic standpoint, we're interested in having those core stations, so that we can find the stable points and provide starting points for surveyors.

The 19 million again, is people download that information. They use those data sets to post-process a lot of their survey work or to do research, so that they can monitor and see what's changing over time, and a whole bunch of other research opportunities that folks have come up with.

The last one here is 1.4 million

online geoid computations. So, we provide models for people to translate the data that they get out of their GPS equipment into something that is more relevant, as far as heights go, and a lot of folks are using that through our geoid computation models.

The image that you see here is just another example of some of the -- it's a service that we provide, as well as products, and this is a map showing a local survey that was completed recently, from the airport up through Seattle, from King County airport through downtown to the Portage Bay area of Lake Union.

It's basically a leveling project that provided the new second order first-class leveling on like 19 different bench marks.

This project was not performed by NGS, although NGS serves as technical advisors on a lot of these types of surveys, but the data is sent to NGS. We quality review it and then we can load that into our database and have that information available for others to use if

they're doing work in that local area.

So, this is just one example of the types of projects that we get in. QA and then make available, make the final information available to others for their purposes.

Next one I'm just going to highlight some of the results of the FY16 work that was completed. This is mainly looking at the coastal mapping side of NGS, because not only is the NSRS about latitude and longitude and position, it also includes providing the national shoreline for the nation and in particular, for application to NOAA's nautical charts.

There is certainly a lot more information that's derived from the imagery and the LIDAR data that's collected, compiled and disseminated, but for the primary purposes of updating the shoreline, we've produced over 9,000 miles of compiled shoreline in 2016, representing 5.5 percent of the US, and over 285 nautical charts received, updated shoreline with 37 ports updated and other ports, 35 other ports analyzed

for change.

Also in, you know, continuing to grow in the bathymetric topobathy LIDAR work that we do, as well as just the airborne LIDAR and so, 400 square nautical miles of airborne LIDAR bathymetry data we've delivered, over 700 square nautical miles that were collected. So, it takes a little bit of time to collect things and get things processed and disseminated.

So, not sure you're going to see this very clearly, but I just wanted to highlight one of the areas that we completed in 2016. This is just a little image of work that was done in the southern part of Florida on the west coast side, just showing the work that's done, as far as updating information that goes on the nautical chart.

There is green and light blue lines that will show what is mapped, as far as the shoreline goes. Some of it being natural, some of it being manmade bulkheads.

If we zoom in a little bit more, maybe

you see some of the additional detail, and it's going to be hard for you probably from where you're sitting to see this, but the take-away is, is that as you go through and reference what we know now, from what we had before, there definitely is many changes that are seen now with the new data that's been collected, and this is what gets applied to the nautical chart for those updates.

Another example of some of the work that's being done with the topobathy LIDAR, this is a couple of insets with information that was collected down in Southern Florida, that's pulled out in one of the inset boxes, as well as in Puerto Rico.

But let me start with the background image here. The data that you see, there's starting at the top, there's the east coast, you see the blue, Martha's Vineyard collection, and the green shoreline, and then some yellow, different project areas, the green being the Sandy work that was collected.

Some of the other areas, partly collected by NOAA, others were contracted out, and then some of the work that's been done as far as either planned, acquired or completed in the different areas in Southern Florida, and again, in Puerto Rico.

So, there is a mix of contract work. Some of it again, is collected by contractors other -- and compiled. Others is just compiled by contracts. So, this is an example of a mix of that information. It's not really colored that way, but we do have that information available.

The second strategic goal that we have is to modernize and improve the NSRS, and this is where we get into updating the current datums that we have, NAD83 and NAVD88, and all the things that go with the -- the update of that -- the datums for positioning, including how do you improve the data submission process? How do you provide the tools that are necessary for people to convert their data back and forth from the old to the new, and then what does it mean to

surveyors? How can they do their surveying more efficiently and that's updating survey methodologies.

So, one thing that Russell had mentioned about GRAV-D. This is our airborne gravity collection that -- that is about 59.6 percent complete for the US.

This is the data set that's going to be the foundation for the updated geopotential or vertical datum for the US. This is going to be where you're going to see the most change when we publish the new datums in 2022.

The basic starting point for heights that are relative to measurements on land are going to change anywhere from, you know, approximately no change in the Southern Florida area, to an estimated 1.5 to two-meter change up in Alaska.

So, we know this is just because of the way that the datums were -- the technologies that we had to do the datums back in the 1980s, before we had GPS available. We know that that

is in need of updating, and that's why we have this massive ten year plan underway.

We still have several more years of collection for GRAV-D. We're currently collecting data in Alaska, trying to get as much of that state complete in the next couple of years as possible. We're leaving the Aleutians for the last because that's a big challenge, but we're -- we're definitely on target for getting the work done as planned in support of the 2022 roll out of the new datums.

One of the other things that goes along with this new methodology for new data sets for our vertical datum is validating the data that we are getting out of the airborne gravity collection.

The Geoid Slope Validation Survey will be the -- that we perform this year, will be the third of three that we have scheduled. This will be in a more mountainous area in the southern part of Colorado, and it will really test the processes we're using for the airborne gravity

data against other geodetic surveying methodologies, to ensure that what we're getting out of the airborne data and the way that we're processing it and utilizing it meets the goals that we have of one to two centimeters for most parts of the United States as far as accuracy goes.

We know in the mountainous areas, it's going to be a little bit more challenging. We're going to see what we get out of this survey that's going to be complete this summer, see how we do in higher elevations with the airborne gravity data.

So, I'm not going to go into this too much detail because you all will glaze over and fall asleep, but I want you to know that datums are complicated. We know that they're complicated and what we're doing is trying to make them easier for folks in the future, to utilize their GPS information and try to serve both worlds, as far as the scientific community and the surveying community and making it as easy

as possible to get the data in the right datum, in the right format that's necessary, which involves one, defining new datums. What -- what that means to people, where they will fall under which tectonic plates, and then building the right tool kit, so people can move from the old to the new, when the new datums are available, or reference frames are available, and part of that is naming them and defining them and that's what we've been doing over the past few months.

We're going to roll that out here at our Geospatial Summit that's coming up next week, but there are many, many different datums and different ways of measuring things from, you know,
International Great Lakes Datums to geoid models, etcetera, and what we want to be able to do is take those, make it simpler and provide folks the tools to make that information transferable.

So, one of the things that we have on our modernization effort is providing an improved geodetic tool kit that would be a web service,

that would provide coordinate conversions between latitude and longitude, no matter what type of datums, federal datums, national datums that are available and give you the information in whatever format that you're interested in.

So, this is -- it's on our beta site. If you're interested in datums, I'd invite you to take a look at this, test it out and provide us feedback, because this is the basis of what we're going to be doing and in -- and updating all of our other datum transformation tools into something of this format.

So, we want to get it right, and we want our stakeholders to provide us feedback on this, and for those of you who are into the GIS etcetera, this is going to be an important tool for getting apples to apples and oranges to oranges, when you start moving your data around.

Some of the other beta mapping applications that we're coming up with to improve the way we display information are our CORS map. We've got three beta sites that I'm going flash

up here quickly.

One is to load information about our CORS network, have a display in ways that are meaningful to people. We've got a new beta CORS map available. We also have an OPUS share map that's got a new look and feel to it, and we invite feedback from you all on that.

OPUS is what people -- it's an Online Positioning User Service. People collect data. They process it in reference to one of our CORS, our multiple CORS sites and they get back a latitude and longitude elevation and a lot of meta data about the site that they collected.

We also have more on the historic geodetic control diagrams. We have a new webpage that's available that shows a lot of information from the past, and so, that's now readily available.

Once we receive the feedback from folks and think about it, how we have to change these websites, we'll get those more into an operational phase if it looks like that's the

direction people are responding.

We also have another datum transmission tool which you all heard about, Vdatum, and I think at some point, we want all of our transformation tools to converge into one delivery system, but we're not quite there yet.

But we have made strides in getting the Vdatum tool to an online web service version for folks to be able to use, and that's what the images here are on the left, and then just sort of another perspective of how that data will get entered, and then the image in the middle is just showing where some of the -- where the station -- the gauging installations were, in order to support the information for the modeling that goes into the Vdatum product.

The third objective or goal that I want to talk about is expanding our stakeholder base, and some of the efforts that we have underway or have recently completed regarding outreach and education, university engagement and some of our IOCM work.

I mentioned, we have a geospatial summit. We have had a number of these in the past, but as we continue to move forward on our progress with updating the geometric and geopotential datums and rolling this out, we're inviting folks to come and hear more details about our plans and what that means to them, and to hear from some of our federal stakeholder and others, about how they are preparing for the datums and questions that they have about the work that we're doing.

The geospatial summit is going to be in Silver Spring, Maryland. It's also going to be available via webinar. So, if you're interested in that, there's still time to sign up for that, even if you just listen in remotely to bits and pieces of that. So, that's available on our website, if you're interested.

We also completed a lot of our regional advisor program last year. We transferred from a state-base, although it wasn't 100 percent state-base, to a regional approach,

and completed that, so that we have every state represented by a geodetic advisor at this point.

We have Mark Armstrong, who was introduced earlier, who is here in the Northwest. He's done a great job of connecting NGS to stakeholders in the Northwest and talking about our products and services and hearing you know, what the special, you know, special circumstances are in different regions, depending on what's happening in dynamics and just helping people build their knowledge base of what our products and services are.

We've also been doing a lot of collaborative work with Oregon State University. They're helping us right now in looking at updating some of our plans for surveying methodologies, doing some assessments for us and been partnering with them as a cooperative institute for a while now, and I think there is certainly opportunities with Oregon State and other universities, to continue to work on research projects and help us in our

modernization effort.

You all have heard about the Coastal Mapping Program. This is just a -- again, an overview slide of that, but in the interest of time, I'm just going to hopefully get to the next one.

Point out that this information of the shoreline that NGS collects and that OCS utilizes for the charts is publicly available on this website. It's there for you to look at and download and utilize, and that's just a map representing that.

Also, I've mentioned before, the efforts to collect oblique imagery, different way of looking at infrastructures and natural features, so that you can more easily identify what it is that you're photographing, and this is just a sample of Seattle oblique imagery that was collected recently.

I'm going to talk a little bit about stakeholder growth, primarily in the products from the coastal mapping side of things and the

data that's available through NOAA's digital coast, which is where the image -- we have our topobathy and our imagery that's available, as well.

This is -- I know you can't see this image, but I want to show you over a ten period of time, what -- how things have evolved and the information that's available and how people are using it.

So, for the past ten years, we've got counsel on this. We've got over 11,000 data sets that have been downloaded through the Digital Coast and again, this is information that's part of the Integrated Ocean and Coastal Mapping effort, and if you look at it and slice it and dice it this way, whether it's DEMs, imagery, LIDAR work or just overall total, which is the purple line that you see, you can see how things are continuing to grow, as far as useful -- the -- how people are downloading this and the number of folks that are downloading it.

The spike that you see is Sandy.

That's where there was a huge increase in the number of data sets that were downloaded, and if you look at it a little bit different way, you'll see the blue, which is almost half the circle here. This .com is folks who are in the .com industries using our data, and then the red is .edu. So, educational institutes is about 23 percent there.

The last two slides I have just highlighting again, some of the areas in partnerships that NGS has and the areas of research, data collection, product development and distribution.

So, as far as research goes, things that we do in NGS involving modeling, development of survey methodologies, development of sensors, and in cloud processing and new ways of manipulating data with different types of IT resources.

We utilize a number of partnerships through contracting, through cooperative institutes, through grantees, as well as visiting

scientists who come to NGS and help us with these efforts.

Likewise, with the data collection effort, whether it's data collection of shoreline, topobathy, LIDAR, CORS data, GRAV-D data or just geodetic control projects that come in, a lot of those are done by our contractors, our partners and our CORS network. We have over 200 organizations that own and maintain CORS stations.

Certainly, academia, surveyors, federal and state agencies and private citizens, and then for product development in the areas of like data processing, compilation of our data and just management of our data, a lot of the work is done through contracting and third party vendors.

Then product distribution, again, the data that we provide is ingested by a number of federal, state and local agencies, GIS community, universities and other vendors, to take our information that's publicly available and have that be included into products and

services that are done by a myriad of other entities.

Then the last slide is just generally similar to what Rich showed. Out of the resources the NGS has available, this is a snapshot for this year.

Thirty-seven percent is going out to contracted services. About 63 percent is that "all other" category of labor, rents and just other costs associated with running the organization, and if you look at the 37 percent that's contracted services and break it down a little bit more, 72 percent goes out on contracts, 21 percent of that goes out as a grant and then seven percent is basically contracted out through -- for travel support, again, going back out to industry and tourism organizations, etcetera, and paying for part of what we're doing here today.

So, that's just kind of a snapshot of our current resources, and that's it. Thank you.

CHAIR HANSON: Thank you, Juliana, and you notice when you made your comment about putting people to sleep with the datum, you forget your crowd here, because about half the people in the table here were eagerly waiting to hear that discussion.

So, maybe after hours. But thanks again.

Admiral Smith, we've already introduced you a couple times. So, I think we'll just let you go right into your presentation.

RADM SMITH: I'll jump right in, in the interest of time.

When I last presented to you, last August, I had been on the job for four days. In fact, I think I wore this uniform first at an HSRP meeting.

I've been in my position for about eight months -- for about eight months now, and within those eight months, we've been working with the coast survey leadership to really hammer out four major areas that we'll be focusing on in

the coming years.

The National Charting Plan, our external source data policy, the hydrographic survey priorities and Autonomous Systems Roadmap, and all of these, I'll be covering today.

So, I really am going to have to dispense with everything else that's going on, in order to be able to focus on these four areas.

We distributed documents for three out of four of those, well in advance, and one, last night and this morning. But they -- they're here to sort of support the presentation.

My final remarks will be about what we -- the final slide, I'll come back to a similar slide about the public/private partnership and how really how we do business.

So, the National Charting Plan. Travis is going to be speaking on some of this, this afternoon. But what -- I want to just sort of frame it out a little bit.

So, interestingly at dinner last night, there was some confusion about this, and I

want to make some sort of by distinction, talk about what it is that I'm talking about here.

So, when we say charting, we really mean the charts. We don't mean any of the activity having to do with surveys or datums or aircraft or ingest of data. We really mean, you know, assembling and publishing and distributing the charts themselves.

So, in that narrower definition of what we mean by charting, the charting plan is about what the form and distribution mechanisms and role of those charts in the maritime industry and how they're used for safe navigation.

So, we recognize that we must have -- we must have adequate data to support the charts, but the focus on where the data comes from is contained in the other -- in external source data policy and also our unified hydrographic surveys priorities plans.

So, in general, we've been hearing for years that our charts lack detail, and people say, "I want more detail. I want to be able to

zoom in. I want to be able to see more."

In fact, the slide that Juliana showed was a really good example of that, where we have much better detail. The Army Corps surveys show much better detail in the channels. The limitation wasn't really about the paper chart. That was how we made charts for many years, and in really it was only about a year ago that we really allowed the ENCs to diverge significantly from the limitations of scale of the paper chart.

So, we're now at a pivot point where we can think about how the charts ought to be, instead of how they are limited by being in their - by the limitations of paper and print distribution, the print distribution system.

It's an exciting pivot point. So, the ENCs were really introduced about 30 years ago, but really have been a side product for quite some time. They really are the heart of what we do now, and the paper products are a branch of that production line, and it's really changed everything in ways that we're still becoming

aware of now.

I think there is a little piece of vision here, and that is that the way that most people under 30 experience maps is on their device. If they want to bring up a map, turn it on essentially, and it covers all space and all scales, and they don't know where the edges are. They don't know what the chart number is. They don't know what edition it is. They never have to correct it, for goodness sake, and so, if you want the chart, you turn on the chart.

The infrastructure we need to support that way of doing things is much more like other types of modern mapping and database driven, consistency of scales, consistency of attribution, you know, seamlessness of features, and everything that goes with it.

So, we're envisioning, you know, that's where we need to go. Our data holdings are still essentially the paper chart, and so, we're -- you know, it's going to take an

evolutionary process to get from the data holdings we have, 133 different scales for 1,000 charts, to what we think is the right number at about eight different scales, and this is a generational level project, really, probably, because we need to collect new data in some cases too.

But we're leaning bravely forward here to put out there what we think the end state is going to look like, and start talking about that end state, without a whole lot of regard to how hard it's going to be or how expensive it's going to be to get from -- to get to that place.

Then we'll figure out really where -- really, really what -- how we can most efficiently get there and where we do it first to get the most bang for the buck.

So, Travis will be briefing on this more in detail this afternoon, so I'm not going to take all of his great slides or anything, but I did want to show just one little example, which I think is different than the examples we usually

use for charting because it's not a big ship, it's not a big ship story.

In the 1970's, this is the Merrimack River in Massachusetts. In the 1970s, there was little to no recreational boating on the Merrimack River because it was an industrial dumping ground of an industrial part of the country. Clean Water Act had just been passed.

So, in the same year that the Clean Water Act got passed, we decided that one day 80,000 scale, which is on the right there, that amount of detail is -- would be sufficient for, you know, an industrial pond, and you know, since then, fortunately it's gotten all cleaned up. All those towns have now turned their face toward that river and are trying to make economic use of it. Huge amount of boats at Newberry port. They won't come up the river, it turns out, because there was no chart, and the people on the river figured this out, and put together a coalition to pay for some surveying, to better -- to take care of some data gaps, and then put a letter writing

campaign together.

So, sort of out of the blue on my first week on the job, we got 80 letters from the Congresswoman Niki Tsongas, all the way down to the guy that runs the pizza store, asking for an -- larger scale chart. So, this just doesn't happen, and it was really a really well integrated story.

So, I want to pass that on and because it, and so, we -- we are -- turns out we had all the data nearly, and have now put together a larger scale chart and it's out in time for the recreation season this year. So, that's kind of a fun, good, new story.

But it just happened that those people got their act together and wrote to us and made it easy. There are probably hundreds of other coastal areas that could be -- that could also benefit from -- from better charting.

So, I added a couple slides form the -- these are mostly for reference afterwards, but Lynne has encouraged me to be very clear about

what it is that I'm hoping that the HSRP will do.

So, I sort of wrote down in advance. So, we appreciate already what you've done in reviewing the plan to date, from some great detailed chart geek type comments from Captain Sal, to some -- to some great editorial and strategic comments from the rest of you.

However, since you are the HSRP, we can't take those comments individually. We have to have the recommendation from the HSRP. So, I'd ask for a consolidated set of comments, so that we can treat that as -- as input from the HSRP rather than from individual experts. That would be more powerful for us.

Probably that doesn't all need to go to the letter to the Administrator. Maybe a few high level comments about how the -- about the plan and where it's going and what you think needs to be tweaked on it and then detailed comments direct to us.

I did want to point out that the existing, it's a bit of a skeleton still. It's

going to be followed up by you know, a detailed chart scheme for how we think the charts ought to be laid out, with specific scales in specific areas and Travis will cover that more. But we don't, in fact, have that layout now. We'll be doing that over the course of this year.

External source data. So, it is -- it's our policy to use the best available up to update the nautical charts. We've not always been very clear about that and we've made a big effort in the last six months to really dig into it and be really clear and simple, but that is the single, simple policy statement, that we use the best available data to update the nautical charts.

If you think about the converse, that means that we are -- we're public -- we publish charts on Thursday. We are knowingly publishing charts this week that we know are wrong. So, that's not a good alternative either.

Do we wish all the data were perfect? You know, and designed specifically for charting,

with all of the attributes necessary and all of the detail necessary and the right places, fully documented. Sure, but we're not going to get it.

We need to -- this needs to be a coalition of incorporating data from many sources, and our, really our gold plated data that we and NGS collect specifically for charting, we will do it specifically in the areas that that's justified. But we need to be aware of and welcoming of all of the -- of all data from different sorts, you know, from different sources.

Part of that is we need to -- the way we're thinking about this is that we're not going to sit and wait for people to send us data, because that has something to do with them. It doesn't have to do with us or our customers' needs.

We start with where we have a problem, where we have -- where we have evidence that the chart is inadequate somehow and seek out data to solve those problems.

There was a great example down in Galveston, I think, that somebody was just telling me about, that that it wasn't Galveston. Rachel is shaking her head. It was Mississippi? Yes, nodding her head of some -- of some -- you know just some -- long standing discrepancy on the chart that everybody been bothering everybody for years. Nobody said anything. We were able to get it fixed in two weeks with some Army Corps data that we were -- that we sought out to address that issue.

