Building the Blue

Identifying Educational Requirements of the Future Ocean Technical Workforce

Real-Time Record

September 13, 2024

St. Petersburg College
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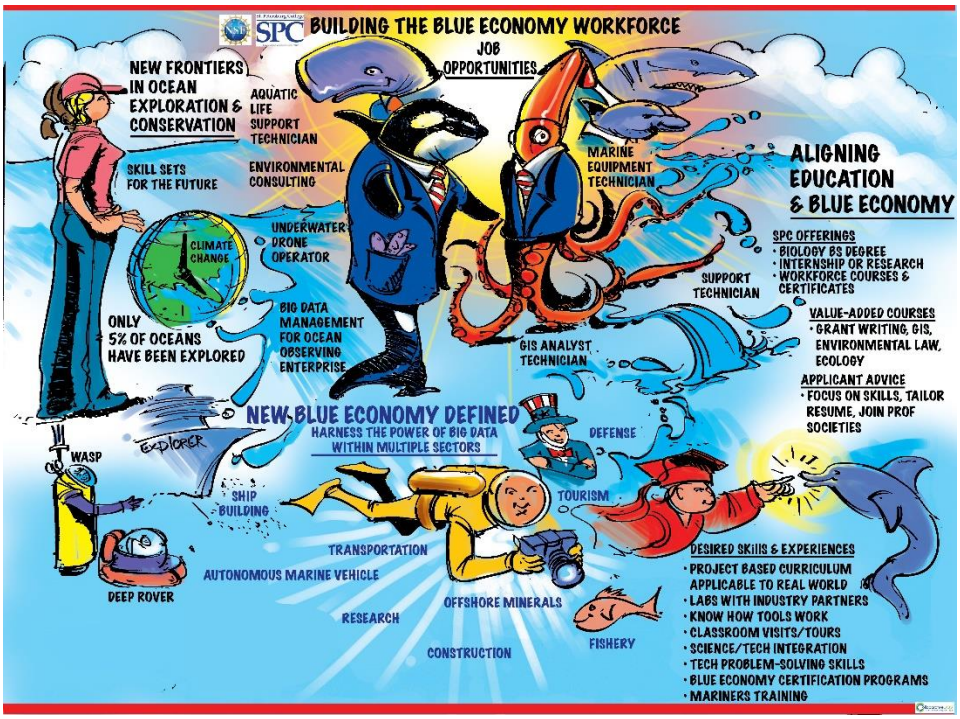

Collaborative LABS
at St. Petersburg College
EXPERT FACILITATORS IN STRATEGIC COLLABORATION

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SPC and NSF Policies

St. Petersburg College is committed to being a place where students, employees and other members of the College community can work, learn and grow together in an environment that fosters mutual respect. As a central part to fostering such respect, the College prohibits discrimination based on race, color, ethnicity, religion, sex, age, national origin, marital status, pregnancy, sexual orientation, gender identity, genetic information, or against any qualified individual with disabilities.

It is also National Science Foundation policy to foster harassment-free environments wherever science is conducted, including at NSF-sponsored conferences. SPC's policy that addresses sexual harassment, other forms of harassment, and sexual assault can be found in the SPC Employee Handbook and includes clear and accessible means of reporting violations of the policy or code-of-conduct. Should you experience such behavior, and to make a complaint, please contact JoCynda Hudson, Title IX Coordinator and EEO Officer through SPC's Human Resources Department: Hudson.jocynda@spcollege.edu; 727-341-3055. Any complaints received during the conference will be resolved by contacting Ms. Hudson.

Executive Summary

Blue Economy industry and education stakeholders, students, potential employees and other stakeholders from across the nation gathered at St. Petersburg College (SPC) Epicenter and Collaborative Labs on September 13, 2024 to discuss Building the Blue: Identifying Educational Requirements of the Future Ocean Technical Workforce, through a grant received from the National Science Foundation (NSF).

Erica Moulton, Associate Dean of Natural Sciences at SPC and Principal Investigator (PI) for this NSF Blue Economy workforce grant, on behalf of her Co-PI, Dr. Linae Boehme, welcomed everyone, and shared various definitions of Blue Economy and objectives of the conference:

- What is Blue Economy?
- What entry-level Blue Economy jobs are open/not being filled?
- What skills are needed for these jobs?
- What is SPC currently doing to prepare students?
- How can we fill in the gaps between what we offer/teach and what employers need?