So, it's a -- doesn't always mean that we have to go out. Problems don't always mean we have to go out to collect new data.

But we do. We will catalogue and evaluate all data that is offered to us, but the real effort is to get all of the data that is collected into archive, discoverable and accessible and even, there's some good big chunks of NOAA that are not very good about getting their data out of the shoeboxes and into the archives, as required by various rules, and we're

working with all of them, to make that available, and then from there, it's easy for us to seek it out and get it on the chart in a time and a manner that it's important for us and our customers.

We will -- we do need to honor the use constraints or conditions that are associated with the candidate data set. Many academic environments have sort of a little bit of a proprietary, semi-proprietary feel to the data for some period for time before, so to allow the principal investigator the first rights of publishing and we can honor those, but we don't want that to go into the shoebox forever, and -- and -- and so, we're aware of those constraints and we need to be respectful of it, and we'll prioritize the incorporation of data sets that makes the most difference to the accuracy of the chart or rebuild, you know, building new charts, in this case.

So, that's it. That's -- it's -- it's -- I don't think it's -- it's real rocket

science. That's the high level policy. There's a whole lot of -- of detail that has -- that we have to put in place, to sort of get that to be not only built into our systems and procedures, but into our culture because there's some pieces, there's some parts of our culture that are not -- that are not as accepting of that elasticness of the quality of data. But although, I was really encouraged to hear both Rich and Juliana also talk about it -- you know, different -- you know, partnerships with other data sources, to use them in an appropriate way of acknowledging what they are and help to make them better. So, I think that's a theme that's really across NOAA.

Here's one little example. Some of you may have been tracking this. This was a Quintillion. This was a pipeline company, went up and over Alaska, a little core, and you know, in the grand scheme of things, it was a narrow little corridor. But we were able to bring it in. It's available and -- and -- and you know, compare it to the chart, if there were things

that were -- that were made clear by this narrow corridor, that we -- that were inaccurate on the chart, we're able to do that.

So, that was a success, it's also a really good example of the type of commercially, collected data that we'd like to make much better use of. Fugro has been leaning forward a lot on this, you know, on figuring out how to share proprietary data for public use, for public for use for science more broadly, and I think there's a lot of really, really good opportunities there, and appreciate certainly, Fugro's, leadership, but I think we're going to see a lot more of this in the coming years.

So, the third -- the third main focus, I wanted to talk about today -- one more slide here.

So, external source data policy, we're probably not going to release it as a formal Federal Register notice in that it -- we're probably just going to tell everyone that's interested, that that's where it is and make it -

- make it so internally.

There is not very much bandwidth in the government right now for reviewing this type of thing. So, if we don't need to do a formal public release, we probably will not.

So, any comments that you have would be helpful, and again, in -- in the -- you know, general comments to the letter, specific comments to us maybe.

But I did want to just call out, you know, I think CO-OPS had Class A, B and C type data, that sort of thing. We struggled for years, mightily to try to class this wide spectrum of external source data into buckets, and struggled more with the bucket definitions, than we did you know, trying actually making progress, getting it in-house.

So, we're -- we've sort of eased off of the bucket definitions. I think there is still some useful things we'll do internally. But there is no fixed standard, best available data, and I also wanted to just call out our -- our

reliance on NCEI for as the holding pen, which is real, which is their role, in fact.

So, hydrographic survey priorities. Back when I first started, the QE2, I guess it had either just happened or was just happening, I can't remember and we got really focused on large ships under-keel clearance and getting full bottom coverage for areas where large ships were -- were navigating close to the bottom.

We had performance measures against it. We bought technology with what shallow water multi-beams and digital side scans, talked about this critical area, even got into sort of reduce survey backlog language and the appropriations bills. It was all about that definition of large -- large ships transiting what, you know, in shallowish water.

I don't want to say that problem is totally solved, but it's not. We're in a different place than we were 25 years ago, on that. We're sliding more into a maintenance mode on that. We've surveyed most of the areas where

big ships transit near the bottom, and the -- and so, all the performance measures and language and technology and procedures that we built around that one focus are not flexible enough to allow us to do -- to justify other types of work, or to -- or to -- or to sort of broaden our focus into some other areas.

So, we've -- we're working on that, but I'll ask for your help in sort of helping to frame this better. So, the -- so, focus area one is -- is again, it's critical under-keel clearance areas, ports, approaches, corridors and passes.

So, this is maintenance of that high resolution, surveys to maximize the efficiency and safety and large ship traffic in the vicinity of ports and passages.

If you look at the whole country, the percentage of area is -- is -- is relatively small, where truly it is under-keel clearance challenge.

But we may also have and we'll talk

about this some more this afternoon, an opportunity to have different products in those areas, to go with different styles of surveys.

So, focus area two, these are just two examples, are what we're calling discrepancies.

So, there are -- it -- I -- we estimate and we really don't have a way to come up with a number on this, because we just recently had a real functioning data base, but it -- the -- probably around 500 to 1,000 reports every year from the public, or other agencies, for -- of -- of discrepancies on the charts.

So, this might be a new wreck or I hit a piling, you know, I was about there, or those types of things.

So, we you know, you'll see, if you look at the charts, and this is a Galveston Bay, this example on the left, I think is a really good example, where the challenge is not about the depth of the water.

If you look at that chart, it's all sevens and eights and nines, and it doesn't

matter to any user, whether it's seven, eight or nine. What matters is all of those other things that are on there, and I'll give a shout out to Jeff Siegel, if he's here.

There's a little teardrop looking things on there are Active Captain hazard markers. If you click on any of those, there's a sob story about somebody ruining their boat on each one of those things.

So, in this one little tiny place, we have documented -- documented, but not sort of government reported examples of major damage to -- to personal property, and you know, hazard to life from all of these little features.

But how many square miles of critical area is associated with that? None. That in the current way that we count hydrographic accomplishment, those things don't count for anything.

So, we need to change the rules, so that we can start to put value on these -- on these real hazards, and so, this is again, a

pretty extreme example, but -- but the -- you know, there's other styles. Joyce will probably know exactly where this right hand screen, and she's probably already collected the data to fix the chart there. We just don't have it on there yet.

This is somewhere off the Northwest Hawaiian Islands. But if you take a look at basically, every depth that's not one of the general background depths, they're all reported. Some of them quite anciently. I don't -- you -- 19 -- yeah, all of them, 27, 50, so, somebody reported it, thinking that maybe the government was going to come along and solve this problem some time. So, 90 years later, we haven't yet.

But -- but maybe, you know, maybe we should. This is a great opportunity for outside source data because -- because a lot of these places are of interest to science, as well as interest to navigation, and we probably could solve half of these with existing data sources that if it's not at NCEI already, it's sitting in

some shoebox someplace, if we could just find it.

Third focus area is the everything else. We've talked a lot about how ocean mapping is an interdisciplinary and cross program type of an effort. It's not just about charts. It's about, you know, fisheries requirements under Magnuson-Stevens. It's about ocean exploration. It's about minerals exploration. It's about extended continental shelf. It's about knowing what -- knowing something about the country that we -- that we -- what we own and control, and you know, so coast survey has a piece of that.

The biggest of that, that we have really is our expertise. We have the biggest pot, pool of experts, you know, with our relationships at UNH and our really rigorous way of tracking meta data and data stewardship. We may be slow, but you can always find our surveys. You know, 50 year later.

Those types of things, you know, really those -- they can be the core for a nationwide or a NOAA wide perhaps, a nationwide

ocean mapping effort, to compliment the international effort that's known as Seabed 2030.

So, I don't have time to get into all of that right now. But there's a big effort really starting worldwide to stop complaining about the fact that we know more about the surface of Mars than we know about the bottom of the ocean, and do something about it.

So, the first question is how much of the ocean do we have mapped? Turns out that that's actually a pretty hard question, not just because of the shoebox problem, but because there have been so many different definitions of mapped over the years, that -- that we -- you can't answer the same -- you can't answer that question the same way two times in a row, five years apart.

We're trying to come up with sort of a common definition that will be used from the international to the national, and to have a common sense of this, which is basically just hundred meter resolution. You have a unique

measurement in a 100 meter bin. If that's the case, we'll call it map for the purposes of that one question, and then we can -- and then we can build out a program.

So, we've got some ongoing work, both with NCEI and UNH, to better answer that question and lay the ground work for a larger campaign to map our coasts.

Okay, so, so, the document that we distributed yesterday is probably a little less mature than the others that we documented -- that we sent out, and I apologize that we sent them out so late.

But the main point is that we'd invite you to join this conversation with us, fairly early on here, about whether you know, these are -- this is the right framing, these three buckets, these three focus areas, and -- and -- and any suggestions that you can help us with for how to think about what the scope of the problem is or how to -- how to put a value on -- on the -- on route -- on resolving those issues.

So, under-keel clearance, resolution of charted discrepancies and broad interdisciplinary mapping.

We've started already internally to -- to change the focus and change the way we're thinking about and -- and talking about our surveys and planning them, but it's going to take us a few years for our long range projects to sort of come into focus in this way, and so, it's -- so, you probably won't see it. This isn't something we can turn overnight. But you will start to see us talking about it in a different way.

So, please, any comments on the general approach and I'm sure we'd love to talk about it some more in September.

The last thing I wanted to talk about was unmanned systems for -- specifically for hydrography.

We've -- I could run through a bunch of different things. I think it was mentioned earlier already. These are all pictures of

unmanned systems, operations that were done in the context of our programs somehow.

The lower left is on the NOAA Ship Thomas Jefferson. The upper right was year one of some TerraSond work that was done in Alaska with sort of a duck and duckling arrangement, a little boat running next to the big boat, collecting another line of data.

One of those two is UNH's boat, and I've forgotten which one is which. No? Neither one? Okay.

Well, UNH -- UNH purchased an ASV. I think the low right is the TerraSond take two and the upper left is the Nancy Foster charter, and then I guess I don't have UNH's boat on there. Nope? Got one? All right.

Well, I'll update my slide. But the idea is that, you know, we think there is real potential in the long run for unmanned surface vessels in particular, to really help to be a force multiplier and allow us to get places that we can't get now more safely, for the coastal

hydrographic program.

So, you know, UNH is working on -- on some of the really difficult issues of control and optimization. Through our contracts, we've got a number of different sort of operational use case scenarios that are getting tested out, and we've got some of our own people working with them, both through a time charter arrangement that we had last Fall, and on the Thomas Jefferson, where we've got some very small boats for inshore work.

We do -- so, there is an autonomous road map, and this is -- it's -- I think the main -- I'll let you read it, but I think the main point is that it's actually hard to take a yellow thing like this and take it off a ship and get it into the water and back again without breaking it, but -- but that's actually relatively easy, and having it drive around and follow an auto pilot, that's actually pretty easy too.

The hard part is having it collect the data and monitor that, but even more so, you

know, if that things come back after driving back and forth after that, you know, in that area in Galveston with all those pilings, and it comes back and it comes back with digital side scan and multi-beam pinging at 50 hertz in eight feet of water, and a laser scanner that's been running continuously for 12 hours, it's going to have a trillion points in a big point cloud.

Well, thanks. You know, that's actually not very helpful. What we need to do -- what we need to know is that needs to be really -- you know, we need to have a level of processing involved in that and analysis and machine learning, that we'll know, that will come back and say, "Yeah, boss, there's 14 pilings out here."

Not a trillion points in the point cloud, and that's where -- you know, that's where a lot of the investment needs to be, is in that automated processing and you know, and analysis, because collecting the data is not really the hardest part.

So, request to you all is we invite your general thoughts on the direction that we're going with the unmanned systems road map. We are focusing on surface vessels for coastal hydrography. Underwater is not much of an advantage in very shallow water, and we're optimistic, but we're sober about the -- the prospects and the challenges of where we can get to in the next few years, and we need to invest in parallel and in process -- processing automation.

Okay, the last slide is -- is really -- we put this together because we've got a lot of new bosses in Washington, and they're -- interestingly, the questions are less what do you do and is it important, than how are you doing it?

Surely, you're stuck in the old ways and this is all feds and you're -- and you're -- your business model needs to be improved and we got a business guy right here to help you do it, and I actually wanted to sort of share where we

are, because I'm actually pretty proud of the balance that we have and -- in the hydrographic program overall, for what we do ourselves and what we contract out.

So, sort of starting from the bottom and going up a little bit of a value chain.

We've got some R&D that we do ourselves in our own little lab there that E.J. runs and the -- and quite a bit of work down at UNH and a few other places.

When I start -- I -- one of my first jobs was the programmer. I worked for Andy and I was a programmer, writing acquisition and processing software for hydrography.

Well, we don't do that anymore. Right, we buy stuff that does that, and so, that -- so, that next -- that survey system vendors, that's a completely contract operation.

Again, in the mid 90s, several of you in the room were involved in this on both sides of being the contractor and the -- on the government side. We started contracting for

hydro surveys and so, that's been a really successful program. Wouldn't trade it, and in fact, if we have growth, that's where it needs to be -- for growing all of those -- all of those requirements, and we're, you know, externally source data.

So, you could read on up there, you know, the various -- the various buckets about what we do, what we do in-house and what we contract out.

What I did want to call attention to is we -- that last piece, where the rubber hits the road is all through partnerships.

So, when we start -- when -- you know, back when we made paper charts, we sold paper charts. People would go into the store and they'd roll them up under their arm and they'd walk out, and we had that kind of a relationship with the customer.

We don't -- you know, we privatized the printing in distribution. It's mostly through navigation systems and value added

resellers of various sorts.

So, our relationship directly on a one-to-one with the customer is mediated through those -- through all of those companies, which is great. I don't resent it at all, but it -- but the way that we then interact, it means that we need to be interacting with our customers through those -- through the lens of those systems, and so, is that my -- are you gonging me, Lynne?

MS. MERSFELDER-LEWIS: Totally inadvertently.

RADM SMITH: It happens that I am done. So.

CHAIR HANSON: All right. Well, I guess it's no longer morning. So, we will have to cut off questions at this point.

But I do note that all three of you will be here this afternoon, and so, we can track you down and for those listening on the webinar, if you have specific questions for any of our three panelists right now, I guarantee you, we can track them down and make sure they provide an

answer to you.

So, with that, I think we need to adjourn for lunch. We will re-adjourn at 1:45, and we have the working lunch with HSRP member and NOAA HSRP staff, and for everybody else, we will see you here at 1:45.

(Whereupon, the above-entitled matter went off the record at 12:16 p.m. and resumed at 1:47 p.m.)

CHAIR HANSON: All right. We're ready to get going here. This is the afternoon session. Just a couple housekeeping notes.

First of all, we know we've had some people join us this afternoon. Make sure that you sign in. The sign-in desk, and if you'd like at this point, we can have you identify yourself, as we did this morning. Anybody new this afternoon?

All right, one of the things we have to be reminded of occasionally is that we are a federal advisory committee, which means that according to the rules, this is a public meeting,

and we're looking to engage the public as well.

So, at this point, based on -- we'd like to go ahead and since we didn't get to do that after the session this morning, we thought we might take a minute or two to see if there are any public comments, either from the audience here in the room or online.

MS. MERSFELDER-LEWIS: If there are folks who are interested, just come on up and we'll hand you a microphone, especially for the previous panel who didn't get any questions. If you want to ask a question from this morning, feel free.

So, there is a question from Rod Evans that says, "Can we see the autonomous road map that Rear Admiral Smith talked about? Thanks," and the answer is that it's on the -- our public website for this meeting, and I will send that to you, Rod, and for anyone else that wants it, we'll put it up on the slide at the next break.

CHAIR HANSON: Admiral Smith, I believe this afternoon is all yours.

RADM SMITH: It says light -- there we go. So, I'm not going to take very much time for this to introduce, but sort of keying off the last slide of my presentation, a lot of what -- a lot of what we're going to be hearing about from this panel is what happens -- how the value is delivered from the services that we generate across -- you know, both at Coast Survey, CO-OPS and IOOS and NGS.

So, this is -- this is about the value delivery, and we've got some fabulous, fabulous partners who have their -- have their own take on things.

But we're going to start with Travis to really pick up where I left off on the national charting plan.

So, Travis and I both started with NOAA 23 years ago, within a few months of each other, and Travis has been involved in ENCs from -- through many of the different iterations that we've had over the years, and was -- and was the leader really, of MCD's effort to get all of our

-- all of our ENCs loaded into a database and made available to have this sort of resilient system that we are about to enjoy. So, we're really close to that. So, Travis, please go ahead.

MR. NEWMAN: Thank you. All right, the national charting plan. Hopefully, everybody has had a chance to view it and read it.

It's a strategy to improve NOAA chart coverage on our products and distribution. It describes actions that will provide the customer a more up to date useful product, which will be more safer for navigation.

Some of these activities include reducing unwarranted alarms and clutter in the ECDIS system, converting depths and contours to meters. Providing timelier data to the mariner.

Improving RNC chart coverage, RNC and paper chart coverage, while also rescheming our current ENC suite to a more orderly layout.

Reduce uncertainties by systematic reviewing those features that are labeled on the

chart, position approximate, existence doubtful or reported.

Improving chart update information, which is the next slide, and then also increasing efficiency by strengthening partnerships with some of our data providers.

Okay, this is a screen capture of one our new features on our website. It provides a mariner -- they can type in their chart number and it tells all of the critical and non-critical changes that were made to that product for that week.

This allows a mariner to help decide whether he wants to buy a new print-on-demand chart or not. So, it's really a nice feature. It's new.

One thing we have recently done under Admiral Smith, when he was the -- when he was Captain Smith in the marine chart division, we started putting out non-critical information weekly, along with our critical information updates.

So, before, we would wait until a new edition of a paper chart, to release any non-critical information that was built up over that year or two years or whenever the last new edition was -- was printed.

So, now, the mariner is getting more up to date information quickly, and as it -- as it comes in and out.

All right, converting soundings and depth curves to meters. This is a popular one.

The U.S. is, you know, one of the few countries that has -- that uses imperial units of measurement on the charts. Most other countries use meters.

Our hydrographic surveys are collected in meters. We are -- we then apply those surveys to our chart production database in meters, and then when we want to update the raster or the paper charts, we convert those meters to either feet or fathoms and then we have to round them to a whole feet or whole fathom, or fathoms and feet, so forth.

So, that causes a loss in precision in that -- in that depth. So, there is -- you know, it's -- there's a lot of issues with that, going in between products, ENCs and rasters.

Our first step though is if -- you could see on the -- on the slide there that the contours on all of our ENCs were collected right off the raster chart. That's how we built all the ENCs. We just digitized all the raster charts.

So, the 1.8 meter curve is the six foot curve and then the -- what is that, the 12 and the 18 is shown there.

So, there are decimal meter curves -- values, and that -- there's a lot of -- you know, so the first step we want to do is to convert those to whole meters, and just on the -- just on the ENC. That's the first step.

We're now investigating the feasibility of converting all of our products to meters, including raster and paper. We feel that having all of our chart formats use the same

units of measurement would be more efficient for us to update all the -- all of our charting products.

The use of the -- of our NOAA charts would be less confusing those mariners transiting in and out of U.S. waters, and for those who still want to see English units, you can still, you know, view ENCs in your ECDIS or ECS based on, you know, the software you're using, you can view those, whatever unit you want.

So, the second one there is to reduce unwarranted alarms and danger symbology. Again, you know, we collected a lot of this information off the rasters. There's a lot of wrecks out there that don't have any depth information on them. They came through in the local notice to mariners.

So, what the ECDIS does is it displays those wrecks and puts an isolated danger symbol when there isn't a depth -- minimum depth encoded in them.

So, you know, we're committed to

improving our data and coding practices to reduce these types of unwarranted alarms and clutter, and so, one thing we're working on now is, we're taking -- doing an effort to estimate and populate these safe clearance depth values for all wrecks that are deeper than 66 feet, which we view 66 feet as non-dangerous.

All right, channels. We did talk a lot, or not a lot, but a little bit about channels and the Corps of Engineers data.

We get a lot of Corp of Engineers data in our -- in that -- that comes into marine chart division, and we receive it in various formats and then there's a big push for eHydro, for all the districts to standardize their delivery.

But, you know, regardless of how it's delivered, there's still -- there's still the problem of their data on their website might be more -- it's probably more up to date than what we have on our chart.

It takes us a while to get the data in, get it on the chart. We -- whether it's a

tabulation or not.

So, the chart can be out of sync with the data on their website, and it can cause issues such as harbor pilot access of data. Prior to its application to the chart it can cause disagreements with -- you know, between a pilot and a vessel's captain.

So, we're looking at ways to standardize our -- our Corps of Engineers data of how we portray the data.

One idea is to replace our channel tabulations on the raster, which is what -- what's on the slide there, on the left, to just showing project dimensions.

We would have a -- a note that points them to the Corps of Engineers website for the channel controlling depths, but we would also still populate our ENC data to show the minimum -- the controlling depths.

We also -- this is another way we show some Corps of Engineer -- we show Corps of Engineer data is we populate the hydro inside the

channel.

So, we could remove that and show that -- the channel quartering or minimum depth, or you know, in some areas, based on local wants and needs, they like to see full hydro developed inside the channel.

Okay, and this here -- this shows how we had this channel quartered, and the turning basin here is a little -- there was a legend, but the cartographer decided that since they didn't want to shoal up that whole entire basin for a few shoal soundings in the corner there, they -- we requested the full survey from the Corps and then put the shoaling in there and then added a legend that gave them a little more water.

Another, you know, ideas to distribute NOAA and Corps data simultaneously, it would require some work on both parties, but that's another idea that's -- that's in the nautical charting plan, or national charting plan.

This is the last -- this is most of our channel -- our big channels are shown like

this with a -- just the four quarters and the minimum controlling depth on each quarter.

Data consistency. We realize that we have a lot of inconsistencies in the data out there because -- just because they were collected off the raster. This shows two ENCs adjacent to each other. One has a -- there's a gap there, it's hard to see. But there's a gap in the hydro because that's where the bar scale was, I believe.

So, lot of times, there's a note for a bar scale or something on the raster that we would have to -- you know, go in and pull the original hydro survey and populate some soundings in that area to make it -- to make it whole.

But you know, we realize there's issues like that out there that -- that I'm sure if you're -- if you used our ENCs or looked at them on ENC online, you can see -- see those issues.

This here is New York. This is our ENC scheme. You can see it's based -- it's kind

of a weird irregular shaped area, based on the collection of all the charts in that area at various scales, and what we'd like to do is create a gridded layout and also reduce -- reduce the number of scales on our products from -- right now, there's 131 to about 20 or so, and also adopt the IHO standard scales for ENC.

We also use ENC only when appropriate now, when we're creating new products. I think the Merrimack one you showed is an ENC only. I don't think we created paper for that one, and that's what New York is supposed to look like, or going to go to.

Here is another issue like standardizing scales, but it's also a data issue. There is two charts there in the Gulf. One is one to 250,000. One is 350,000 scale, and you can see where one of the charts is not showing any pipelines, while the other one does and I don't think they all just stop there.

So, you know, over the years, there's been various products and when you create a

chart, there's a chart spec and for one -- one reason, that one said we're not going to show any pipelines on it. Maybe it was too cluttered or something. We want to show one without pipelines, and you also see that with depth contours, where one depth contour, even on the same scale charts adjacent to each other, one, we might have a 30 foot contour on an ENC that's coming across, and then it stops at the boundaries, and that's just because it was never on the raster.

So, those kind of issues, we need to go in and clean up too, you know?

This is a small craft chart in Puget Sound. It's no longer -- we canceled it actually. But for 60 years, small craft charts had been around, but you know, NOAA feels that there are easier, safer ways to get rec-boaters to use charts in the ECS.

So, some of these charts have over two dozen panels and various skewed projections. The red arrow -- arrows there indicate the North-up.

So, when you load those -- load the BSB and ECS, a lot of the labels are kind of sideways or upside down and they're hard to read.

So, now, we're migrating all of these panels onto either, you know, same scale conventional charts or larger scale charts. This one would -- there was only two panels out of all those panels that did not already -- that was not already covered by conventional scale -- conventional charts in the area.

If you look at Puget Sound, the raster catalogue, there's a lot of scale that's covered very well for most areas, and so, we only had to move two panels onto existing conventional charts, what we call conventional.

So, that gives us a consistent North-up product with no loss of coverage, and a bonus is, there's the reduction of duplicate same scale products. So, it's less maintenance for our cartographers in the shop.

Recently, the U.S. Coast Guard and Coast Survey have started to develop a process

for extracting all the Aids to Navigation changes from the Coast Guard database, which then could be applied to our production database, and weekly, and that would refresh all the positions and any characteristic changes.

So, that's being worked on now. That would save us a lot of time. Right now, we have cartographers who get the local notice to mariners from each district and they input the changes by hand, into a -- into our critical correction database, and then from there, all the changes are made to all the products by hand.

Coast Survey will continue to practice an open data policy, which includes free data offered in useable formats, consistent with international standards, consistent with all federal policies. Bottom line is we want our data to be used for purposes other than navigation.

So, there you can see we have -- we offer channel framework or channels, maritime limits, boundaries, shipping lanes, regulations.

Okay, and some of those -- some of these changes have already begun, like the -- like the unwarranted alarms, populating wrecks. Others are being evaluated, such as converting all products to meters. That's one we've -- I've seen some few feedback on.

But the feedback is going to help us refine these initiatives and you know, hopefully maybe identify new ones, which we aren't -- that aren't on our radar.

So, how to provide feedback, it's right there. It's in your -- it's in all your packets. That's about it. Thank you.

RADM SMITH: Thanks, Travis. I think we'll -- in the interest of time, I think we'll hold questions for the end.

So, with that, I'll introduce Jane Newtown, who is the director -- I didn't hear your bio, director of NANOOS, which is the Regional Association associated with the IOOS network across the U.S., and she's been doing some fabulous stuff with delivering -- delivering

NOAA and other data out to the public in a variety of ways. So, please, Jan.

DR. NEWTON: Thank you. There we go.

Well, thank you so much, and I really want to thank the organizers for inviting me to come and speak to you about IOOS and NANOOS, and specifically, as the Admiral said, linking that with stakeholders in the Pacific Northwest.

Okay, let's see if I can make it work. There we go.

All right, so, first of all, just to make sure we're all on the same page, what is IOOS? The Integrated Ocean Observing System. I was glad to see -- I was speaking in the integrating NOAA's navigation service data panel because integrated is our first name with IOOS, and so, these are bullets from the IOOS website about what IOOS is and it very much is national regional partnership, so, federal/non-federal partnership, integrating ocean information from a variety of sources, providing easier and better access that allows stakeholders, the public,

different decision makers to do the things that they want to do, widely used and needed, and of course, including maritime operations.

So, where is IOOS? It is a federal interagency, but it is housed at NOAA within NOS. We're one of Russell's children, so to speak.

So, there you can see the layout, if you can see it. Carl Gouldman is the new director taking over from Zdenka Willis. So, we're in the navigation, observations and positioning part of NOS.

All right. So, as I mentioned, it's a Federal interagency. So, these are the 17 federal agencies that are part of the U.S. IOOS operation, and what the -- the people who constructed IOOS from the get-go, back in the late 90s had the wisdom to do is to have both the Federal and then a regional component to this.

So, you see 11 regional associations around the nation. NANOOS there in the Pacific Northwest, but covering all of the Pacific, Alaska, the Caribbean, the Great Lakes, as well

as the Continental U.S. coasts.

All right. So, these regional associations, or RA as we call them provide end to end observations, so, in-water observations, infrastructure, forecast and modeling, data management, user products and then the outreach and education to get them in the hands of users. But we start at the bottom and make sure that we're making observing systems that will fill stakeholder needs.

There's a lot of leveraging and a lot of linking, and there, you see the regional associations. What we do by our mandate is to engage with diverse local stakeholders.

So, I engage with stakeholders from Washington and Oregon. My colleagues in SECOORA engage with stakeholders in Florida.

So, it's distributed that way, but because we are a system, we can assure consistent national capability. All of the regional associations are undergoing certification by NOAA.

So, we've all ascribed to the same standards, inter-operable data and all sorts of acronyms when you get into the data management, SOS and all of the stuff that is beyond me.

All right. So, you are in NANOOS land, and there is our logo. So, NANOOS stands for the Northwest Association of Network Ocean Observing Systems. There's our website and as I mentioned, we serve Washington and Oregon, but we do have good collaborations with Canada, through their ONC and other -- Environment Canada, other Canadian entities there, and then all of the regional associations kind of overlap and interact together. So, certainly with California to our south.

So, each of the RA's started be defining their region, their users and the needs, and so, I'm not going to go through this, but there you see the natural habitats within the Pacific Northwest, as well as the regional user groups, and you can see maritime. I did not doctor this slide. It was actually written that

way a long time ago. Fisheries, etcetera, etcetera, and you see that there's a diversity there.

So, maritime, fisheries, environmental management, shoreline, hazards, educators, marine recreation. So, it's the full gamut, and very much encompassing of NOS's objectives.

All right. So, we heard loud and clear from the beginning, about the needs of the maritime community in the Northwest. Here is a quote from Captain Dan Jordan from the Columbia River Bar Pilots, who is in our audience today, talking about the Columbia River Bar as one of the most dangerous harbor entrances in the world, and a recognition of NANOOS's efforts.

Another quote by Oregon State agency called DOGAMI. For some reason they make their acronym that way, but anyways, talking about the utility of NANOOS to the coastal community stakeholders.

So, we knew that this was important and set about how can we be useful?

All right. So, one of the things we do, aside from funding some of the observations and modeling and outreach is to create this data portal that allows people to access data. We call it the NANOOS Visualization System or NVS, and you can see there is all of these little buttons you can push on.

So, the one first up at the top data explore has basically all of NANOOS' assets and data inventory that you can access from that. We tend to call that the kitchen sink because, for obvious reasons.

But then all of these ones are specialized, different user groups.

So, we have maritime operations. We also have one that's more designed for recreational boaters, and then one for tuna fishers, as well as shellfish growers and people worried about tsunamis, etcetera, and I'm just going to go through the ones that are outlined there, to give you a sense for how we are serving needs of these three different user groups and of

course, there is overlap, but we try to optimize it.

So, first, here is a view of the kitchen sink. It's on your basic Google Map, and each one of those little icons is a different asset. Along the side, you see there's models and remote sensing and mobile platforms, etcetera, and it can be actually, quite overwhelming for people.

So, what we've done, so now, up at the top we're going to look at maritime operations. So, instead of saying data explore, it's going to say maritime operations at the top.

So, one of the first things we done is make available, the NOS charts as NVS overlays. So, users can click on whatever chart they would like to see, but you also still see the icons there, and we'll get to that just in a moment.

All right. So, here is -- if a user wants to select current conditions instead of querying one icon at a time, they can ask, show me all of the winds.

So, there you see color-coded and with the little tail, the speed and direction of the wind at the current time.

But we can also see that against the backdrop of the NOS charts, and then we can also see that same thing on the backdrop of Wave Watch III forecast, and on the Wave Watch III, you see both the vector and the color.

If you turn off the color, you can see the chart behind it. So, this has wide flexibility, in terms of how a user wants to interact with it.

Another thing you can do is then query an individual buoy, and so, here is a CDIP buoy from Grays Harbor and pulling up the wave height, and so, you can interact with that time bar down at the bottom. There's also the little white pop-up thing that gives you the wave height and you can actually download the data. You can interact with the data. You can print a plot of it, that sort of thing.

All the while, where the -- the wind

conditions, the current conditions are still staying there, as well as the chart, or whatever overlay you want to use. It's very flexible that way.

So, other features are shown here. I'm going to show you two of them. The little yellow dots down the coast, you can disregard for a moment, but let's focus on the blue things.

So, that is now surface currents, another NOS product and you notice we're scaled out here quite large, and I zoom in, those little blue things and the blue arrows multiply. So, it scales with whatever you're -- the view that you're looking at, so people can go in or out.

Then again, at the same time, while you're looking at the currents, maybe you want to know if the wind is in the opposite direction or if it's strong. So, you can query the winds, as well as that.

All right. Maritime operations. I've been showing you so far, just the observations in the forecast. But one of the features I love

really a lot is this little tab called the Comparator, where you see the forecast and the observation at the same time.

So, the red is the forecast. The blue is the reality, the observation from a NDCB buoy, and I used this all the time, before I take students out on research vessels, and whoever was looking at this would have been well-advised to not believe the forecast, and that way we can let mariners see things in a real-time.

So, I want to thank both John Veentjer, Captain John Veentjer and Captain Dan Jordan, as well as Coast Guard member whose name escapes me at the moment, for being our inner -- our first focus group to talk about what are some of the features that maritime operators would want to see, and then our developers have gone off and made this and we're just about to re-engage with user groups, to try to understand better, the needs, are we on target.

Okay, what about those little yellow circles? Well, those are wave forecasts with yet

another model, and so, there you see the wave -- significant wave height forecast along the coast.

We have also the ability to plot the HF radar currents. I didn't make a slide of that, but we are investing in X-band radar at different ports. This one is off of Yaquina Bay, and you see the conditions there at the bar.

All right. So, another -- so, that's great, very sophisticated for maritime operators. Recreational boaters, again, that might be a little overwhelming. A lot of things that maybe aren't needed as much for the kinds of navigation that a recreational boater might want to do.

So, we made an app for boaters, which has an abbreviated list and more common terms, and all of these, you can either have metric or you can have English, whatever it's called, non-metric, feet, and so, here is a simplified showing the Xtide predictions there, and again, these -- the scale, if you click on one of the tide stations, you can see the tide things going out into the future, and we think this is really

helpful for boaters because a lot of them are planning like crabbing or fishing, which really relies on tidal conditions.

But then let's say I want to take a boat from Oak Harbor on Whidbey Island to Victoria, Vancouver Island, and I want to do this in a way that I'm going to hit, you know, the tides on a certain -- in a certain way.

So, we have the ability to figure out a route, and so, that's that little squiggly thing, and then in that green box are all the lat longs for the wave points, and then you can download those. But you can do that, you know, several months out, planning your trip against the tides.

Then when a boater is out there, let's see how the forecast and the current conditions compare. So, this is just that same capability you saw before, and here we're comparing winds and winds. So, current conditions, as well as forecast, and you can see the overlays and the vectors, and again, you can pull up the chart.

You can see that up at the top. You can put that chart overlay.

So, the last use case scenario is tuna fishers, and this one came to us a bit serendipitously, but it turns out that what does a tuna fisher want to do?

Well, they want to find tuna and they want to be safe, and so, it turns out that you find tuna in warmer waters rather than colder waters, and it turns out that you find more tuna in 60 degree waters.

So, what we did is color-code our sea surface temperature horizons on a Fahrenheit and Celsius color bar, where red is basically 60 and above Fahrenheit, and blue is not.

Now, I made this slide just a little bit ago and guess what? It's not a good time to be tuna fishing.

But here is a screen capture from August of 2014, and so, you can see the places where you can get to red water soonest and then it also has the surface currents.

Also, on this page, the tuna fisher page, not only are the forecasts, but also the current conditions from sea surface temperature and HF radar, as well as chlorophyll-a from the satellite.

So, last slide here we've got animations from NOAA Wave Watch III, which is a very popular item with our users, and you can see that they can make it specific to where they're at.

But I want to note at the bottom is -- one of the things that I didn't show, but want to emphasize is the attribution is really important, and so, you see here forecast fields provided courtesy of NCEP
National Centers for Environmental Prediction, and in all of our cases, people can see where the data are coming from. They might be federal. They might be academic. They might be private. They might be a shellfish grower, whatever.

So, in any case, I would like to say thank you for listening to what NANOOS is doing,

and we would love -- we value your feedback. We're not doing anything with bathymetry, so I was very interested in the eHydro, but I think there is a lot of opportunity for growing this system.

Visit us. Anything that I showed you is available online, and there is my email, and thank you so much.

RADM SMITH: Our next panelist is Jeff Hummel from Rose Point. Rose Point is -- has grown, since I've known them, 15 or more years ago, NOAA ships were some of the early -- early adopters and has grown into really, the leading PC-based navigation systems company, certainly in North America, and are -- are really ubiquitous throughout the tow boat industry, small fishing industry and the research community, basically everyone that's not required to have an active, chooses instead to have a system like this.

What I'm really excited about is the relationship that Rose Point has had with NOAA and others, to really, you know, lean forward to

make navigation systems as sort of powerful as they can be, outside of the sort of regulated environment.

But they've also been really big leaders in -- with the Coast Guard in defining the usage standards for ECS. So, take it away, Jeff.

MR. HUMMEL: Thank you, Shep. Can I get the remote? Where should I be pointing the remote? Okay, good.

All right. So, you might notice that my first slide doesn't really have a NOAA chart on it. It has maybe an idea of what a NOAA chart could be in the future, and what I'm going to talk about today is kind of the future, and not just the future of you know, next year or five years out, but really talk about the future 20 to 25 years out, and that might seem impossible, but I really think it is possible to figure out the direction that NOAA should go in for the next 20 to 25 years.

So, little bit of background. I mean,

most people probably don't realize there were electronic charting systems back in 1987. Does anyone remember Windows 3.2?

I worked with a company locally called Oceantech which was one of the first companies to do anything in the PC navigation market.

From '95 to 2001, I was with Nobeltec, which was the leading supplier, and still is the leading supplier, eventually purchased by Jefferson Boeing, followed by some ex-Microsoft developers up here.

In '96, I did a presentation for NOAA at the IMO and during the process of getting raster charts approved for navigation in the international market, there were many people who just thought that raster charts were evil, and we were able to convince them that raster charts were a valid stepping stone to getting towards the ENCs, and it really sped up the process for the U.S. to have official charts available for customers worldwide.

Last few years I've been with Rose

Point. Our company is focused on inland towing, coastal market, offshore oil and gas. We have the largest installed base of commercial users in the U.S. As we're sitting here today, there's probably 4,000 to 5,000 vessels operating, with someone staring at one of the screens right at this moment.

Rose Point chairs the SC109 committee, which is the committee at the RTCM, which has been tasked with creating the standards for ECS systems in the United States.

I'm happy to say that just last week, the SC109 standard was approved and now, for the first time we have a standard for ECS systems in the U.S., and it's been a long, long, long journey to get here.

So, what I'm going to talk about today is basically, I really want to look at the past, like, okay, well, how did -- when did the process of getting where we are today starts, and the thing that's remarkable about it is that it really started a really long time ago, even

before I was in the industry.

Kind of where do we go from here, you know, as a national direction, and then I want to just show just one little piece of technology that we've been working with NOAA to develop, which is one idea of where we could go in the future, in terms of improving electronic charting in the U.S.

So, I think that again, the way to make progress is to really look at where we -- where we started, and one of the things that I learned in this process of doing this presentation was that there were some big changes in the late 80s and early 90s, and I don't know if any of our members are with Contract with America, you know, the Newt Gingrich era, or you know, the same ideas actually carried onto the next administration, with the reinventing Government with Al Gore, and of course, he invented the internet with that.

So, anyway, there was -- there were these plans, basically existing back in the late

80s, early 90s, and everyone knew that the United States was going to have to shift paper charts to electronic charts, and there's a big question like how you should do that.

So, in 1994, the National Research Council was commissioned by NOAA to do a report on what the future should look like and how they should get there, and it's called Charting a Course into the Digital Era. It was issued in 1994, and looking back at it from the perspective from 2017 it was an extremely effective approach to governance and deciding priorities within NOAA.

It's remarkable how accurate that report was. Now, maybe it's a one off. Maybe it can't be duplicated. But I think that it can and I think that this type of approach really needs to be taken, to look at where NOAA should be in 20 to 25 years. I mean, it seems like a long time. A lot of us won't be in the industry in 20 to 25 years.

But we need to chart a direction now,

so that we can get to this better place in the future.

So, they made recommendations on some very specific topics. They talked about what sort of survey activities NOAA should be involved with and creating a database, which of course exists today, how the charts should be produced and changes like this, and it sounds like this is some gigantic document but it's only about 30 pages long, but it was very specific in the recommendations.

How many people are actually aware of this document and its existence? So, there's a few people in the room that are aware of it, and that's great.

So, the 1994 report said that NOAA should establish a process aimed at minimizing the time between the acquisition of new data and publication of those data for public use, and the time period, I was told by someone at NOAA, that on average, it took about 50 weeks from some piece of information being learned by somebody

that something should be changed, to the time period that it actually showed up on a new paper printed chart, and you know, there was a limit on how much capacity they could actually output at the time period, based on paper charts.