Attendees were notified of several videographers and photographers at the conference including SPC's grant videography team, PBS South Florida – Changing Seas team, and the Collaborative Labs team technologist for this Real-time Record. Attendees responded to three polls:

- **Who is in the room today?** (Blue Economy Industry Professional, Educator, Stakeholder, Student/Potential Employee, and Other)
  - *Majority of attendees responded as Educators and Industry Professionals*
- **How familiar are you with the term "Blue Economy?"** (Very familiar, Somewhat familiar, Slightly familiar, and Not familiar and ready to learn)
  - *Majority of attendees responded as Somewhat familiar*
- **What are you hoping to gain from attending this conference?** (Meet people/network, Learn/share blue economy insights, Learn/share regional industry workforce needs & gaps to be filled, Learn/share SPC education pathways and programs, Learn/share knowledge on job opportunities, Explore how to share this career path, Explore what comes next)
  - *Majority of attendees responded with Meet people: network with institutions & industry*

The conference continued with our keynote, Dr. Edith Widder, Deep Sea Explorer and founder of Ocean Research & Conservation Association (ORCA), presenting "New Frontiers in Ocean Exploration and Conservation." Dr. Widder shared her experience and technology advancements as a researcher and scientist. She concluded her presentation with a list of what she believes are current educational requirements of the future ocean technical workforce:

- Sensing technologies, Ocean processes, Robotic systems, Geographic Information Systems, Embedded systems programming, Communication systems, Data analysis and statistics, Internet technologies, Pressure-vessel design, and Logistics of maintenance in the harsh marine environment.

Dr. Widder answered numerous questions in the Q&A portion of the keynote presentation.

Following the presentation, Dr. Natavia Middleton, Dean of Natural Sciences at SPC, shared SPC's credit and noncredit offerings which include:

- **Bachelor of Science Degree in Biology (credit program)**
  - 2 subplans: Ecology, Evolution, and Organismal Biology OR Cellular and Molecular Biology
  - Internship or Undergraduate Research
- **Workforce Programs and Articulations (noncredit)**
  - Existing certificates & courses in any of the current Workforce program areas (Allied Health, Business, International Language Institute, Manufacturing, Technology, Professional Development, Personal Enrichment)
  - Potential to develop a new Blue Economy certificate or program

Team Breakouts #1 – Aligning Education with Blue Economy Workforce Needs: Job Opportunities and Preparing our Students

Conference attendees deployed into several mixed teams to brainstorm:

- **What entry-level blue economy Job Opportunities do you see as available in our area to SPC students beyond traditional science careers? What Job Titles might align with these job opportunities?**
- **How do you feel we can best inform and prepare our SPC students for these Blue Economy Job Opportunities?**

Top Job Opportunities

After brainstorming, team spokespersons shared their #1 job opportunity and the group prioritized the list with a poll:

- Marine Equipment Technician (calibrations, repairs, integrations, water sampling, data management)
- Data management and breaking down data for analysis/ applying AI (example: acoustics research)
- Environmental consulting: assessment and monitoring, living shoreline planning, dredging, interfacing with homeowner/community/retail associations, resiliency planning.
- Support technicians *technology (biofouling, maintenance, sensor comms, troubleshooting)
- GIS specialists - nonprofits, government, private companies
- Underwater drone operator
- (Aquatic) Life support technician (water quality, making sure water can sustain animals in it, tanks)
- GIS analyst/technicians

Teams brainstormed an additional 90 ideas for job opportunities which can be found here.

Preparing our students for the blue economy workforce

In addition to brainstorming job opportunities, teams also brainstormed over 120 ideas of how to best prepare and inform our students for the blue economy workforce which can be found here.