If you look at this today, you know, it's changed completely. The notice to mariners come out, you know, very often, I'm going to talk about that a little bit later in my talk.

Another idea that came up and I was involved in this a little bit when I was at Nobeltec, was the privatization of collecting data.

So, in this report they came up with this idea that some of the activities should be privatized, and I think on this particular suggestion, it might not have been the right idea, but it was certainly well implemented by NOAA.

NOAA gave every attempt, you know, to make this work. There was a little bit of, I should say resistance from a number of companies

in the industry, but I think they gave it a worthy, you know, try and you know, at the time period, they were looking a shrinking revenue. You know, that doesn't sound like a strange thing to say today. I mean, it looks like NOAA has always had a shrinking revenue, as far as I can tell. So, or at least the outlook that there was going to be a shrinking revenue.

So, one of the things that came out of this was a Cooperative Research and Development Agreement with a company called BSB. We all have heard of the BSB format, but no one actually really knows what it means.

BSB comes from Blue Marble Geographic, Seoul and the Better Boating Association, who knew that?

But anyway, that's the format that every raster chart is issued in the United State, and it's just this strange, weird, you know, conglomeration of three private companies that end up being the BSB format, and but the original data or the original technology for that format

was actually developed by NOAA, a small group of people inside NOAA, and then they licensed in this CRADA, and the purpose of the CRADA wasn't that there was really cooperative research and development going on. It was basically a mechanism for NOAA to get their revenue to flow back into NOAA to fund some of the chart production.

Again, this recommendation for privatization and having that revenue flow back into NOAA was, something was directly in the NRC report.

So, again, I don't think it was the best idea, but they did a very diligent job of trying to make it work.

The BSB format, you know, was licensed to a number of companies worldwide, and this is kind of where the whole thing feel apart with the BSB format.

I was sitting a hydrographic conference in Monaco with a meeting with our NOAA representative and the head of the

Argentine hydrographic office, and he looked at the NOAA representative and he said, "You make the world, and I live in it," and what he meant by that was that the United States creates these standards and then the rest of the world looks at us to you know, for leadership of what? Oh, well, you're doing this? Well, you guys have thought about this a lot. You must be doing the right thing.

So, the challenge with it, the BSB format was -- it was privately owned, and so, then you had a private U.S. company licensing the format to various hydrographic offices around the world, and it really probably should not have been done that way.

I think NOAA should have, you know, perhaps done it a different way, but they owned that format, and I think that one of the important roles of NOAA is to create standards. I think that is a job, as the Government, we can set the standards, this is the way we're going to do things. This is the way we expect the data.

I mean, it can come from industry feedback, but it's really an important part of, you know, governance and leadership around the world, is the ability to create standards and then work with other people to foster those standards.

Unfortunately, we've really lost that role in the U.S. The IHO, you know, has a lot more influence on what happens with the new standards than the U.S. We're not in the leadership role, and there's a big question today.

If you ask people who owns the BSB standard, no one really knows. I have private companies telling me like, "We still own it." I've had people in the government say, "Oh, no, the government owns it."

So, I have -- I don't -- honestly, I don't even know, I don't know if anyone knows who owns the BSB format today.

So, let's see. In 1995, NOAA began producing raster charts based on paper charts and

I think that you know, the approach that they took was great.

I mean, basically, they said we're going to make raster charts first. But before we make those charts, we're going to look at the world based on GPS. Most of the charts at that point, GPS wasn't involved in the creation of the charts. I mean, there are surveys going back to the 1800s or the 1700s or whatever, the 1940, on the next slide, I think that one of my next slides, it says that in 1993, most of the data was collected, I think before 1940 for the charts, or something like that. We'll see on the next slide.

Anyway, what NOAA did is they basically said, okay, these charts aren't as accurate as we have instruments today to record the differences, so we're going to basically the chart on a rubber sheet electronically, and move things around based on where we know they really are, and that worked really well, and then from there, they actually made the vector charts.

So, first they corrected the raster charts and they went to creating the vector charts, and so, they basically shifted everything, you know, with satellite imagery, aerial imagery, or GPS and they were able to make big corrections of the charts to make them more accurate, at a very -- without doing any surveying or very little surveying.

So, again, this I think was a great success. I think NOAA got charts out there in a raster format. They got them approved internationally and it was a great thing.

The charts eventually, initially started off at about $250 per region, and then through process of some feedback from industry, eventually NOAA released the charts for free, and that's where we are today.

It took consternation worldwide and I mean, I remember talking to people at the time and everyone at IHO meeting, everyone would be against it, what are you guys doing? We have this great cartel and we get paid a lot of money

for these charts.

The British Crown for example, makes $50 million a year selling their charts through their distribution. U.S. offers for free and more and more countries are looking at us to distribute their charts for free, based on NOAA's leadership in that area.

Unfortunately, the plan did create a bit of a cartel. I think NOAA was duped a little bit by the technology that these guys allegedly brought to the table, and I think that the ownership of the standards should have been either non-profit or NOAA should have maintained ownership of that standard.

But again, overall, successful. Let's see here. Yes, again, I think if you looked at this report, and my suggestion at the very end of my talk is that what we should do right now is, we should be planning a new NRC study and put together a group of 50 people or so, and plan out what direction NOAA should take over the next 20 to 25 years, and I think based on the track

record of the NRC report from 1993, you can show demonstratively that it's an effective technique and will lead to the United States being in the right place in 20 to 25 years.

Unfortunately, the NRC report missed the biggest issue of the whole thing. It's the elephant in the room, and that is the exact method that electronic navigation would become legal in the United States.

The NRC report was focused NOAA's role in getting to an electronic world, where we could legally navigate using these new charts, but no one ever sat down and thought, well, how is the rest of the process going to work, and unfortunately, it didn't work very well and I think that NOAA should have a leadership role in the decisions that are made on how electronic charts are supposed to be used in the United States.

That role right now is designated to the Coast Guard. The Coast Guard, in the last two to three years, has done a very good job, but

in the last 15 to 20 years, have not done a very good job in getting this process moved forward.

There's a variety different reasons that that has happened. But the net result is, the United States is a long ways behind the rest of the world. You know, and I think that NOAA has the expertise to take on this role, and I'm not -- it's actually not clear to me, what changes would have to be made from a legislative standpoint, to put NOAA into this role, but I think it is the legitimate role of NOAA, and this was a mistake in the original vision of how electronic charting should be done in the United States.

Personally, I think it's a national embarrassment and no one really talks about it very much. It's like there are countries, you know, I call them like third-world countries, that can legally navigate on electronic charts, but in the United States, it only became legal last week. So, literally last week.

So, I mean, what if Malta had made it

to the moon before us, because that's where they are now. They're ahead of us in this process, and it's ridiculous.

I mean, we claim to be the leaders of the free world. Let's do it. Let's lead the free world. Let's chart a plan for the next 20 to 25 years and do it right, and do it effectively.

So, I'll get off my soap box now, and just talk about one example of things that we could lead on, and this is some data. It doesn't show up very well on this slide. I think in just a second we're going to switch over to my computer. It seems to have turned itself off now. Hold on.

But anyway this is some data that Rose Point has been working with NOAA on. They've created some prototype data sets and we've just been collaborating.

So, we are the mechanism for NOAA to display this concept, and this is real-time and predicted high resolution current data for estuaries and coastal areas and the purpose of

this data is that you could literally save -- I think -- here, I think this it right here. Hold on. Pardon me. Hold on just a second. My computer went to sleep.

So, you know, I don't think the current administration cares too much about CO2 emissions, but they do care about saving money and this system will do both.

The experience that we've had with our customers is that the vessel going from one location to another, hauling some cargo tends to race to that location, get there early, tie up, wait and then eight hours later or ten hours later, a day later, load the cargo, unload the cargo they're supposed to do.

The challenge with that is, most of these vessels are displacement vessels and if you slow down the speed of that vessel just a little bit, you end up saving a lot of fuel, and some of our customers have paid for our software and the entire installation on the first voyage that they've used our software on, because what they

do now is, they know much more accurately, when they're going to arrive someplace, they slow the boat down, and the fuel savings for that again, can just be massive.

I'll go to my next slide. Nothing is working. Usually I am him.

So, using this information operators can very easily calculate exactly when they're going to arrive somewhere, and it's based on computational fluid dynamic model based on the title constituents, and then it also takes input from real-time sensors, and then re-casts the model every certain amount of time.

Now, we were looking at now, how high a resolution does it need to be, how often do the forecast need to be, but again, this system, which is essentially based on information that NOAA already has, what we need is the mechanism for delivering it and how it's going to be delivered, you know, to the vessels in real-time.

It's not up there. There it goes. Okay, anyway, you can see it's incredibly high

resolution and you know, some analysis needs to be done on how accurate it is, but now, a vessel could plan on being somewhere an hour before they need to be there, or a half hour before they need to be there, rather than, you know, days or you know, half day or something, and it would be very easy to crunch some numbers and figure out how much money this will save industry. It will be in the billions.

Just using some of the stuff that Rose Point has created, we have a customer who took a vessel from the Gulf of Mexico to Chicago, and using our software, they were able to save two days off of their travel time, with a particular feature that we have. This year, we'll have the same sort of impact to industry.

I think now it flipped back to the presentation.

So, moving forward on this one, I think NOAA should come up with a clever name for the concept and -- there we go. How? In order for it to be successful in North America, it

would have to also include Canada. Canada is moving down the path of going to S-100 formatted data for this, and we've had to figure out how that meshes with that international standard. But again, I think it's a very valuable thing for the Government to do.

The like the loss of the El Faro, you know, with software with these sort of capabilities in it would have prevented something like that because they could very clearly see in their navigation software, the kind of conditions that they would have in the future.

So, these are my specific recommendations. NOAA should focus on open standards that don't create non-competitive exclusive relationships. I think the U.S. Coast Guard should be relieved in part of the role in implementing ECS standards within the United States, and I think NOAA should requisition the new NRC report, looking at the next 20 to 25 years of where we should be at that time period.

That's all I have. Thank you.

RADM SMITH: Thank you, Jeff, that was great. Lots of -- lots of exciting stuff. Really happy to see that demo coming along. That's awesome. Next we have Jeff Siegel from active -- founder, president and everything for ActiveCaptain. For those of you who don't know what ActiveCaptain is, Jeff I'm sure will describe it to some extent.

But I'm going to -- I'll fluff it up a little bit because he has -- he's really revolutionized the way people share information about -- within the sort of particular recreational cruising market, share information about hazards, about marinas, about even where they are. And he's done it in a way that is sort of, in a sense non-proprietary. That is, he partners with everyone, including us.

And I met Jeff at a -- I don't think I met you. I think I heard about you and called you -- cold-called you a few years ago and I -- and he was sitting on a gold mine of hazard information about where there were dangers on the

-- you know, dangers in the coastal areas. And I said, we're on the same side here. We're trying to -- we're trying to help people be safe.

Can we have access to your hazard database in order to help us plan and focus our hydrographic surveys? And as another source of information? And without blinking an eye he said absolutely. And we had an agreement in place just a few months of lawyers later to -- to share it. And it's been really revolutionary to the way that -- the way that we think about the charts and about -- and about our customer's interactions with them.

So Jeff promises this will be as thought-provoking and revolutionary today as has been the rest of his work. So, Jeff Siegel.

MR. SIEGEL: Thank you. First, I can't sit here. I live on a boat. I cannot sit here and give a talk. I need to walk around and so forgive me. I have no slides, so I'm it. You're going to have to listen -- kind of what -- verbally what I have to say about some

interesting things about crowd sourcing.

I'd like to start by -- May 25, 1961 was a really famous speech by John F. Kennedy when he said -- and everyone knows this speech -- how we're going to send a man to the moon and bring him back safely. And that was a fascinating time and you know, back at NASA they had their own little conflict because on one hand they knew their budget was going to go through the roof. But on the other hand, they didn't know how to get the man to the moon and back again.

And even worse than that, they knew that they couldn't do it. But what happened over the next couple of years is something uniquely human. What happened is innovation and creativity. Because the mind set was how are we going to shoot a rocket from Cape Canaveral to the moon and have enough fuel to have it come back? The technology didn't allow us to propel that much fuel up to the moon to have any fuel to come back.

It's sort of like shot putting, you know, a tennis ball. Think about how -- how poorly you could throw it in this room. And then someone realized well, you know, if I wound up and I -- just a quarter of a throw, I could -- I could hit the end of this room right here. And then the next step of that is well, let's do a -- like a sling, like David and Goliath, and fling it once around. Imagine how far you could hit that tennis ball.

And you know, a bunch of calculations happened and that was called the slingshot effect. And if you went into Google and you said today Apollo trajectory, what you'll see is that it shoots up from Cape Canaveral, goes around the earth once and goes to the moon. And that's how it was done. It had a lot to do with thinking outside the box. And it had a lot to do with this slingshot effect.

And so my entire life has been defining what I call slingshots. And we'll come back to slingshots because they have an important

characteristic in crowdsource -- crowdsource data. And most of you probably have some familiarity with it because you live more in the crowdsource world than you realize. You know, today -- crowd sourcing is about getting a community of like-minded people together to collect data from them, somehow process it in one way or another, and then feed it back to them.

It's an interesting element of statistics and mathematics that isn't very well defined but it heavily roots in statistics. The terms didn't even exist until 2005 and really didn't start to come into play around 2006 or 2007. I'll give you some more history of that. But there -- there's some fascinating things that most people don't realize about crowdsource. And there's been a lot of study. There's been a lot of scientific study into it.

I'll give you one example. The BBC who didn't believe any of these studies about crowdsourcing wanted to do a documentary on crowdsource -- crowdsource data. So what they

did was they had one scientist. He took a big glass jar and he filled it with jelly beans. And as he was filling it, he counted the number of jelly beans he put into this big glass jar. And what -- and this is all -- there's a documentary on this. If you go to YouTube and search BBC crowdsourcing there's a seven minute kind of summary all about this experiment that they did.

And so he put in 4,510 jelly beans into this big jar. And he was the only one that knew how many jelly beans were in the jar. Closed up the jar and then walked around BBC office and just asked everyone in the office how many jelly beans are in the jar? And he wrote down every response. And the video is really great because, you know, the -- when they show a person guessing 400 jelly beans -- I mean, imagine this huge thing and someone guesses 400.

And then they showed another person guessing 50,000 jelly beans. And you know, this is one of the characteristics that crowdsourcing has to people that aren't involved in it where

you -- you take those outlying data pieces, like 400 and 50,000 and you think this can never work. Of course it's wrong. It will never work.

All right, but what he did -- and again, on the video, showing live exactly what happened -- he wrote down every one of the 160 data samples that he got. And then he did that -- the obvious thing. He added them up, divided them by 160 to get an average. The average number in that -- of all the data collected was 4,515 -- off by five jelly beans. That's an incredible finding.

Now, and he did -- he walked into this whole experiment -- because that experiment had been done many times before -- not believing that it would work and the documentary became really incredible because it blew him away. There's been a later meta-analysis -- a meta-study -- of all of the different crowdsourcing things because jelly beans and golf balls and peanuts and a thing -- there have been so many studies like this. And so they went and collected up as many

as they could find just to find what's the average amount of inaccuracy.

And it turns out that in that study when you have 100 or more participants -- and that's not many. Just 100 people. There have been studies that they -- that they grab 20,000 and you actually don't get any more -- you don't get better data than about 100. The average error is 3 percent in that kind of study. It's an incredible thing.

So, the -- what detractors of crowdsourcing do is they concentrate on that 400 or the 50,000. We get it all the time. You know, we collect up crowdsource and we have 1.5 million users today. There's 280,000 that are fairly active that, you know, contribute data. Some contribute an unbelievable amount of -- there's a very interesting curve of that. And detractors of ours, basically the companies who we've competed with who didn't like what we were doing, they would come back and say oh, you know, look at this anchorage. Look what someone says.

They say, they just have all that information wrong.

And yes, they -- you know, that one comment review about that one anchorage, maybe it is wrong. But the 14 others are dead-on accurate. So as a -- as a person using this data, you can't look at any one piece of data, any one comment, and say that's the whole thing. You've got to -- you've got to bring it together in your own mind a little bit. It's the same thing with -- with TripAdviser if you're looking for restaurants. You know, you can't look at just one of those reviews and decide that's the restaurant I want to go. You need to read a body of them a little bit and get an impression. And what walks away from that is incredible -- incredible information.

All right, so now I want to -- I want to pull together the crowdsourcing idea with the slingshot idea because that's where the real magic happens. That's where changes happen that are completely unusual. How many of you have

ever used an app called Waze, W-A-Z-E? And I mean use it, that means you've been on -- you've been on the road for more than a couple of hours, especially interstate highways. So maybe 10 percent have done it? Okay.

It's an incredible app. It was started in 2006, the same year I started ActiveCaptain. It was an Israeli company headed by Uri Levine. He -- he got a couple people together and what he wanted to do was solve the traffic problem. To get information about traffic on the roads.

And his -- his idea was two things. First, he would have no street maps. He didn't use any of the existing street map data at all. He started with a blank screen. And what he did was he would capture the GPS time and date and -- you know, and speed of where you were in your car if you ran this free app. And it was free.

I was a very early Wazer. In 2006 I used the first version of it. And -- and I drove -- I lived in Maine at the time in the summers

and I drove around because as an early Wazer you got to pave roads, which is a weird thing, but it spoke to me and I paved a bunch of roads in Maine.

(Laughter.)

MR. SIEGEL: And what you had to do is, if you drove a road more than 10 miles an hour three times, the road became part of the database. But it did more than that behind the scenes that even an early Wazer didn't know. He also kept every intersection when you turned -- or if he realized there was an intersection -- and I say he, it's not he. It's the database. The database also kept track of what direction you turned.

So what was coming was this very unusual database of not only what roads are actually used, but at every road, what's the distribution of turn -- including going straight? Okay, then to collect real-time data about traffic, he also knew just from looking at the speed of data that your -- that your car was

moving, he knew the speed limit of every road that you were on.

So if he knew a road was 65 miles an hour and he all the sudden got four data hits of 20 miles an hour, he knew there was traffic there. And in going back from that, you know, the feeder roads coming on that he would also get information on, he would know the distribution of how they would turn. All right, the result of all of this is the -- the quality of the data and the instantaneousness of the data became so good that today there are no, you know, helicopters that go up in every TV station and report on traffic because that's an instantaneous one-shot at what the traffic is. He could -- Waze not only gave you a continuous, every day of the -- of the -- every minute of the day, every place on earth, what the traffic was, but he could also predict the traffic. That became the really valuable thing.

And it was using -- it was using speed and collecting the speed up in a way that was

very revolutionary. And no one even thought of it. That -- that was his slingshot. By collecting speed, he could detect traffic. He didn't have to have anyone saying that there's an accident. He could just know.

And Waze was purchased just a couple years ago by Google for $1.1 billion, with a B, dollars. My wife and I look at each other and say why did we do recreational boating? You know, we could have done traffic. So --

(Laughter.)

MR. SIEGEL: We have more fun. So you know, it's really important lessons out of that. And you don't have to go too far to think that collecting speed and collecting depth -- we can put together charts and we can put together hydrography pretty well. Now, in the whole subject area of crowdsourcing there is a conflict between what I'll call the experts and the crowd. It always happens. It doesn't matter whether it's TripAdviser and, you know, collecting up restaurant reviews and the restaurant critic in

the newspaper who, notice, doesn't exist anymore. There is no -- there is no restaurant -- no reviews in newspapers.

Or same thing with -- with theater. You know, no -- no Siskel and Ebert any more. You know, there is now websites that give you reviews on movies. And on and on. Every -- every time, you know, that we -- we had -- we had the guidebooks -- the recreational boating guidebooks who did not like at all what we were doing. And you know, they were the experts on where to go in the Caribbean. But it turns out that we were the ones collecting where people actually were going and, in their own voice, what many people were saying.

So, okay -- looking at crowdsourcing of depth, which is obviously what I'm talking about -- the experts in this are the hydrographers, and I recognize very clearly that I am in the belly of the beast of the hydrography expertise right now. Which is one -- another reason why I'm standing and I'm near an exit.

(Laughter.)

MR. SIEGEL: But it doesn't have to be a conflict. We need your help. And -- and there's a lot, you know, that -- that can and -- and should be done. Let's look a little bit about what has been done in crowdsourcing because -- for depth data today. Because there's -- there's efforts right now. There's Service Engineering, which is an Argus project. I'm sure many of you have come in contact with that in some -- one way or another. And a very similar project in the UK called from Team to Surv. Have -- have most of you heard of that? Familiar with it? No?

RADM SMITH: We provided the seed money for it, in fact.

MR. SIEGEL: The -- you provided the seed money?

RADM SMITH: Yes.

MR. SIEGEL: Good, okay. Both companies have asked us to get involved with it. Both -- and I turned down both companies because

their business model was just -- it will never work. It just can't work. Their business model was about -- and I don't mean to bash them at all. I mean to get the project done. And we -- and it's not something that we're doing at all. We're -- they wanted us involved because we had so many users.

What they wanted to do was collect the data from the crowd, process it, and then sell it back to the crowd. That is a terrible business model. I mean, that just doesn't work on the internet in anywhere. It -- and it's never going to work with that too. I mean, this is the one thing where open source, where open collection, where open databases is so required.

There are some other commercial entities. Navionics, you've probably all seen sonar charts. They're a very, very common thing. A weird thing -- they don't -- they don't provide the information about what they do to the data. And I've done enormous personal, you know, in our boat, going on anchorages, looking at the NOAA

chart, looking at the sonar charts, and the data looks really neat. I mean, they're -- they have precision without accuracy. They have unbelievable contours. Just none of them are right.

And, you know, there's a place -- and I can give a lot of specifics. You know, just north of Addison Bridge, you know, near Titusville, Florida, we anchored there just a couple weeks ago. And if you looked on the NOAA chart, it would be a very obvious -- you get off the IC-W, you could go in the -- around by the bridge and it's a beautiful place to anchor. And in fact we did.

If you looked on the Navionics sonar charts, it would scare you to death. You would never even think about venturing back there because the contours showed you that there was two feet. Well, there wasn't two feet anywhere there. It was 11 feet everywhere. So I don't -- they don't present where they're getting the data from and it's a big issue because there are some

challenges, you know, collecting -- crowdsource.

Garmin is doing very similar thing, you know, with their Quickdraw, if you've seen that. And that's kind of neat that as you're collecting the data they're drawing the contours ahead of you. That's a -- that's a wild user interface. And it's really interesting. And -- and that does work in that, you know, the data is live to your own boat and you see where the data's coming from. It -- it solves that problem.

The real problem that they don't -- that they don't address is tide. You know, they just ignore tide. They just figure, well, you know it means you can't share the data at all. You know, because if you're in Maine and you have 12-foot tides, what does it matter what the -- what the depth I got was? You know, they -- zero correction.

Okay, and the other side, Navico, has a thing called Inside Genesis which you may have seen. It's a wonderful product. They're

actually doing everything right. They are -- their business model is interesting for it -- they haven't really tied it into their -- to their commercial -- their normal chart plotter products. It's now really sold as a -- you know, if you want to -- if you want to survey a lake and -- for your community and figure out all the hydrography for it, it's a really inexpensive way to do that.

You go on a jet ski, you know, zip around a little bit and then out comes this really nice chart that is actually pretty accurate. And they take care of -- they take care of tide and current and -- so no one is doing it right yet. Now there is that IHO that -- that I've been -- I had talked to Admiral Smith about. I'm involved a little bit with it. I use -- I use Jeff's -- Jeff's a partner and a friend of mine. I use Coastal Explorer in our own boat and they have an ability to contribute to that database. There's really nice things about that.

But there are some challenges.

There's real challenges in putting this all together. You know, there is the -- the -- the tide issue, and tide is critically important. You know, in many places like Maine -- like here, you know, in the Pacific Northwest, you have enormous tides. And it really does matter. You know, people -- in our hazards today, when we try to train them -- but you know, we try to keep their comments in their own voice and we won't edit them.

So they'll say things like, you know, the Little Mud River is -- is -- this is me saying it, the Little Mud River the worst place on Intracoastal Waterway, you know, on the East Coast. It -- where the ICW should have about 12 feet of depth, the Little Mud River -- parts of it have about 3.5 feet. So 3.5 feet on the typical cruising boat, which is around 4 feet to 6 feet, means that every day of the week people are grounding there. And some are destroying their boat. Some are getting towed off. Some are just uncomfortable for a few hours. But it is a

very, very annoying thing.

So people will write comments -- we have -- we have -- if you are in ActiveCaptain, you are going to see an array of golds, which is our sign for a hazard. But people will say, so no problem at Mud River. Had at least, you know, 10 feet. Saw at least 10 feet. Don't even understand what the problem is about.

Well, yes, that part in Georgia has eight feet of tide. So sure they saw 10 feet. They just didn't -- there's a class of boaters who doesn't really understand. They just don't -- they -- they just don't get it. They don't know that -- amazingly, they don't know that Georgia has eight feet of tide.

SO there is that -- but that is that guy that guessed 400 jelly beans. You know, and you've got to remember that. Because that -- that -- if you look at the rest of the 80 comments about that area, what you're going to find is 79 comments saying, oh my god, at mean low water, this is the depth. You know, make

sure you read that.

So again, you know, the detractors of it are going to point to that guy that said it was 10 feet here, what am I even worried about? So you know, just an important point. Tide is critically important.

There is a transducer issue where again, a lot of boaters don't realize that, you know, the transducer is only giving the depth at -- where the transducer is, and a lot of people put offsets into their transducer because they either want depth below the keel or they want surface level. You know, and people do it different way. So the -- if you're -- if you're just collecting the data and reporting it to a service, you have to normalize that in some way. That's actually really easy. There's a couple slingshots to make that trivial to do. But it is an issue.

The other issue is a spatial issue. You know, when you collect the GPS position and you collect the transducer, generally your GPS is

not directly over the transducer. So you're GPS may be back a little ways and your transducer may be more forward in the -- in the boat. So there could be a 15 to 50 foot difference that needs correcting.

There's also a privacy issue. In order -- in order to do crowdsourcing right, I believe you need to track the data to a boat. And that creates a privacy issue where some people will want to hide their identity for good reasons. And it's not because they want to trash the data. It's because, you know, I don't want someone seeing that, you know, maybe I have a house in Boston and here I am in Key West. And so I don't want someone in, you know, Boston being able to see, oh, Jeff's on his boat and he's 1500 miles away and I can -- I have all the time in the world to get into his house.

So -- so there is a privacy issue and it can't be overlooked. At the same time, you know, collecting the identity data is wonderfully valuable. It would allow me to say, okay, you

know, I don't really care about all the data going through the Little Mud River. I really want to know, you know, 50-foot and over trawlers. Because I can pretty much guarantee that those guys are going to know what they're doing. What did they find?

You know, or 50-foot or over sailboats. Or -- or my friends. You know, we have a -- a website that we -- we -- it's sort of very Facebook. You know, what friends you have on your boat. You know, getting all the Facebook stuff out, just friends. So I know, you know -- people that I -- that I share friendships with, I kind of know those people. So show me the depth that they had through the Little Mud River -- just my friends, you know, coagulate it all together.

All right, so what do -- what should NOAA do? You know, the data is being collected now. I would very my like to see -- one other piece. It feeds into this really importantly. I believe that paper charts had their end really

with the -- with the practicality of GPS. The day -- and it was around 1993 -- and this is all Jeff Siegel, it -- there's no proof in this or anything. But I believe that that was the start of the end of the paper chart.

And that's what -- that's what really created the ENC. Okay. There's no reason to believe we're done. There's no reason to believe there's not a next generation. And the enabling technology as bigger than GPS in 1993 is something that has affected every one of our lives today in everything that we do. From communications to information exchange to information retrieval to the way we entertain ourselves -- every single element. The way we buy things -- it's all been changed by the internet, every single one.

Yet, where is the internet -- where is the internet in this chart plant that -- that is in that? It's not even -- it's never even mentioned once in that chart plan. There is one time where a server is mentioned. But why won't

the internet affect what the ENC chart is today? And my contention is that -- that we are further than 1993 today. That really there's -- there's what I call TNT. You know, there's ENC and there's TNT. And TNT, I like the imagery of that because of the explosiveness of it. But it just -- for me it means the next thing.

And what ENCs are going to, I believe, change is in the process and in the -- in the -- in the touching of the internet they're going to change in a big way. And the crowd data is going to be a huge piece of that. So what I'd like NOAA to do is -- this is going to sound really strange but I would like NOAA to telegraph to the recreational boating community that we are going to get out of ENCs, electronic charts, for recreational boating. I think that will do an enormously great thing.

It will spark developers to start figuring out how to get to this next generation. The reality is that a lot of the electronic charts are okay, that we're using today in the

United States. They're not great. There's too many times in the last week that, in my pilot house, I was driving on land. You know, those things need to be corrected. They have to be corrected. And there's a lot of that.

I think we -- that's the kind of thing crowdsourcing would fix in one week. And with -- with almost -- with no effort by -- by NOAA. So I'd like to see that telegraphing. I'd like to see -- I'm not saying to end nautical charts for recreational boating because it's going to be needed for another couple of years. But telegraph to every software developer out there -- we work with 65 companies today of developers. Like Rose Point is an example.

We also work with guys who are writing iOS, you know, iPhone apps in their basement after work at night that are looking for, gosh, what can I do next? Well, telegraph to them that there is this big opportunity to take crowd data and make the next generation of recreational charts. And that has to come from NOAA to say we

-- we're thinking about getting out of this.

I think that a lot of what Jeff was talking about, and a lot of the other tide data that I heard today is really exciting because I don't see that. As a recreational boater I only see the -- kind of the ex-tide stations which are not good enough. We need a lot more tide information to do crowdsourcing of data properly. We need -- and it's not actually prediction. Prediction is wonderful. I'd love to see the prediction because I'd like to know -- I'd like to get -- I'd like to slow my boat down too and get there the same time.

But -- but just the historical data. Because the historical data of tide against the GPS and depth data collected will allow me to correct for tide. Or any -- you know, the database to correct for tide so that we can get a normalized tide value. I'd like to see that in a big way. And I understand there's some of this data, because, you know, Jeff is showing how they're using it. God, get that out to us. We

need that. We need that in a big way.

And I'd like to see some more adoption of some of the -- the crowd data. The IHO effort looks -- looks really great. And I'd like to see you know, more -- more of that happening. That's really all I have to talk about. I wanted to actually end really early too so I -- you know, answer questions and -- I know that the whole panel will answer questions, but I think there's a really fascinating element in the crowd. If you went up to ActiveCaptain and looked around at the data, you'd see there's a tremendous amount of information there and it changes the life of everyone that uses it. You know, we have -- the last point. The -- one thing that -- we have a newsletter that goes out to 280,000 boaters every week. And a month and a half ago -- I write the newsletter and I basically said I'm coming here to this meeting. And so I'd like to crowdsource what you'd like me to tell NOAA. You -- you feed back to me.

And -- now to be fair, there's

probably -- it goes out to 280,000. About 230,000 actually receive it, you know for one reason or another. And these are our core users. You know, these are our most fervent users that read it. And we got back 500 responses, which is pretty good you know for -- it was within three days. And we categorized every single response that came in.

And interestingly they came in -- there were only two categories of responses. Fifty people responded back with very specific kinds of things like you're not -- tell them they're not doing Barnegat Bay, you know -- they're not doing a good enough job with the charts in Barnegat Bay. And -- and there were more New Jersey than anything else. And I don't know what that means. Maybe it's left over from Sandy, or maybe it's just people from New Jersey. I don't -- I don't know.

(Laughter.)

MR. SIEGEL: But it was that kind of thing. It was the Wilmington River -- the

Wilmington -- oh, sorry if you're from New Jersey. I don't mean anything. I -- I was born in Brooklyn, New York. The Wilmington River was another one. You know, the bends in the Wilmington River are just way off. You guys are not doing a good enough job.

So, that wasn't even what I wanted to talk about at all. Or, it wasn't even, you know, what -- what -- that was a very personal thing. Those were people basically saying me, me, me. Fix my problem. Okay, 450 people said the same thing. They said we want to collect depth data, have NOAA put it together and feed it back to us. Four hundred and fifty people said that consistently -- every single one. They said it in a couple different ways, but they all said please tell them that.

So you have a recreational boating community who is really dying for that information because it will actually allow them to have more confidence in where they are going. So, thank you.

(Applause.)

RADM SMITH: Thank you, Jeff, that was awesome. And thank you to the whole panel. Let's have another round of applause for the whole panel.

(Applause.)

RADM SMITH: And Mr. Chairman, do we -- how much time do we have?

CHAIR HANSON: A long time, 45 minutes.

RADM SMITH: For questions, great.

CHAIR HANSON: Yes, sir.

RADM SMITH: Fabulous, all right. Who wants to lead off? I will. Oh, I got one for -- I got one for Travis. So Travis if -- if -- yes, it's a set-up question. So if you chart all the dangers right away and you automate the update of nav aids and you get rid of channel tabs, what do we need local notice to mariners for?

MR. NEWMAN: Good question. So if -- if -- if we get rid of channel tabs, we update the dangers right away -- well, it's really for -

- to still support that mariner out there who is hand correcting his paper chart, if there's anybody out there still doing that. I -- you know. But that's why we write notice to mariners. And we spend a lot of time writing notice to mariners. That's a big part of our -- our job and -- and it's a resource drain to identify notice to mariners and write them. But if we didn't -- you know, if we didn't have to write them, we would be able to spend a lot more time doing other -- other things like applying shoreline and hydrography and -- and so forth.

But it's really just to, you know, support that mariner that still has his paper chart and he looks at the local notices to mariners, or he goes on our website and looks at the chart updates and he actually hand corrects his chart.

MR. SIEGEL: I don't know if you meant just NOAA's notice to mariners, but you know, notice to mariners tells me when a bridge isn't opening. And so you know, Main Street Bridge in

Jacksonville that I just went through went from on-demand to opening every four hours. Trust me when I tell you, that makes a big difference. And we're one of the few people -- we read all 17 districts every week and we -- we say we put the notice in notice to mariners. Because what we do is we go through the notice to mariners and find the places that are new that we don't have in our database already, and we put a hazard marker. Or we update the bridge that says when -- what the changes are.

We do that every single week and it is a huge job. I -- and by the way, every single district uses a different format. You know, I've begged the Coast Guard, give me --

RADM SMITH: You noticed that too, huh?

(Laughter.)

MR. SIEGEL: I begged them, give me one database so that we don't have to read -- most of them are in PDF format. They -- we can't even get the digital format to search on things. So I

think notice to mariners is going to be around for a long time.

RADM SMITH: Joyce?

VICE CHAIR MILLER: Yes, Jeff, you -- an example of what I was going to ask you just talked about is, you know, that knowing what the sources are. You know, is it Army Corps, or is it NOAA? You know, how -- we were in -- we were in along the Intracoastal Waterway several years ago and there was -- there was incomplete understanding of who was responsible for what. How -- how many of your boaters do you think are really aware of, you know, the sources of data and -- and -- you know, the various Army Corps districts versus oh, the Coast Guard's responsible for this versus oh, NOAA makes those charts?

MR. SIEGEL: I'd say that the -- the vast majority have no idea. I mean, the vast majority, they're looking at a screen. I mean, this is -- we're not in -- we're not in the more responsible boater of the 1970s and 80s and 90s.

We're in the guy who -- and not to disparage anyone, but is in a -- a 40-foot Sea Ray that bought the boat last week and is looking at a screen and the screen is telling him where to go. And he thinks that that information is coming from God, you know, and he's going to follow it.

And it's -- it's what -- or, you know, just up until two seasons ago for five years the Intracoastal Waterway went across an island in -- in -- in Georgia called Cumberland Dividings and -- and sadly on the sides of that in that area it -- there were temporary buoys. Which was -- if they were -- if they were fixed buoys it probably would have made a -- or, fixed marks it probably would have made a difference.

But they were temporary so -- so boaters would come across that and they'd see on their chart plotter that -- that the -- the buoys are taking me across this island on the chart because that's what the -- the NOAA chart had an island there. And it's the marshes of Georgia, if you see a figure, okay, I -- it looks like

water, but it's just underground. And I would say there were 100 boats a week that would say, the buoys must have been blown away. I'm going to go on the other side of the buoy where there's water. And they'd immediately go aground because you actually had to go over the island because that's where the deeper water is.

So they have no way of really understanding. And a lot of the navigation products have taken that ability to click on something and say where did that data even come from? They've taken that away from us, so we don't know.

You know, we try to get -- as much of that data as we can -- we use the -- we use the Army Corps of Engineers' soundings. We look at them. You know, the Wilmington District -- I'll tell you right now they -- the Wilmington North Carolina District is the best Army Corps of Engineers. They actually do almost every inlet every few months. And we get the PDFs and we translate that into stay to the green side here.

And even for that, boaters have no idea where it comes from. They -- they don't even know what Army Corps of Engineers is. It wouldn't even make sense to them that the Army is involved in boating. So --

MEMBER SHINGLEDECKER: Yes, Joyce, I would echo that. It's something that I've said for a number of meetings that, you know, asking a boater to go to various Army Corps districts to get the latest data and soundings for that area is never going to happen. They -- you know, and -- so the progress that I think we've seen in the communications and the coordination with the Corps over the last probably three years I think, in terms of using eHydro it -- it has to happen because otherwise the recreational boater is never going to see that Army Corps data.

Jeff, while I have the microphone, question -- curious for you what your average age of your active users are.

MR. SIEGEL: That's a great question. Well I'll tell you -- there's -- there's two

things. I want to -- I'll answer your question, but then I'll answer the question that I really want to answer.

(Laughter.)

MR. SIEGEL: Because there's some amazing data out of it. The -- the average age is retired. You know, without any question. That said, you know -- you know, we're in our tenth year. The -- the 65-year-old today is much different than the 65-year-old was when we started, you know, in 2007 when the first data went public.

You know the -- because they were 55 back then and they couldn't get out of the computer era then. And so, you know, we -- we've seen our -- our user base grow incredibly. Here's the question I really want to say because it's -- it's a fascinating thing. We actually talked about it at dinner last night.

But, you know, one thing that we noticed too, in the recreational boating world, if you go to boating forums and even boating

groups on Facebook, it is a dominated male thing. There is 98 percent male contribution to CruisersForum.com, Sailnet.com, TrawlerForum.com. Ninety-eight percent male activity. We noticed in year one that more than 50 percent of our users are women. That's an incredible, interesting thing that I -- we're not 100 percent -- we think we know why, we're not 100 percent sure why. And we don't know what to do with that.

But there's a fascinating element to that that -- that I think could be used in a lot of ways. And I think that there's probably a -- a female side to navigation that isn't being addressed by the typical navigation systems that boaters use.

MEMBER SHINGLEDECKER: Yes, I would say that I -- I was wondering if you would skew younger. But yes, the average age of the recreational boater in the U.S. is 55. And we've gotten ten years older in the last I think ten years. So --

(Laughter.)

MEMBER SHINGLEDECKER: No, no, sorry. That's not right. We've gotten -- we're aging six months every year. And so the -- the average age -- boaters are getting older, and as we look at the new generation that could come into boating, the amount of student debt is really holding them back from buying boats.

Where I tied it in -- and you warned me you'd be provocative in the -- in the presentation. I would say I'm not quite ready for NOAA to get out of recreational charting just yet. But it was interesting. The National Marine Manufacturers Association just released some first-time boat buying statistics and studies that they did. And they kind of broke boat buyers into different categories of people.

And one of those groups is kind of a -- something about technology and techies and guys that want the latest and greatest equipment. Usually very specific -- fishing or wakeboarding or -- and I would imagine very, very internet

savvy, app savvy with the latest gear. There is just as much another segment of boating that is a -- I go on my boat to escape nature and to unplug and to not be in front of my phone because that's where I am all the time.

So there -- it's a really diverse group of people. It is predominantly white male. Absolutely, right? But I think there's still a need for the products to be delivered in a variety of ways. That said, the ActiveCaptain is a fantastic product and it's really fun to see how we can work to incorporate that data more.

MR. HUMMEL: I'd like to make a comment just real quick about the -- the demographics of various users and, you know, NOAA falls under the Department of Commerce and in the United States 98 percent of international trade happens by sea. And the focus for NOAA and your mandate is to create charts for commercial users. None of the commercial users use the ICW, even though that's what it was sort of created for. It's used a little bit in the Gulf.

And so it's -- to me it's no surprise that there are inaccuracies. And it's because NOAA has been appropriately using your resources to address your mandate, which is commercial users. Our users, commercial users, find the charts to be very accurate, very up-to-date. Never really hear any complaints about the charts. But again, that's because you focused your energy on that particular user group and I think you've been very successful at addressing their needs.