After the team brainstorming activity, Alison Barlow, Executive Director of the St. Pete Innovation District, presented "Navigating the Blue Economy: Opportunities in Tampa Bay." Alison shared NOAA's 2018 report of the diverse sectors of the blue economy at that time and the emerging ocean industries that were poised for growth. She shared Florida and Tampa Bay

marine economy metrics, Tampa Bay assets (map), Tampa Bay Employment statistics, and the Tampa Bay blue economy employment outlook (based on three internet searches). Alison also introduced the concept of the "new" blue economy framed by Dr. Richard Spinard, Under Secretary of Commerce for Oceans and Atmosphere & NOAA Administrator, as leveraging the power of big data within multiple sectors. She concluded her presentation with "new" blue employment examples, a sample job description, and the sources she used. She answered a number of questions in the Q&A portion of the presentation.

During the working lunch, attendees responded to a couple of polls:

- **What is the one class you wish you took in college or you did take that added the most value as a blue economy technician?**
  - *Popular responses included grant writing, GIS, environmental law, and ecology*
- **What one piece of advice would you give a student with regards to resume structure, when/how to apply, and what skills to highlight in order to qualify for an entry-level blue economy technician position?**
  - *A lot of great advice was entered including focus on skills, tailoring their resume, and joining professional societies.*

Team Breakouts #2 – Aligning Education with Blue Economy Workforce Needs: Workforce Needs, Desired Skills & Job Alignment

Conference attendees deployed into focused teams (either industry or education) to respond to specific questions.

Industry Teams' Questions

- **What are your current workforce and training needs that can be addressed by SPC and other Tampa Bay academic institutions?**
- **What desired skills, technologies, and experience are needed for an entry-level blue economy technician and are any skillsets missing in your current applicant pool?**

Industry Teams brainstormed a long list of workforce and training needs that can be found here. These teams proceeded to brainstorm desired skills and experiences for an entry-level blue economy technician.

Top Desired Skills

Industry team spokespersons' shared their #1 desired skill and the group took a poll prioritizing the list:

- Integration between technology and science
- Technical problem-solving skills (troubleshooting)
- Ensure students understand the process involved with the tools they are using. Understand the larger task and know how to solve it as tools change over time. Understand the foundational concepts/language in the industry.
- Mariners training - ships captains, engineers/ systems, deck positions/ wheelhouse

Education Teams' Questions

- **What partnerships, learning opportunities, and methods of communication can be used to ensure our students are prepared and employable by blue economy companies?**

- **Where do you see these entry-level blue economy job opportunities aligning with our degree/certificate/educational pathways and how/where can we incorporate these emerging technologies and skills in the classroom?**

Education Teams brainstormed a long list of ideas to ensure our students are prepared and employable by blue economy companies that can be found here. These teams proceeded to brainstorm opportunities to align our educational pathways with entry-level blue economy jobs.

Top Job Alignment Opportunities

Education team spokespersons' shared their #1 job alignment opportunity and the group took a poll prioritizing the list:

- Make curriculum and labs more project based with transferrable skills and applicable to real world problems/current issues
- Certification programs (through organizations that are respected)
- Labs with industry leaders to prepare students with the information they need
- Tours/class visit with equipment and jobs related to that equipment (like a Great American teach-in)

The conference concluded with a verbal unveiling of the visual illustration that was drawn during the conference. Erica Moulton thanked everyone for attending. She shared that everyone will receive a copy of the Real-time Record produced by Collaborative Labs. She and Dr. Boehme will create a white paper from the data collected at this conference that will be sent to NSF as part of this grant.

Agenda

8:00-8:45	**Welcome & Setting the Stage** **Erica Moulton**, Assistant Dean, Natural Sciences, St. Petersburg College (Pi)
8:45-9:45	**Keynote Presentation** **"New Frontiers in Ocean Exploration and Conservation"** **- Dr. Edie Widder**, Founder of Ocean Research & Conservation Association, Inc. (ORCA)
9:45-10:00	**Break**
10:00-12:00	**Team Breakouts Part 1 – Aligning Education with Blue Economy Workforce Needs: Job Opportunities and Preparing our Students** To set the stage for brainstorming, we will share an overview SPC's programs that may support job opportunities in the Blue Economy workforce. Then we will deploy into mixed industry/education teams in Collaborative Labs to brainstorm. ***Considering areas such as ocean instrumentation, product design, manufacturing and maintenance of marine-related hardware, ocean data science and data analytics:*** • **JOB OPPORTUNITIES: What entry-level blue economy Job Opportunities do you see as available in our area to SPC students beyond traditional science careers? What Job Titles might align with these job opportunities?** ➢ **Select Top #1 Job Opportunity** • **PREPARE WORKFORCE: How do you feel we can best inform and prepare our SPC students for these Blue Economy Job Opportunities?** We will return to the Executive Boardrooms for each team's spokesperson to share the **Top #1 Blue Economy Job Opportunity!**
12:00-12:45 *(Working lunch)*	**Navigating the Blue Economy: Opportunities in Tampa Bay – Alison Barlow, Executive Director, St. Pete Innovation District** While you enjoy lunch, you will hear reflections on Blue Economy trends, employment, technology, and the shift to the "New" Blue Economy.
12:45-1:00	**Break**

1:00-2:50 **Team Breakouts Part 2 – Aligning Education with Blue Economy Workforce Needs: Workforce Needs & Desired Skills**

We will deploy into focused teams (Industry / Education) to take a deeper dive into aligning education with the blue economy workforce.
(See next page)

Industry (Employers, Researchers, Engineers, Other Stakeholders):
For your specialized area or industry sector,

1. **WORKFORCE NEEDS: What are your current workforce and training needs that can be addressed by SPC and other Tampa Bay academic institutions?**
2. **DESIRED SKILLS: What desired skills, technologies, and experience are needed for an entry-level blue economy technician and are any skillsets missing in your current applicant pool?**
   - **Select #1 Desired Skill and/or Education Requirement**

Industry teams will select a spokesperson and the **Top #1 Desired Skill and/or Educational Requirement** to share with the group!

Education (Teachers, Faculty, Students, Mentors, Other Stakeholders)
From your educational perspective,

1. **PREPARING STUDENTS: What partnerships, learning opportunities, and methods of communication can be used to ensure our students are prepared and employable by blue economy companies?**
2. **JOB ALIGNMENT OPPORTUNITIES: Where do you see these entry-level blue economy job opportunities aligning with our degree/certificate/educational pathways and how/where can we incorporate these emerging technologies and skills in the classroom?**

Education teams will select a spokesperson and the **Top #1 Job Alignment Opportunity** to share with the group!

2:50-3:00 **Visual Illustration, Wrap-up and Next Steps**

Welcome & Setting the Stage

Erica Moulton, Assistant Dean, Natural Sciences, SPC (Pi): Good morning and welcome to Building the Blue. We have a really diverse group in the room, and there's a team from PBS here filming. I've been working on this grant with Dr. Linae Boehme from SPC's Clearwater campus.

Blue Economy is defined by a multitude of things. Be thinking about these definitions through the day as you work. We have a series of objectives for today:

- What is Blue Economy?
- What entry-level Blue Economy jobs are open/not being filled?
- What skills are needed for these jobs?
- What is SPC currently doing to prepare students?
- How can we fill in the gaps between what we offer/teach and what employers need?

Collaborative Labs will spend the day extrapolating information from you. Tina will lead us, along with her team.

Tina Fischer, Director, Collaborative Labs: Welcome everybody! Collaborative Labs has been a department of SPC for 20 years serving nonprofits, municipalities, government, and private sector organizations in strategic planning, community engagement, and focus groups. We'll get the information out of your heads and have you collaborate and come up with innovative ideas together. You'll get a Real-time Record, a robust document that contains the work you do today, slides, and more. With the NSF grant foundation, they'll create a white paper and this Real-time Record will provide them with the documentation needed.

There are three groups taking pictures and videos today, and everyone should have completed a release form.

And now, we're going to do some polling to learn more about you. First, let's see who's in the room.