Now maybe NOAA needs to say, well the recreational boating market is worth x-dollars, and we should assign some number of resources. But I mean generally, I think it's just been ignored. But you know, I think the focus has been in the right area. Sorry Jeff.

MR. SIEGEL: I agree with you. Although, you know, I -- I pass too many barges on the ICW to say that there's no commercial traffic. But yes, I -- I agree that, you know, the -- NOAA -- I'd hope that NOAA's spending more

time on Charleston Harbor than the Waccamaw River. You know, I mean that -- they -- the resources should be that. My whole point is that -- that the recreational boaters can take care of the Waccamaw River really, really well.

I mean there's 14,000 boaters that go from the New England, Chesapeake Bay down to the Florida Keys and back. You know, 28,000 passes a year. That's an enormous amount of data. Even if only 5 percent of them will collect the data, think of the surveying that will be done. You know, the -- the -- you know, think of that averaging again of what happens with crowdsourced information.

VICE CHAIR MILLER: A follow-up to that, though. I mean, most of the ICW -- I've sailed it, and most of the ICW is actually not NOAA data, it's Army Corps data. You know, there's -- there's very little that I'm aware of that NOAA has any responsibility for.

But I wanted to follow up on the woman -- what percentage of your users are -- are long-

term cruisers?

MR. SIEGEL: That's hard to get data on because a lot of people -- our primary user is someone who gets in their boat and goes to a place that they have never been before or are not used to going or is more than, you know, a couple days away from home. Those are the times you need -- if you're going -- if you're on the Chesapeake Bay and you're going from, you know, Annapolis to Rock Hall and it's something you've done 50 times, you -- certainly you don't need us.

So you know, it's really hard to know how many people are using it in that way. You know, because they -- people will go -- they'll charter a boat and they'll use it for two weeks. And so we can't really get really good information about that. Charters actually give -- they contribute a lot of information in the Caribbean especially.

You know, we get a lot -- we're also worldwide. That's another thing that you know

isn't -- these things are eking out. You know, we have users in Tasmania, which is kind of a cool thing, charting the hazards just like we do here. So it's easy to get geography. I can't -- I can't really get -- I can't assume time and the time domain of when they're actually on their boat.

VICE CHAIR MILLER: I was thinking that, you know, it -- having cruised for four years myself, it -- a lot of times you know internet things -- it -- I was thinking about your dichotomy of how many women. Is a lot of times the women were the ones on the weather reports or -- or, you know, that they keep the scheds and it may be that that's part of your demographic issue is that --

MR. SIEGEL: Yes, I think -- you know, so many times we -- we pull into a marina and, you know, I say -- I tell my wife, there's four dock hands. Can you believe that? And we pull in, there's one dock hand. There's three women with their iPads having questions about

ActiveCaptain. And -- and what happens -- you know, so we get a chance to talk to a lot of people on how they're using it.

I think it -- I think that -- the -- first the iPad has taken over in terms of the co-pilot chart plotter. That's without any question. And I think that the guys are still there driving the boat and -- and this is not meant to be sexist. This is going to come out a little bit sexist.

They're driving the boat and they're worried, you know, they're -- they're going to get to the right navigation. But the women finally have a tool that can say well, what is there to do once we get there? And that's what we do. And where do people think about going to that anchorage? And are there bugs in May? Because I just don't want any more bugs. You know?

And that -- that's -- those are the things that we do. You know? What chart says that there's bugs in, you know -- you know, off

Belle Haven, North Carolina in May? And yet, that's where they are. You know, and -- so you don't go there in May. And so I -- so -- it's more become that the women have more decided here's where we're going. And now it's the guys are just getting there. And I think it empowers them. And that's what I think they like about it.

RADM SMITH: Lindsay's been trying to get in here.

MEMBER GEE: Yes, I just -- we got to talk about this a bit on Thursday with the technology working group, but that's really for -- well, actually for all of the panel a couple of comments and questions. I think the standards are one thing, and you have to have them because you encourage navigation and all that. But it has held back then I think what we're seeing is the other -- the other group of users. And Travis kind of set up here because you are going -- you just want to talk about a charting plan and there's kind of survey, there's charting.

But in between that is -- as you're talking about with the internet, there's got to be this database of -- and multiple databases as information. So we see in the nanos all of the -- the various things that are integrated with that. But with those databases I wonder whether the future is, as Jeff's saying, with -- also regard that, I think if you take that kind of business approach when you do your business model and say, well, you know, what's my proposition? You've got your proposition, and who are my customers?

But one of the other things is how do you deliver to your customers? And I think what Jeff is saying a little bit is that well, the channel might be from the database to the -- through a third party, and there is no recreational product. So I wouldn't say that NOAA gets particularly out of -- my comment, where I wouldn't see them getting out totally of the -- the recreational boating, but you don't deliver a product to recreational boaters.

I think that maybe is a way that -- and because the standards and things with ECDIS if you like, it was the EC that was the important part of the electronic chart, but the display and the information side of it, I think is being kind of sadly neglected and held back. The kind of really move forward. So what -- one question with -- for Jeff, we talked about well if we -- we're going on different sides of a channel and we see that all the time. Well what's to stop the iPad and handheld phone app, not for depth, but just for where boats go? Like a Waze of the -- of the -- sort of ICW, and that sort of thing?

MR. SIEGEL: That's exactly what we do today.

MEMBER GEE: Right.

MR. SIEGEL: We have about 900 hazards on just the Intracoastal Waterway. And the hazards are specific points that one or more people have identified. And you click on that and, you know, even though it says there's nine feet there, so many times it says there's not

nine feet here. The shoal has come in from the west, you know, stay to the red side. Stay to the green side. And -- or -- and there will be specific things. People will give latitude/longitudes for where to go through a specific area.

And it's really funny -- what incredible happened just a couple of years ago to me, I was coming down North Carolina and I'm -- in the ActiveCaptain world, I take care of every single hazard. And you know, it's -- it's -- there's only two of us in the whole company. Which is another amazing thing. Resources are -- are used really well in crowdsourcing. And there's two people in our company.

So I knew that dredging had happened and there was a hazard that said, you know, stay to the red side. And you know, we're going down in a -- we're going north in the -- in the spring and so you're naturally on the green side. And I'm watching two boats ahead of me. And the hazard had been removed because it had been

dredged. But you know, people don't necessarily update their ActiveCaptain data every day. And it was about a month old that -- this data.

And so I'm sitting there and I'm on the natural green side assuming that you -- the hazard said stay to the red. And I'm watching the two boats ahead of me all move over to the red side. Which is really funny, the hazard is gone. So you know, the -- I -- there's nothing that stops us from doing that. We're doing it today.

What's really needed is sort of a backdrop to make a standard for really disseminating it. I mean, we're going to always be the qualitative side of that and that's our business model. What -- what I think is needed is a quantitative side of that. And I think that that's about depth. And I think NOAA is -- NOAA through the IHO is the perfect place to have that done.

MEMBER GEE: Right. So -- so ActiveCaptain, but it's a -- it's an input you

take. You're not just tracking people as they go and just use -- like you said with Waze, that was based on speed and turns. You don't actively -- you don't have a database of that. It's a -- people enter hazards, and if they see an buoy out and -- is it that way? Or -- or both?

MR. SIEGEL: Well, we do -- we do track where people are too if they let us.

MEMBER GEE: Right.

MR. SIEGEL: If they say it's okay.

MEMBER GEE: Yes.

MR. SIEGEL: Because there again is the privacy issue. And then we have an app that you can see where all your friends are and where they're moving and you can message them and -- so, I mean, there's that social element that -- that's in our wheelhouse too. But we are -- we are tracking them. And we could easily feed back the depth data as well. You know, given a network where we're collecting depth, we could feed it back too.

I'd like to see -- I'd like to see a

lot of thought go into that database. I'll bet that there's not a privacy issue thought about in the database. I'd like to see things like, like course over ground and speed over ground and heading, if that's available to put in the database too. Because that will solve some of the other problems.

Much as Uri Levine saw, you know, collect at every intersection the direction that people turn. You know, you never know where that stuff is going to be used in the future. It is so easy to collect it today. Let's collect -- let's make sure we are collecting all of the right data. And no one is better positioned in the United States to do that than NOAA.

MEMBER GEE: Right.

MR. SIEGEL: So I'd like to see them do it.

MEMBER GEE: Just one final comment, sorry. Shep, just regarding the -- I think this is regarding a particular user segment, which is the recreational boating. But it may be

something that's also applicable to other segments like the precise navigation. Maybe that is something that potentially is another type of product, and it is not just trying to adapt something that is already there. It becomes a separate product again that could be done by others if -- if it was --

MR. HUMMEL: I -- I'd like to --

MEMBER GEE: A framework to do that. So --

MR. HUMMEL: I'd like to address that on how our commercial users handle this problem. About half of our customers are on the inland rivers. And the larger companies that we work with, for example American Commercial Lines, ACL, they actually have one person who manages all of their data. And when we originally started, they were one of our launch customers, we came up with a standard way of identifying a track file using a certain nomenclature.

It would say like you know, the segment of the river, line miles, what river

gauge was at what height, and that would just go into the file name for each file collected from each vessel. And so what they do is, as they're headed up the river, they want to use the straightest line through the river that they can at their depth. So maybe they are -- they are -- the maximum depth that they have on their towboat is -- and tow, is 12 feet.

And so they'll call into the office and there is a guy there that all he does is handle these files -- ingoing and outgoing files. And they say give me all the files at Memphis at 42 feet for river mile, you know, Upper Mississippi blah, blah, blah through blah, blah, blah. And then that -- that guy will just send out those track lines to the vessel. And the guy will sit there in the vessel and he'll look and see where every vessel with the same, you know, depth that he had traversed that area.

And so I mean the river is obviously -- it's changing all the time and depths is going up and down with the -- based on the flood state

and all that sort of stuff. And I mean our commercial users, you know, do that. But they've all implemented their own sort of way of doing that. And it's, you know, it's kind of a big -- it is a big job. But it saves them so much money it's worth them having somebody in the office that just handles that one issue.

Similar situation with ICW. ICW is changing all the time. So there are commercial customers who are addressing that issue. But with regards to the internet connection, our software is set up for periodic internet access. So we -- we know that the vessels do not always have internet access. But more and more, every year they get more and more access. Most commercial vessels in the U.S. have internet access all the time and it's for two reasons.

One is they can't hire any crew members unless they have internet access. No 20-year-old wants to go work on a towboat and not be able to FaceTime his girlfriend or whatever. I mean, it's just the reality of today. All these

companies have, you know, high bandwidth connections. And so we've designed our software, though, for the spectrum of periodic access to access all the time. And chart updates and all that sort of stuff, there's one button that you push. It synchronizes everything. Notice to mariners, light list, you know all those -- all those things.

We have a new product we just rolled out which gives the corporate view -- a view of their entire fleet and they can look and see what every vessel -- the status of that vessel in terms of are those charts up-to-date on that vessel? Because the guys in the office, they're always wondering like, well did that vessel update their charts? Are they operating on the latest charts? Because if they run into something, that's going to be the first question someone asks. Did you have up-to-date charts?

So and I think the future is that all vessels will be connected to the internet all the time. There's a local company here -- or, SpaceX

is developing a new network of satellites that will allow -- you know, inexpensive internet worldwide. And when things like that, you know, exist -- I mean, I think the chart of the future has to anticipate the fact that everyone will 99 percent of the time be connected.

CHAIR HANSON: Can we go ahead and take some questions from the audience? Sorry --

(Simultaneous speaking.)

MS. MERSFELDER-LEWIS: I have to ask Jeff if you could repeat your -- you explained about the two categories and the content of the 500 comments you got back. The audio went out and so people on the webinar did not hear it. So if you could speak a little bit more closely into your mic.

MR. SIEGEL: Sure. Okay, the two categories were a small group of 50 people asked for specific charts to be fixed generally where they lived. And it was more -- it was kind of me, me, me. And then 450 people basically said we want to collect up depth data and be able to

see where the person in front of me or -- a lot of people said that. They want to be able to see, you know, who just went through that cut? You know, let me see their data. Or collect it up and let me put it all together and give me a -- give me a chart based on what the real data is over the last week or month or -- you know, how it's changing. Those -- and four -- that was a -- the bulk, 450 people asked that.

RADM SMITH: Actually we -- I'm sorry, Jan's been trying to get in for a few minutes here.

DR. NEWTON: Oh, no I just wanted to respond to the gentleman who just left the room's question. So -- so --

Laughter.)

DR. NEWTON: So maybe I will wait till he comes back.

RADM SMITH: You want to -- you want to wait till he comes back?

DR. NEWTON: Yes, sure. Go ahead, sir.

CAPT. BRENNAN: I'll -- this is Rick Brennan. I'll have one for Jan. I'm curious if you could talk about how -- how the information that you're gathering from your stakeholders, do you have a method for paying that -- or getting that back to the -- all the various data creators that -- for which you get -- get the -- you know, that you're assimilating that data and how you feed that back to them. Because you're -- you're the -- you're on the front lines of actually touching the users with that. And just curious how that information gets fed back to the creators or the gatherers of data.

DR. NEWTON: Yes, well that's -- that's an interesting question. I think the main thing is that what we focus on is looking at available data sets that are sustained. And -- and so some of these, as I mentioned, are federal. Some of the -- so, I showed you the NANOOS Portal. We use IOOS dollars to support maybe 19 of the observing data streams, but we serve over 190. So there's an order of magnitude

difference there.

And so who are the data providers? As I said, you know, NOAA, we have USGS stream gauges, we have a lot of different providers. And so what we really trying to focus on is that integration, and then also on making products that -- that would be useful. So we talk about users, well what we want to do is be useful. And so I think one of the things that -- that we heard from -- we hear from our users a lot is like, okay, well so if I want to know buoy conditions, I go to NDBC. If I want to know forecasts I go here. If I want to know this I go there.

And -- and so what we've really focused on is trying to integrate those data streams into something that will be useful. And so your question is are we then taking that back to the -- to the actual data providers? Certainly, if it's a forecast model and people are saying like, oh, the granularity isn't -- isn't small enough or -- or whatever. We would -

- we would send that back. But because we are part of -- of NOAA through that US IOOS Office, we can get feedback.

We interact a lot with Rich and his group, with Andy BC Group and that sort of thing. We just had a -- a large effort to define what coastal moorings -- a national strategy for coastal moorings. And you know, the NDBC buoys have surface met and temperature, but there's no salinity. We could add salinity, and that could go a long way for circulation model optimization.

And so -- so yes, I -- there is that -- that two-way sort of street, and I don't think there's anything terribly formal, but it is very much a two-way street. And so now that -- the gentleman --

RADM SMITH: Yes, Lindsay's back.

DR. NEWTON: Yes, Lindsay, I wanted to just reply to your question. And two things that I want to emphasize to this group and it was sort of led in by your question is I think that we shouldn't underestimate the power of public-

private partnerships. Because I think what we really want, is we want things that will be consistent, that aren't going to go away. But we also want innovation.

And that's what excited me so much when the founding people for IOOS came up with this idea to have these -- these partnerships. And so I think integrating the best of both of those systems is -- is really a powerful way to go. And that's what I think we try to do through the IOOS system is be that integrator so that we can take advantage of innovation, whether it's the people behind the electrons you saw up there in those NANOOS portal screenshots or -- or new things.

And we link to a lot of information. So for instance, we could link to ActiveCaptain from our website so we have like, resources where people can go to that. And so that brings me to the second point which is it's all about discovery. Right? So IOOS doesn't -- or, NANOOS doesn't want to be the only place where people

can find, you know these -- these sorts of resources.

It's great to see all the different offices having those websites, having different apps, having the innovation. And all of that I think is what we really need to do is maximize discovery. So I think that's -- that's another part of what we're -- we're trying to do is to better illuminate these -- these data sets, and we want to do that in the way that's most useful to the -- to the citizenry. Thank you.

CHAIR HANSON: Since we've been talking about the cloud all afternoon, should we see if we have any questions from the cloud?

MS. MERSFELDER-LEWIS: We have no questions.

CHAIR HANSON: Oh, we do have one question. Okay. From a nearby cloud, I guess.

MR. DEBOW: Yes, this is for Jeff Siegel. You've read the National Charting Plan and on page 27 it says the reduction or elimination of all Raster Chart coverage seems

very likely as the use of the ENCs and ECSs increase. I'd like to know your comment on that.

MR. SIEGEL: Yes, RNCs are basically just paper charts for the most part. So, you know, they don't allow the overlay of data. You know, what I'm seeing for -- I don't mind seeing RNCs go away. So that -- that just seems natural. What I'd like to see is ENCs that have sort of more data layers to them than I think that is being planned. It would be fine to me if there -- if you could turn off the -- the contours and turn on a crowd layer for instance. And I don't see a facility for doing something like that.

But RNCs, I actually like them in my own pilot house. But for a -- a data model moving forward they are -- they're paper charts and I think they are too static.

MR. DEBOW: Okay, thank you. And Jeff Hummel, from Rose Point, I'd like you to put in a plug for yourself on what you've done to work with us on collecting crowdsource data.

MR. HUMMEL: I'm sorry, on collecting outsource data?

MR. DEBOW: Crowdsource.

(Pause.)

(Simultaneous speaking.)

MR. DEBOW: -- figure out a way to do that.

MR. HUMMEL: Yes. No, okay. So I'm just drawing a blank on that. So the thing -- that's funny about that project because one of our developers did that and really no one in the office knew it was going on.

(Laughter.)

MR. HUMMEL: And I think I -- I think the first time I heard about it was like in a press release. And I'm like -- I had to go into an office and say are we really doing this? And he's like, yes. So --

So the thing is that -- the one thing about that project is that the end-user perception of the project is different from what it actually is. The idea is that NOAA is

collecting data on -- excuse me. Our customers are sending in input and the customers think that input is going to directly change the chart. But in reality what's happening is NOAA is using that information to say well, this area is under-surveyed.

And so, you know, our users would love to participate in more things where they can contribute, you know, data to the charts. And I think that, you know, in the future -- you know, essentially it's free information coming in. And if -- you know, what Jeff is saying is true, you get a hundred users saying something, you know, you're going to be very, very accurate. You're going to have a three-percent, you know, margin of error.

So I don't know that there's been that much input provided to you guys through our -- our system. Yes.

MR. DEBOW: Like 50.

MR. HUMMEL: Yes, that's not too surprising to me. But I think that --

RADM SMITH: Can I -- can I comment?

MR. HUMMEL: Yes.

RADM SMITH: Because like I think this is a great thing. I'm conscious of the break here coming up. But basically IHO put this database together with NOAA sort -- you know, NOAA funding and -- and sort of put it out there. Rose Point, as usual, bit early and provided this, you know, interface.

People like Jeff and a few other people found it in the deep, you know, beta section and turned it on. And that's been all the out -- that's been all the outreach we've done because we just wanted to see whether it would work.

MR. HUMMEL: Right.

RADM SMITH: So for now we're doing nothing with it. You gave us too much credit. And because -- because it is really just, you know, bringing it in, figuring out what the issues are, getting the -- getting the databasing right, getting the metadata right before we -- we

don't want to announce it and go -- go big with it until it works. So we're really at that -- at that early stage. So --

MR. HUMMEL: I think -- in order for that successful it needs to address, you know, general chart plotters, iPad applications. I mean the -- you know, we make PC-based software for recreational users and commercial users. And our recreational users tend to be the very serious boaters. The -- you know, the 100,000 people or so that are doing real navigation. But the -- the real crowds are using an iPad or an iPhone or a whatever.

And I think once that spreads to that bigger base of users -- and just like in some cities you can hit 511 on your phone or whatever and report a pothole or whatever. I mean, it's got to be that easy where they know, it's like hey if I report something, this -- you know, and I've got five different ways of doing it. I think once that becomes more convenient, I think that you will see a lot more people contributing

to it.

RADM SMITH: We haven't heard from Carol yet. Oh, I'm sorry --

MEMBER LOCKHART: Did Rick want to continue the conversation before I butt in? Because I'm going to ask about something different so -- okay. I guess I have a couple of just more fundamental questions since you guys are all talking about charting specifically. I think what's interesting to me is that we're still talking about contours and soundings even with electronics charts. And I find that fascinating because obviously in a lot of places now we have a lot more information than just contours and soundings. And I understand that -- that in an ENC obviously you can develop those on the fly if you have the underlying data.