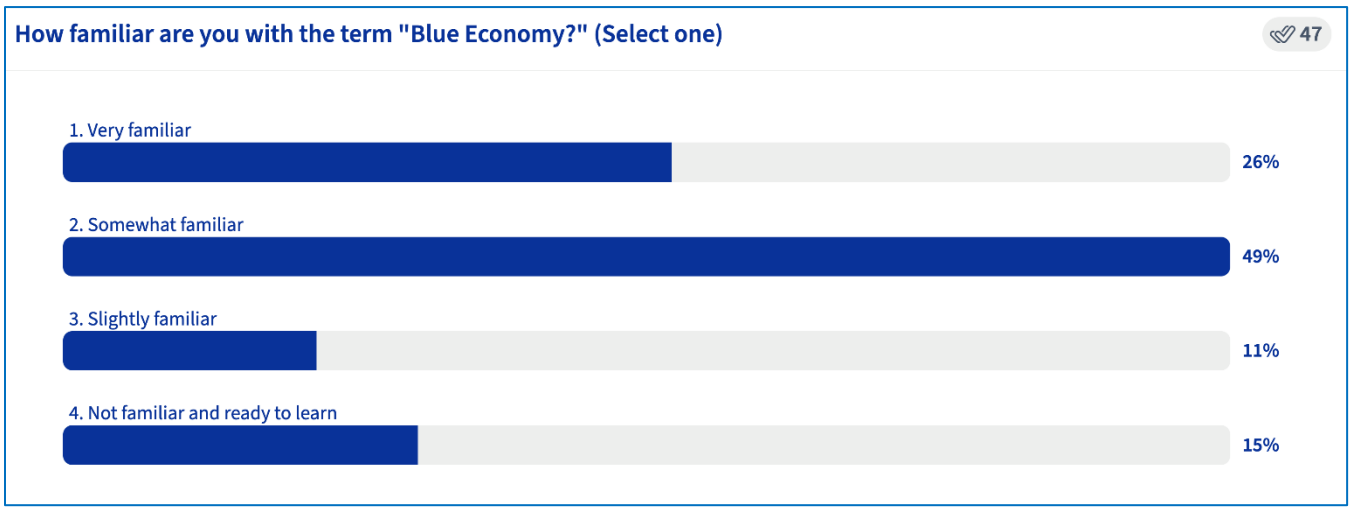
If you listed other, what does that represent?

Speaker: I'm just a technology nerd.

Speaker: I'm a professor in CCIT, but run the Data Science degree.

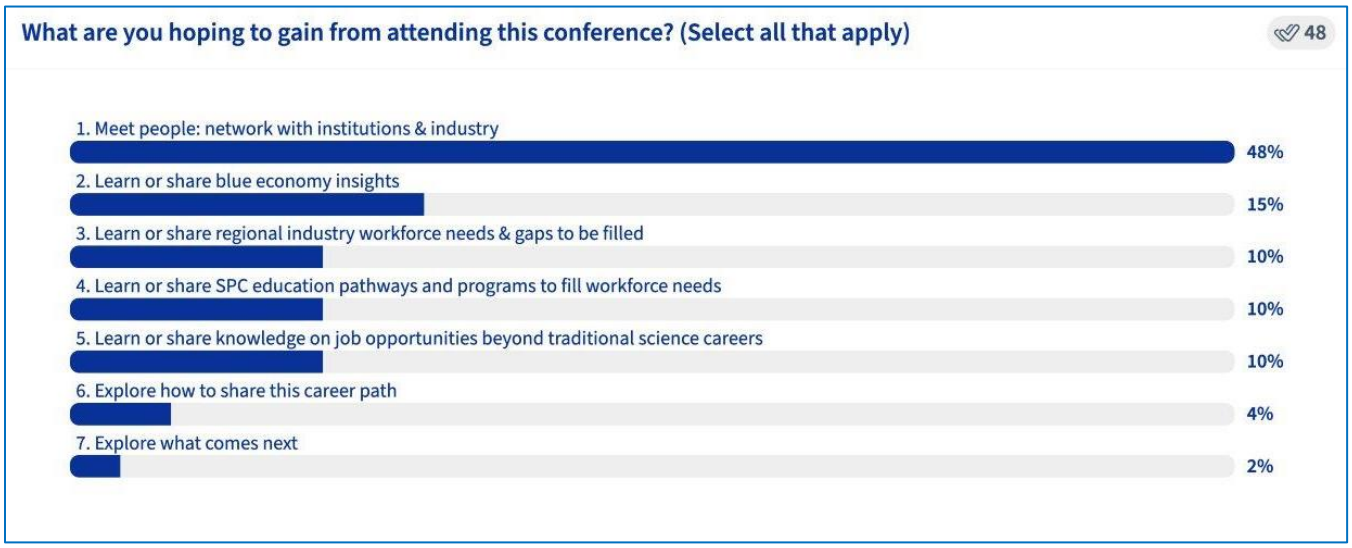
Tina: Some are Blue Economy enthusiasts. Curiosity is the one word that ties us all together, however you're related to this field.