But I'm kind of curious why -- as we look at the chart of the future, why we're not talking about maybe displaying more than just contour and sounding because you get a lot of information from that full information grid or

dem or -- or whatever it may be. It's a lot more obvious where rocky areas are, for example. It may be a lot more obvious.

And it's a lot more intuitive for people and recreational boaters to look at that than look at necessarily a contour or a sounding. And the other question -- so I guess, one question is, is anybody looking at that? I realize there's probably drawbacks to it because of data size and things like that. But I'm curious just to know if anybody's looking at that.

And then the other thing I'm curious to know if anybody's thinking about -- or even if it's something that people consider useful, is we are still talking about 2D, albeit with a time component. Is anybody looking at the chart of the future being in -- in 3D and is that even a useful thing?

MR. HUMMEL: I'd love to comment about 3D. So when I worked at Nobeltec one of the owners of the company, the person that lived next

to him worked for Intel. And he worked in the gaming division of Intel. And he had come up with this incredible 3D engine. And because they were neighbors, they would talk. And that's how Nobeltec ended up with a 3D product -- because of this strange connection. It wasn't because of user input said hey, we want 3D.

So I was completely against adding 3D. I mean, my hobby is hunting for shipwrecks. I'm interested in the bottom. But we've done some studies on the data to see how accurate it actually was, and it wasn't accurate enough to -- to properly depict the bottom. So I go to boat shows now and I mock all of the people who have 3D because it's ridiculous. It's not accurate enough. It's not useful. As a mariner you can't do anything with it.

You know, a chart -- electronic chart is a tool for navigating. And it has very specific language that it speaks to a mariner and 3D is not their language. Even the commercial fisherman, when I talk to them, some of the data

might be useful to that limited set of people, but again what I find is generally the data is not precise enough.

Now, multibeam, if you could have multibeam for everywhere, that might appeal to a certain number of people. But I personally think that 3D has no place in navigation. And I base that on, you know, being a navigator myself. But also just looking at shows and seeing how it's portrayed to end users and all this sort of thing. And I just -- it has nothing to do with navigation.

Now it may be useful for a chart -- for a pretty picture to look at. What I tell people is 3D navigation is for showing your friends who don't boat what you do when you're boating. And you have a cocktail and you say oh, this is what we use. But in reality, you never use it. So, I don't know. Diane?

(Laughter.)

PARTICIPANT: This corner has really unloaded on that question.

(Laughter.)

MEMBER GEE: I think sometimes when people talk about using 3D for navigation I think it's talking too generally about how you might use that. If we take the specific example for fisherman, I find that hard to believe. We were involved -- Larry was involved and I'm the side of it -- I was involved with a company in -- up in Canada that was Clearwater Fisheries who actually bought a multibeam and mapped the whole area up in that. And basically use it now to kind of farm the -- the area in scallops. So that's a specific use of that.

MR. HUMMEL: I agree on that one.

MEMBER GEE: And I -- but I think it's unless you -- until that -- the skipper and the lead in that project saw the multibeam data it wasn't a pretty picture to him. That was the seabed to him. He was not interested in navigation at that stage. He was interested in dragging his rakes around the -- the thing.

And again I think well, the other

thing is we think of it just -- just for navigation. But part of navigation is if anybody's ever been in a bridge simulator, it's kind of that as the beginning of part of navigation. You're training people to navigate and it's a virtual reality.

And I think there's a number of areas here of what we've been talking about is -- is not taking on the technology that's -- that is available. And I think it's partly standards, partly conservative attitudes to -- to that by always hiding behind the -- this is for, you know, safety of navigation and those sort of things. So I think there's a -- a whole range of -- of steps forward that we don't make because we're kind of scared to or we're not willing to -- to take them. But I'll leave -- I think Larry may have a comment as well. So --

(Laughter.)

DR. MAYER: Actually, I'd like to just save my comments -- save my comments till Thursday when I'll make a presentation that will

-- will discuss exactly this issue. Is there a place for 3D or not? And I -- I tend to agree with Lindsay that I think we've grown accustom to the constraints we've had and built a mindset that says this is the best we can do. And I think we just haven't been open -- open-minded enough.

You know, if God wanted us to see in 2D, we'd have one eye. I mean, we've evolved to experience the world in 3 dimensions. And I think the more intuitive we can make a chart for particular purposes -- again, it's got to be for the purpose -- the safer things will be. But we -- we can talk about that on Thursday. And I --

PARTICIPANT: I'd like to address that too.

MEMBER SAADE: I'd just like to add that if your statement was true, then Google maps without imagery would be a lot more powerful tool than Google maps with the imagery. And that's not the case.

MR. HUMMEL: The thing is that as it

relates to navigation, 3D is a complete distraction. And again this is based on me watching people use -- recreational boaters using 3D. I think the commercial fisherman and -- and there's certain applications -- if the data is accurate for knowing, you know, if your vessel is going to be able to fit in some channel or something like that. But then you're really relying on the accuracy of that data.

But for the -- for the general recreational boater, 3D has no role. If they're fishing, different story. But in terms of navigation -- now, if you decide that the -- the chart of the future is going to be a data set for all different types of users, environmentalists, people who are interested in pollution, or just whatever and they really want to know what the bottom looks like then yes, that chart should include that. But as a presentation to an end user telling them they're supposed to navigate on 3D it -- it just doesn't work. So --

MEMBER GEE: I think -- that's the

problem, I think we're talking about the chart of the future because I don't think we're talking about a chart -- one chart. We're talking about a database that can deliver a variety of products. And if we look at the -- what was the governor's representative this morning, I think this list he had of the sectors was really a great list to say well, all of these people really need something different in each of those sectors, but what we end up, I think, talking about is kind of like the chart plan and navigation on a chart. Whereas, I think part of the future is the database and how you deliver new products.

DR. MAYER: And if I could add to that, you know, I think Lindsay is exactly right that what we envision as the chart of the future is something that you create on demand for your need. So should you -- should you feel more comfortable looking at it in 2D, it's a 2D display. But for those applications and -- and for those who feel more comfortable interacting

in 3D, it's a 3D display. That -- you know, that -- and again I'll talk about this on Thursday a little.

DR. NEWTON: I'll just add one thing really quickly. Not for our intention for navigation, but our intention to show the world the coastal ocean, we do have many sub-surface observations -- including the sea gliders that somebody was showing earlier this morning -- as well as -- I know that Parker MacCready will be here talking to you this morning, so his hydrographic model has depth.

And so you have the chance on NVS to query what depth level you want to be looking at. If you want to look 20 meters under the surface, you can do that -- 100 meters, whatever. And so there is that ability to see depth. But that is different than 3D per se.

DR. MAYER: 3D is passe, we're looking to 4D.

DR. NEWTON: Right, 4D is where you need it.

RADM SMITH: I think we're running close on time here, but is there anyone online that hasn't -- that's been trying to get through? Lynne? Nobody online? Rick? Captain Brennan?

CAPT. BRENNAN: So first I think there may be -- you may be arguing from the same side. If I understand what Jeff is talking about in having looked at some of the 3D displays, I don't think we're -- I mean, if I know Larry in this group over here, I think they're -- you know, I think they are thinking probably much more in 3D data and the -- the value that the 3D data brings to the table.

And certainly knowing where Jeff is coming from, seeing some of the 3D displays of how they've been implemented to the mariner, you know, and as a mariner I would agree that they are -- they are not optimal for making tactical and strategic decisions from a navigational standpoint. They are -- they are interesting from a gaming perspective, but they are not -- they are really not designed to give you course

following or, you know, or making maneuvering decisions very well. And so I think they are -- they've got a lot of gee whiz value, but they are not answering a navigational question for you.

But that -- that said, one question I have, particularly for Jeff, is right now the S-100 standards are -- have not solidified yet. The IHO S-100 standards have not solidified. We had a S-102 which is a gridded bathymetry standard that went out. It got out to the industry and industry flatly refused it, said it's not -- it's not a viable format right now.

So my question for you is, for us as the hydrographic office, how do we better engage with -- with the vendors? Because we -- you know, we can come up with standards all day long and then they get to you, the software vendors, and they are -- they are un-executable, you know, for a number of reasons. And so, you know, we used to have control over the display and the content and everything when it was a paper chart, right?

Now, how we disseminate the data, the size of the file that we disseminate, what's in it, the meta data, the content, the form and shape of it, how it gets displayed -- I think now we're seeing, particularly with S-100, there are elements in there that can help us better control the display of it so it doesn't look like the nasty old S-52 display, you know, that we see in ECDIS's today. So I think that there is a real ripe opportunity for us, the US Hydrographic Office, to push technology forward in the IHO, but we really need to do it hand-in-hand with vendors like yourself. So how do we do that better?

MR. HUMMEL: I think the best way to do it is through commissioning of an NRC, you know, committee to study it and have people involved from the primary -- you know, larger manufacturers from Garmin to whoever, to people from -- you know, from various parts of NOAA and basically all come together and basically look at a roadmap. Now, I don't know if that roadmap is

for 10 years or how many ever years. And sort through those details in something that comes to a conclusion, which is a report.

Like I said, if you go back and look at that 1994 NRC report, it is absolutely remarkable how correct it actually was. And I think that that process should be followed again, and it needs to involve, you know, different people from different constituencies. Of the people in the original NRC report, Henry Marx from Landfall Navigation -- which is somebody that I know, you know that sort of expert in navigation -- and there were a couple other people in there that, you know, I have met over the years who are continue to stay -- Stan Honey is another example.

So, you know, bringing again people like that -- again to look at the future. I think that is the way to do it. And then come to a very concise report. It's only like 30 pages. And I think that is the process that should be followed.

RADM SMITH: Mr. Chairman?

CHAIR HANSON: All right. Well, first off I want to say thank you to the panel. That's exactly the type of discussion we've been looking for. You guys make a chart presentation, tell us what's on your mind, challenge us a little -- a lot -- and then listen to the guys and gals talk. And so you've gotten most of the panel to engage and I think you for that. So again, let's give the panel a round of applause.

(Applause.)

CHAIR HANSON: And I think we're going to take a break. If we can do it in ten minutes it would be great.

(Whereupon, the above-entitled matter went off the record at 4:09 p.m. and resumed at 4:22 p.m.)

CHAIR HANSON: All right. No need to introduce the admiral forever known as Admiral Underlap.

(Laughter.)

RADM SMITH: So the -- sorry? Pull it

closer or Lynne will get yelled at on the -- so this was an issue that I think we -- we first raised in these terms at the last meeting. And I will -- I will do a quick update about what the -- what the problem is and then just a little bit of a state of play. But the reason I didn't jump in this morning with the Army Corps story was because we were going to be talking about it this afternoon.

So the problem as -- as we -- as we phrased it last meeting was that many areas with critical under keel clearance for large ships are not being surveyed to object detection standards regularly. There have been a few high-profile accidents such as the Athos oil spill for -- does everyone know what the Athos was? It was a while ago now, but it was a major oil spill. It was the second-largest oil spill ever before Exxon-Valdez. And -- I mean before the Deepwater Horizon.

And -- and you know, oiled a huge section of Delaware Bay. It was caused by a -- a

tanker hitting an uncharted derelict anchor that was -- that was in an area with very little clearance underneath the tanker. It was on their way to the berth. Nothing unusual about their passage, they just hit this -- they hit a couple things. But -- but the anchor was the thing that holed the -- that holed the ship.

And so this really -- the -- the court ruling came out about it last summer. And part of the ruling did acknowledge that the Federal Government did have a responsibility for -- for surveying safe passage in federal -- federal waterways and designated anchorages and other coastal areas. And so the -- the liability on the -- on the shipping company that had chartered the vessel was cut in half as a result.

So in the end this ended up costing the Federal Government -- it's under appeal, but it cost the government -- Federal Government $80 million. So that is -- that is a -- you know, that's a -- we can do a lot of surveys for $80 million. And the -- the amount of environmental

damage and economic disruption from that incident can't be -- can't be put back.

But I -- you know, since then I've been talking about this a lot in a lot of different parts of the country and almost everywhere we go, somebody says oh, yes, you know, this just -- you know, a few weeks ago this -- blah, blah, blah -- we hit this -- you know, so -- it's come -- it's been very clear to me that there are -- this is not actually a very unusual circumstance and that -- and that elisions, that is the -- a ship hitting something that's stationary, bottom touches and other near misses are actually pretty common and are really very under-reported. Many of the -- many of the parties involved do not have an interest in -- in talking about it, right?

The port doesn't want to make the port look like it's unsafe. The Army Corps doesn't want to admit something was in the channel. The pilot doesn't want to admit that -- that they hit something, because that could endanger their

license. You know, nobody really wants to talk about it. And so somebody scurries out there and pulls the thing out of the water and -- and -- and then everything carries on.

But really, every obstruction in one of these areas where it's an under keel clearance area is a major near miss that we should be -- that we should be very concerned about even if nothing hit it. And -- and -- and the fact that we hit them periodically and don't hole the ship is just luck. So, you know, when we dig into this a little bit further, the -- you know, the types of surveys that -- that NOAA does typically with digital sidescan or really high resolution multibeam processed very carefully to avoid deleting any small things off the sea floor -- you know, we typically do not survey in the channels because that is sort of Army Corps territory, right?

They survey much more frequently than we could ever do. They are very attuned to the dredging cycles. And -- and -- and they are --

and they are typically right there. But the Army Corps's typical, you know, survey -- they just say that it's varied variables. Anyone from the Army Corps here? I'm happy for the Army Corps to be -- is -- she left? Bummer.

So I'd be happy to have my -- I think my characterizations are fair, but I'd be happy to have them corrected. It varies a lot from -- from -- you know, high resolution, multibeam surveys processed in a variety of ways to, you know, pretty core single-beam surveys also processed in a variety of ways. And those -- any of the hydrographers in the room will appreciate the fact that just because you ensonify the sea floor with a multibeam doesn't necessarily mean that you have processed it in such a way that would preserve the knowledge of a -- of a small feature such as an anchor on the sea floor. It's very easy to edit those out or to choose a sounding set in a way that doesn't honor those -- those features.

And so, you know, I've talked a lot to

the Army Corps about this at the -- at the very high levels and, you know, they've been pretty clear that their survey program is to support dredging and the maintenance of the channel, it's not for object detection and it's not -- not even necessarily to support navigation. Although it is very clear that that is the standard practice in the U.S. for the Army Corps surveys to be used, you know, directly for navigation by large ships entering ports.

And -- and so that's sort of where we are. And, you know, the -- the basic upshot is we're not doing anything differently today than -- than on the day of the Athos grounding or elision incident. Little bit more -- so -- so since then we have been working on -- we have been working to sort of get the word out and to work on trying to fill this underlap. This is in the last six months or so.

So we have been engaged with, you know -- through various conferences and meetings with ports, pilots, shipping concerns and -- in both

private and in public venues. And so we have been trying to at least be open and truthful with the public about the way this -- about the state of this -- of the situation. And we have changed our charting practice. For the real charting geeks in the room, there is a -- there is this attribute of an area on an ENC and in chart source diagrams which categorizes sort of what kind of a survey was done. Was it an -- was it an object detection survey or -- or an -- simply an accurate bathymetry survey?

And that distinction goes all the way back to various IHO standards that are -- that are designed specifically for finding small features. At the same time I have been having -- on various levels we have been having ongoing discussions with the Army Corps at the sort of flag level plus a few levels down where they are more engaged in these things. And we are -- you know, I think they have -- you know, through -- I think it -- it takes a little while because it sounds on the surface when we talk about quality

of surveys and how these aren't up to standard, it sounds like we think that they are doing a bad job.

And in fact, that is not the case at all. It is just that they are doing a different job. And to sort of, you know, that fine distinction is sometimes lost. But I think we have -- you know, we are having the conversation in a way that is not offensive to the Army Corps. But we do need to, you know, keep being clear about this.

And we have -- as you noticed when we talked about the requirements for surveying going forward, we did talk about, you know, managing under keel clearance. You know, continuing to survey for under keel clearance areas, and that includes channels and anchorages as well as some approaches.

This is a growing concern in the maritime industry about this. You know, I would -- a few years ago if I had said CATZOC there would not have been anyone outside of the really,

really dorky cartographers that would even know what I was talking about. But it's -- that's not necessarily the case anymore. The Army Corps got sent a -- it got a letter from Intertanko that we were copied on that -- requesting clarification about what is the -- what is the CATZOC of Army Corps surveys?

For many years, basically since the beginning of ENCs, we had characterized them as unassessed, which is what we did for our own surveys for many years too until we got the ability to get them assessed. And then out of sort of professional courtesy, and because the Army Corps wasn't categorizing things in the same way, we just left them unassessed. So, you know, in this -- in this example here which I think is Tacoma, you can see there is a fairly recent NOAA survey there with a ridiculous portrayal of the stars and the triangle thing is a -- is a quality indicator portrayal which is terrible which is why everybody turns it off.

But, you know, then you can see just

inside the channel it's been unassessed because the source of that was that it was an Army Corps survey. So there is a number of -- the public -- Larry's squinting his eyes, so do you -- everyone see what I'm talking about here?

So what does that mean? So, if we go to the actual official description of what a -- what is zone of confidence defined as? So the ZOC A, A-1 and A-2 have the same description. It says full area search undertaken, significant sea floor features detected and depths measured. And then in -- in the CATZOC B it says full sea floor coverage not achieved, uncharted features hazardous to navigation are not expected by may exist.

And so for a typical, reasonably well executed single-beam survey, or a sloppily executed multibeam survey, that's more or less a reasonable description of what -- of the object detection expectations of that survey. However, if you are a tanker those words are not very confidence inspiring. You know, particularly in

an area where there might be debris in the -- in the -- debris in the waterway.

Here is an example -- this is slightly different example and John Dasler gave me this -- gave me this excellent little -- little picture here. So the -- so this is multibeam -- I'll call it a NOAA survey. It was done for us by Dasler and his team. The black soundings are from an Army Corps survey as provided to NOAA for charting that was done after the multibeam survey. So the normal practice is, in a dynamic area, if you think the sea floor is changed you -- we update the chart based on the more recent survey. We are not going to keep a multibeam survey forever if the world has changed. Just because it was a really good description of the world 20 years ago doesn't mean we need -- that that's the appropriate thing to keep charting.

And so this is our -- it's our -- it is our normal practice, and so we superseded the multibeam survey with this single-beam survey and removed that 12-foot sounding which had been --

which was charted as a normal sounding, not as an obstruction or anything. And sometime later a large tugboat, maybe John has the details of the incident, it was a large tugboat -- came through and did some major damage to their propulsion system. And you know, by hitting the 12 which had not changed at all.

So this is a -- you know, this is real world example with, you know, real consequences. And you know, I think there is a -- there is another example also in the Columbia River of -- of sand waves where the sand waves had been beautifully captured. Huge sand waves captured in the -- in the multibeam survey. A single-beam survey came back through, happened to be in the troughs of the sand waves and -- and the chart was superseded again and -- and a ship went aground on the sand waves.

So sand wave fields are awkward because they do move around. But -- but generally kind of the tops of the sand waves at first approximation kind of stay about the same,

even if the exact location of them moves. So there is also a limitation with our current charting practice. So this is a -- most NOAA charts as Travis showed earlier show the -- show depth -- channel depth information in a channel tabulation. This was a really clever way to do it on a piece of paper. Because you could then cut a -- you could then print out a little piece and cut it out. Right? It comes in the local notice and you cut it out and you paste it over the old channel tab on there and you've updated your chart.

Well, you know, in the transition to ENCs we basically kept the same information and encoded it in -- now called dredged areas using the same quartering system. And so while we don't -- no longer have those old limitations we have sort of -- the cartographic practice has perpetuated through that transition and is in some ways is -- is being held back by the fact that we still do have concurrent products of paper and raster. And part of the reason that we

are -- that I am so hot to get rid of channel tabs is it will allow us to move on. And we can -- and allow us to make the ENCs that much better.

But this is a -- I don't know whether anybody's been looking at this chart while I've been talking to see what the trick is here. But if you were to come into that channel, you've got to leave the buoys on one side, you leave the other buoys on the other side, you stay in the white part, right? Well, take a close look at it. That's a red mark on the green side. So the actual passage through there is like that.

What you are seeing is what was available -- is what is available. So I don't think that is very clear.

DR. MAYER: It would be perfectly clear in 3D.