Now we'd like to know how familiar you are with the term Blue Economy.



We've got a good mix of familiarity in the room. We're here today to learn, whether you know a lot already or are just familiarizing yourself.

Next, we want to know what you hope to gain from today's conference. We got these concepts from your RSVPs for today's conference.



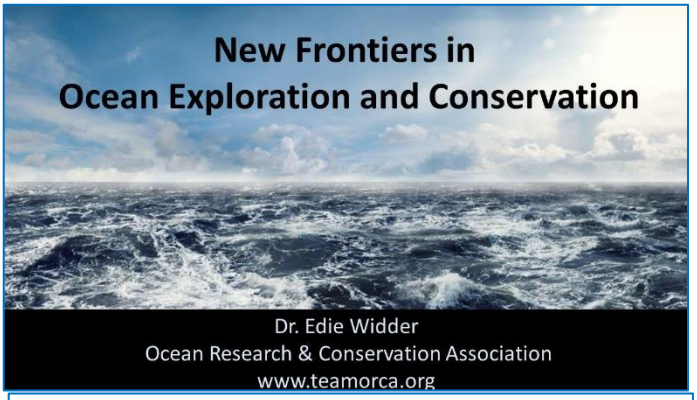
Most of you said your goal today is to meet people and network. You'll have a couple of opportunities for that today with our morning and afternoon breakout sessions.

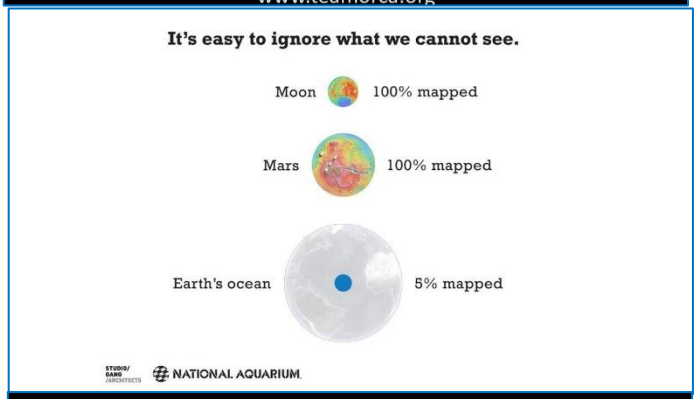
Erica: Now, I'm so pleased to introduce Dr. Edie Widder for our keynote presentation. She is CEO and Senior Scientist at teamorca.org, a non-profit she helped found to save the ocean. Her career has brought her wide acclaim. She filmed the first video of a giant squid using a camera of her own design. She's been featured on BBC, PBS, Discovery Channel, National Geographic, and many others. In 2018, she stood beside astronaut Jim Lovell and Amazon's Jeff Bezos to receive The Citation of Merit from The Explorers Club. She's dedicated to helping to determine how to protect and preserve our oceans and marine ecosystems and cultivating the next generation of ocean stewards and colleagues.

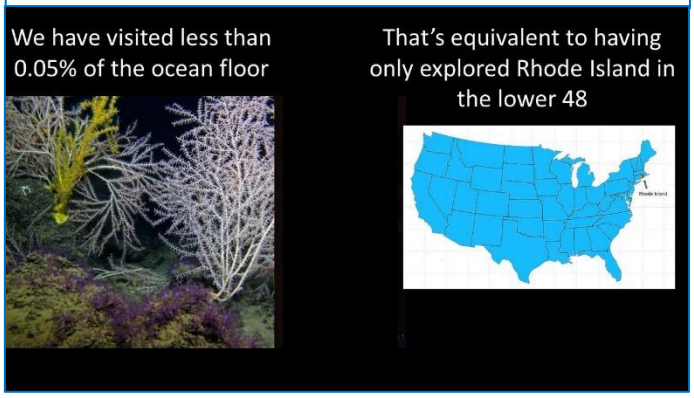
Dr. Widder's entire slide deck is provided as a separate document. Slides that guided conversation or invited questions are included in this document.