RADM SMITH: It would be -- it would be clearer in 3D.

(Laughter.)

RADM SMITH: But it was not an unknown

situation. In fact, it was charted properly considering the way the chart was designed at the time. And this is -- this is the shoal that -- that -- that was -- this is slightly out of time sequence now with the chart that I just showed you. But -- but the shoal extended across -- don't have enough money, harbor maintenance trust fund has been all locked up, so we haven't been able to dredge properly. And so essentially the shoal has gone all the way across the channel leaving, happily, some good water outside of the charted channel.

And so it was well known, you know, what the situation was. But -- and I didn't have chance to actually get a picture of the ship that was aground here, but that red tinted area is the location of the -- of a big bulker that went aground on that shoal. And I -- they didn't -- they didn't point the finger at us for bad charting but when -- as soon as I saw that I was like, I have to think that we could do better somehow in -- in making it clear where the --

where the good water is here.

So it's a -- you know, I think it is an example of a -- of the sort of challenge or our -- and limitations of our current charting practices. So we have a flag-level discussion with the Major General Ed Jackson and the people that his presence can attract. And me and the people that my presence can attract in May and they are coming to us to sort of talk through what -- how we should do this.

Clarify standards, roles and responsibilities between the two agencies. You know, improve the discoverability, you know, despite the fact that Seattle is fabulous, you know, many Army Corps districts are -- it is very inconsistent with, you know, what is -- what is accessible. And there is a lot of Army Corps surveys that are done for, you know, monitoring shoal migration outside of a federal channel for instance that would be very valuable to us that we usually don't know about because they don't send them to us through the eHydro system unless

they are a part of a -- associated with a federal channel.

And so just like every other organization, and NOAA is no better than others on this, there are shoe boxes full of bathy data all over the Army Corps that -- that are potentially valuable for charting. So I don't want to point fingers excessively at them because there are just as many shoe boxes around NOAA.

But we also really are working -- working to develop public input for the next generation of methods to chart the channels. And we are going to -- we are going to leverage the national charting plan framework for that, although we haven't made very much noise under that -- under that umbrella yet. Travis did a great job of sort of putting some ideas out there.

In my mind I don't know what the right answer is, and there may not be a single right answer for the best way to chart channels. It may depend on the sort of depth of the channel

and the size of the ships that are using it, and the under keel clearance, the scale of the chart, how fast it changes and, you know, sort of how tight the tolerances are.

So we really need to kick off and I -- you know, I think in the next six months or so we really need to kick off a different way of thinking about how to -- how we chart channels so that we can -- so that we can build a really good automated system to do that -- do that automatically, smoothly, maybe it's not even the most elegant thing that a hand cartographer could do, but if it happens automatically on a weekly basis with no latency, that would be -- that would be really, really valuable.

So that's it. I promised an update on it. I wanted to be sure that you all didn't think that we -- that I had raised this big concern six months ago and then forgotten about it. Because it is one of the things I'm really worried about.

VICE CHAIR MILLER: Yes, a question.

In the National Charting Plan, and -- and it was referred to Travis, I think it's unclear whether you want to continue using -- if there are soundings in a channel, whether you will plot them there. And I was a bit surprised by that. Why would you not plot -- plot soundings in a channel?

RADM SMITH: Well, there are soundings in every channel, right? We have access to soundings in every channel. It's a question of, you know, again giving ourselves credit for being two years, or one year out of the paper era, you know, you cannot fit the soundings in there on a -- you know, when the channel is this wide on paper. Right? So that -- so it -- you know, we -- we plotted soundings in channels where it was relatively stable and where at the scale of the chart there was enough room to show them. And so that was the -- the historic practice. So there's -- there is not one way that we have charted channels, right? There is a little legend thing, there is a channel tab, we put the

hydro in there sometimes with the contours, sometimes without. Sometimes we put the project depth in with exception.

We -- there's already a lot of different ways that we do it. And we basically follow our own practice for updating that channel whenever -- whenever we would update it. Does that answer your question?

VICE CHAIR MILLER: Yes, and I have a -- a second question. Let's say six months down the road after you've had these meetings that Army Corps decides to stick with its current practice. Let's put it that way. What then? I mean, Jeff here made a suggestion of you know, reviewing the national charting plan and -- and we have talked about in a draft document the possibility of a -- a -- an independent review panel to try to help review some of these issues. And I was very interested in Jeff Hummel's suggestion.

RADM SMITH: Sure.

VICE CHAIR MILLER: So what -- what do

you think -- I mean let's just -- you know, let's say hypothetically Army Corps says no, we're not going to -- you know, we are not going to do object detection.

RADM SMITH: I think it is very likely that they will say that at the corporate level. Now Seattle, Philadelphia, Wilmington -- there may be a handful of -- of Army Corps districts that are saying come on, headquarters, just get off our backs. We know how to do this. We are going to do it right. You know, give us a common standard with NOAA that we can jointly respect and no problem, we will do it. We've got the resources. We -- we recognize the value. We want it to be a competitive advantage for our port.

But I don't think that the Army Corps at the headquarters level is going to mandate that. It -- in a lot of ways it is a -- it is because there's 23 -- Travis, help me out. How many coastal districts?

MS. MEDLEY: Twenty-two.

RADM SMITH: Twenty-two coastal districts. So it is really 22 different organizations that we are working with. And, you know, certainly at the survey level -- at the survey system's level it is probably more like 22 different organizations. So I -- I think it is very likely that they will say at the corporate level we are not going to commit to doing object detection surveys systematically all the time for -- you know, specifically for this.

So I think there's -- and maybe that would be overkill anyway if all you are doing is just seeing whether the shoals are moving around. That -- that boat for example I saw, that didn't need object detection. That just needed faster information provided and gotten to the point of a decision better. And so I -- I think it would overkill to sort of force a multibeam all the time everywhere to this really high standard. That -- that's probably not necessary either.

So I think there's probably a compromise out there where we could say that the

-- a channel maintained its sort of object detection standard qualification, if it was a survey done every two or three years, say, that would -- that would check to see whether there was no -- no more major debris in that waterway and you could then update the bathy. Maybe we would do it as an overlay.

So I -- I mean, there's a lot of different ways that we could go about it. And it may be that NOAA ends up doing, you know, some surveys in channels -- anchorages I think we already own and frankly are deficient in not keeping up with. That Athos incident was not in a channel, it wasn't an anchorage. And that's not -- that's not necessarily any more Army Corps' problem than ours. And so I think we already have that as a requirement.

Square nautical miles or critical area didn't give us any brownie points for -- for -- for surveying anchorages, right? We need to be thinking about this risk management in a different way. And that's a -- I think that's a

-- I think there's -- there's still probably room for a joint -- a sort of joint approach to this that -- where the districts that have the -- have the capacity and the equipment and the expertise and the desire to do it, that we would recognize that as having been done. It's not -- doesn't have to do with Army Corps, it has to do with the survey.

And the -- and you know in other areas we might -- we might need to supplement or want to supplement with -- with our own -- with our own surveying.

CHAIR HANSON: Other questions? I noticed -- one of the things you closed with was the -- just the fact you had followed up and we do appreciate your -- appreciate your attention to all this. We've talked about it several times so, appreciate you engaging on this. It is an issue for the Corps and -- and as you found, with Congress as well. So.

MEMBER SAADE: Can we ask questions from this morning?

CHAIR HANSON: Absolutely, sure.

MEMBER SAADE: I'm going to take you back to this morning.

RADM SMITH: You've got me in the hot seat all by myself.

MEMBER SAADE: No, this one's easy. You talked about 500 to 1,000 known inconsistencies on the charts.

RADM SMITH: Yes, actually I -- I knew -- I meant to clarify because I -- both EJ and Rick helped me to understand that I missed the overall picture there. And the -- if you query our charts today using a -- an attribute combination for things that we would consider a discrepancy, you get about 10,000.

MEMBER SAADE: Okay, that's even more interesting.

(Laughter.)

RADM SMITH: So it's more like 500 or 1,000 new ones a year.

MEMBER SAADE: Okay, so you were talking about finding ways to clarify these. And

for companies like ours, we have no idea where these discrepancies are. If there was a way -- if you would consider for NOAA to put out a list of the discrepancies to allow those of us that are testing equipment --

RADM SMITH: They're already on the chart.

MEMBER SAADE: Okay.

RADM SMITH: These are just things that are already on the chart. That doesn't even include the -- the awesome database that Jeff Siegel has.

MEMBER SAADE: Well it would be easier -- if rather than us going and combing through all of your 1,000 charts or thereabouts, if there was a -- a list of geographic location --

RADM SMITH: Yes, we -- we have a --

(Simultaneous speaking.)

RADM SMITH: We have a quiet little web -- we've been trying to figure out how to frame this, right? So we don't really want to talk about how terrible our charts are until we

have a plan on how to -- on how to make them better, right? So it's all about the framing.

So we do have a web service that will -- that, you know, highlights all of these. And part of our solution, just to keep talking here, is you know the Power Squadron -- we had a guy from the Power Squadron here earlier. He's still here. You know, the -- we have a over 50-year long relationship with the Power Squadron cooperative charting program. So this is groups of local, mostly recreational boaters all over the country who are interested in helping us keep our charts up to date and would be very interested in helping to resolve some of these same issues.

We need to be a little bit careful to -- not to direct either you when you're not under contract or the power squadron to do something specifically for liability reasons and environmental compliance reasons. But -- but that said, you know, these are the 10,000 things we wish we knew more about, can anyone help us?

Is a -- is a -- you know, I think is a reasonable way to -- you know, one of many things that will help us get them resolved.

MEMBER SAADE: And I was definitely thinking of completely voluntary and testing the equipment, things like that. Maybe you could do it at least through your list of contractors.

RADM SMITH: Sure.

MEMBER SAADE: Thanks.

VICE CHAIR MILLER: One thing on that topic. Ben Evans is back there. He and I in 2002 did the -- one of the very first surveys up in the northwestern Hawaiian islands. And we called it the donut survey because we were mapping boundaries. So 25 fathoms, 50 fathoms and 100. But a lot. And it was something that I would have never been thinking about or aware of.

But what we did was we disproved a lot of those bad soundings that had been on the charts for years and years and years. But I don't think it is something that maybe the survey community is very aware of. You know that if --

if there is something -- and especially if you've got side-looking capability or something -- you know, to go up there and run a little multibeam survey over -- and just a line and say oh, nothing there. Might be worth some outreach is what I -- I was thinking.

RADM SMITH: Yes, and -- you know, of course that's a -- that's a useful piece of information, to run the line over it and say it's not there. However if you look back -- why did somebody think it was six fathoms deep? They probably weren't totally crazy, right? And so they probably just didn't know where they were.

And so there probably is a six-fathom somewhere. Probably somewhere along that latitude line and -- and, you know, it will turn up sooner or later. And so a little bit more of a coordinated campaign to -- yes.

MEMBER GEE: Yes, just a quick -- you mentioned about the different places and with the precise navigation and those things and then kind of doesn't fit the CATZOC B and the price of

navigation, obviously. And I just -- is that -- I think you mentioned that, is there a plan to kind of prioritize where you thought it was important to be kind of doing this first with the Corps? Like the areas that were targeted so they really need the precise navigation. And how would you -- like, what's the federal requirement for that as well? You know --

RADM SMITH: I don't think that's -- I don't think that's defined. What we have been talking about internally is defining any port with a draft -- with a dredged channel of 30 -- 30 or 35 feet or deeper would be a -- sort of a candidate for looking at this first. And paying attention to it first. And, you know, there may be other places by exception.

But that really we are talking about large-ship critical under keel clearance. And you know, it's not that we don't care about the smaller traffic. It's that, you know, in the grand risk management, we take care of the big guys and then when we know about problems, like

these 10,000 deficiencies -- many of which have a sorry story behind them -- you know, then we deal with those once we know there's a problem. We prevent their -- we get ahead of the problem when the risk is too large.

MEMBER PERKINS: Follow-up question this morning that -- for Juliana or maybe Mr. Aslaksen. It was reported that 700 nautical miles of bathy LIDAR data were collected last -- last season or this FY. And I believe 400 of them have been processed and with a backlog of 300 square nautical miles. So just wondering what -- what's the limiting factor on addressing that backlog? Is it -- is it -- you know, is it human collateral?

Is it processing collateral? Is it -- do you -- you know, do you need more investment in the processing technology? Just trying to get a feel for -- is 400 nautical miles a year maximum capacity you know for -- for the organization? Put a little more color to that if you would, please.

MS. BLACKWELL: Sure, I'll start and then I'll ask Mike to correct me when I -- when I misspeak. But that's not the capacity. That's just what was collected last year. And I -- you know, there's a delay. So depending on when it was collected -- and again, those were just FY-16 end-of-the-year totals. So out of that 700, you know, it's more than likely that we've got more than the 400 square nautical miles -- processing compiled at this point.

But we're also continuing to collect. So there's a delay in getting it in and getting it processed and compiled. And I would say it's just -- you know -- human resources. You know, part of it is just the timing, the workflow, and part of it is having people that can address these things faster. But people are stretched to their limits of trying to get all the coastal mapping work done.

So that. I'll ask Mike if he's got additional details to add.

MR. ASLAKSEN: No, ma'am.

CHAIR HANSON: And we need it open up to the public for comments, questions?

MR. DASLER: I'll comment. Is this on? Okay. I -- John Dasler, contractor with NOAA and Corps of Engineers. So we see both sides of the story. And I think Admiral Smith really touched on that. But I think often what people overlook, especially as you look at eHydro is the mission for the Corps of Engineers is to monitor dredging and when they have to dredge. So on the Columbia, for example, they have to monitor 100 miles of the river.

So running single-beam surveys, if their surveys are more than a couple weeks old they consider that old data. So that information is critical to know where they have to dredge and where shoaling is, but it's a generalization of the sea floor. And there's been several incidents where those surveys have missed obstructions, or in that particular case it was a charted obstruction in a federal channel, so you can't really -- I mean, there wasn't a way to put

an obstruction -- I'm not sure how you did that now on that chart.

But the tabular data showed that sounding, but as soon as a new Corps survey was done, the tabular data was replaced and so that critical sounding was displaced by the single-beam data. And in the -- within the Portland Harbor, when we did the charting for NOAA, there were so many obstructions they couldn't plot them all as obstructions, so many of them ended up as soundings which got displaced with Corps single-beam surveys that missed the obstructions.

So and I -- and I think the same is true with crowdsourcing, you're talking about generalizations of the sea floor, right? As opposed to anomaly detection in charting surveys. And so I think that's the real critical thing to address. I think 3-dimensional data really helps. The Columbia River pilots like to see not just a sounding but a 3D representations of what those obstructions are, and many get removed during the course of -- after the spring

freshets.

I think just keeping that in mind as that play is coming out. I -- I don't think on the Columbia they'll -- they'll switch to multibeam any time soon just because of the -- the shoaling and what they have to do. I mean, it's a different mission, right? Their mission is not object detection. Thank you.

CHAIR HANSON: Anybody online, Lynne?

MS. MERSFELDER-LEWIS: No.

CHAIR HANSON: Okay. Thank you Admiral Smith, again. We'll go ahead and wrap up for the evening here. Kind of want to do real quick recap as we've come to do in meetings past where we kind of -- if anybody wants to offer some thoughts on the day and some of the meetings -- some highlights of the discussions, and I'm prone to volunteer others if I don't hear from you. So --

DR. MAYER: I'll just make a comment that I thought they were really, really good panels. I mean, I thought they really addressed

critical issues and all presented really well. So it was actually quite exciting.

CHAIR HANSON: Great. Ed, what do you think?

MEMBER KELLY: I would agree. I think we had a really good, broad discussion. I'm looking forward to tomorrow for a more local discussion.

CHAIR HANSON: All right, thank you.

MEMBER HALL: I think the one thing I would like to actually mention is, Admiral, I really, really appreciate you outlining what you wanted from HSRP. That's very helpful to kind of say hey, what can we do for you? And I would suggest -- I think today was great, but I think that that's helpful for everybody. Putting it in the context of what we do as HSRP and asking us -- not telling us what to do, not directing us, but it's really nice to kind of have some direction so we can focus on certain things. So thank you for that.

RADM SMITH: That was Lynne.

(Laughter.)

MEMBER HALL: It might be because I talked to Lynne, too.

(Laughter.)

VICE CHAIR MILLER: One -- one follow-up on that, particularly since the Admiral is not going to be here tomorrow is I think it's also helpful -- and this to also Juliana and -- and Rick -- if there are things that we touch on and you think that there might be a potential -- you know -- direct us to areas that we might want to say, write another one-pager on or something. That -- I find that helpful too. If -- you know, what would be useful?

And it -- generally the areas mesh quite well with what we here. But just -- we're kind of -- for next time -- we are going to discuss the papers tomorrow and we are kind of not quite sure what comes next I would say with Dave. So if there are ideas, you know, let us know.

CHAIR HANSON: Juliana?

MS. BLACKWELL: I guess maybe one thing I'd like to see if other people want to weigh in on now or discussion for later this week is the recommendation for an NRC study and whether or not that's something that could survey as considered or if the panel thinks -- would be a good idea to recommend to NOAA to do. I know that we've -- we NGS have been involved in some in the past and -- and looked at them.

And I'm not saying that they're -- that they're easy or -- or cheap or fast to get done, but the weight of the studies and what they can provide as far as looking into the future of what -- what the organization should do, and perhaps touching on other -- other aspects of -- of charting is -- is something I think we should think about and if anybody else has any thoughts. Or, Admiral if you -- if you want to comment on that because you won't be here at all tomorrow. Is that correct?

RADM SMITH: I'll be here -- I'll be here in the morning.

MS. BLACKWELL: In the morning, yes.

RADM SMITH: If we have a chance to think about it then, we could. I -- so I guess I'm -- I'm open to the idea. Sometimes you -- careful what you ask for. But -- but I'm open to the idea and I think we could probably figure out how to pay for it if that's the -- if that's the thing.

But I think most importantly, I have no idea what you would do to actually do that. But the man who does is right here. Who -- and -- and I don't necessarily want to prolong the day here. But invite Larry to either now or later -- to describe what it would take to do one of those.

DR. MAYER: Now or later, Chair? Later. Okay.

VICE CHAIR MILLER: We do have one suggestion similar to that in two of papers about an independent panel.

CHAIR HANSON: Dr. Brigham?

MEMBER BRIGHAM: It's nice to see this

evolving dialogue between the Corps and the -- and you, Admiral Smith. I think during the 5 or 6 years we've been on we've seen this kind of roll along slowly. I didn't say today when we were -- when I was asking Andy, lt. colonel there, that I wonder whether providing these products is under the legal authority of the Corps.

And because that -- the customers that -- the users are using them for navigation. And so I would say that the legal beagles of the Corps should look at eNav and -- I mean, it's all great stuff. But what is their legal authority to provide that in -- that it's used as navigation? I mean, I don't know. I'm not a lawyer. But if I was lawyer in the Corps, I might ask a friend of mine to look at that. Just -- we want to sort this out. And the relationship between the two organizations.

I mean, a lot of progress been made. Just an administrative thing, maybe I know -- I think NOAA sends out letters of thanks. We

should send a letter of thanks to the governor or the commissioner of commerce in Washington State for the presentation that Joshua. It was a good presentation. Quite enlightening. Thank you.

CHAIR HANSON: All right. Lynne, what you got? Do we have instructions for tonight and tomorrow?

MS. MERSFELDER-LEWIS: So for those interested in an informal recap, we'll be in the lobby from about now till 6:00. And then for those who are joining us for dinner, we'll be walking to the restaurant. If it's pouring rain, we can get taxis. Or if it's too -- too much for somebody because of medical stuff, you could take a cab or something like that. Okay.

And then tomorrow we have the same set up as we did this morning. Breakfast is at 7:30 in the -- the restaurant. So please come join us there. And then the regular meetings starts at 8:30 here. And we have an excellent panel. You should not miss it.

CHAIR HANSON: Thanks, Lynne. Hey and

-- and before I do that. We ought to give Lynne a round of applause. Putting these things together is no fun and we're not very easy to get along with, so --

(Applause.)

CHAIR HANSON: And we'll see you all tomorrow at 8:30. We're adjourned.

(Whereupon, the above-entitled matter went off the record at 5:06 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: Hydropgraphic Services Review Panel

Before: US DOC/NOAA

Date: 04-18-17

Place: Seattle, WA

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

Court Reporter