Keynote Presentation: New Frontiers in Ocean Exploration and Conservation. – Dr. Edith Widder, ORCA

Dr. Edith Widder, Deep Sea Explorer & ORCA Founder: Technological advancements have furthered my research, and advancements not yet here have constrained it, so I look forward to talking with you tech nerds in the room. The elephant in the room is climate change. I feel a moral obligation to educate people about it. The news is grim. Things change faster than predicted and sea surface temperatures are surprising and alarming people.





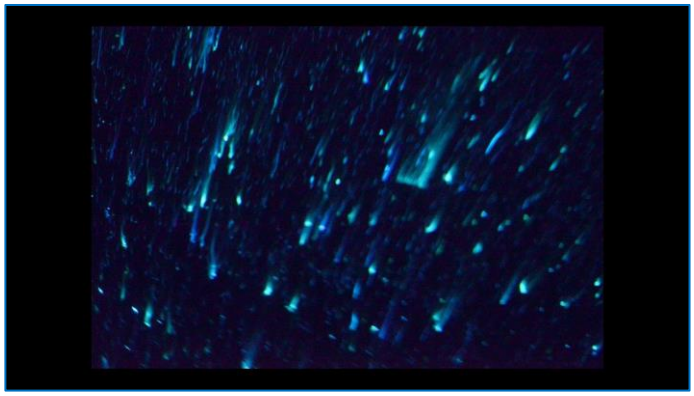


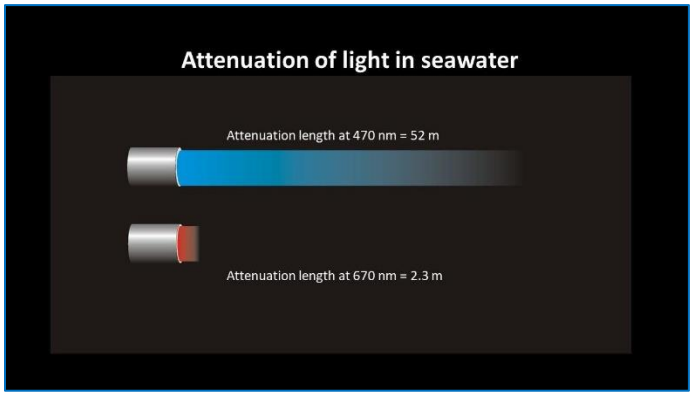
We spend billions on space exploration, but haven't explored our own planet. Only 5% of the ocean has been explored. We're now approaching 30%. Sonar doesn't tell you the cool stuff about life in the ocean; you have to go there and touch them.

I got my PhD in neurobiology. I loved the tech nerd factor and what was involved.

Early on, I had the opportunity to do dives in WASP suits and the Deep Rover. I went down 800 feet and turned out the lights, just knowing I would see bioluminescence.

This has to be life. Why aren't more people studying it? Because the technology didn't exist. That was 1984.

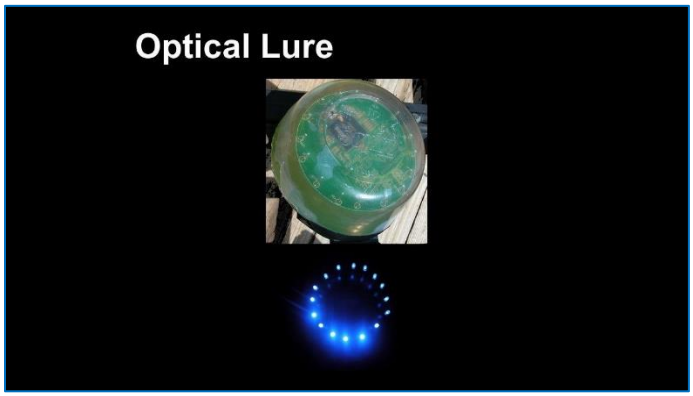




Technology advanced and I had access to some DoD technology. New camera systems allowed color to help identify marine life.

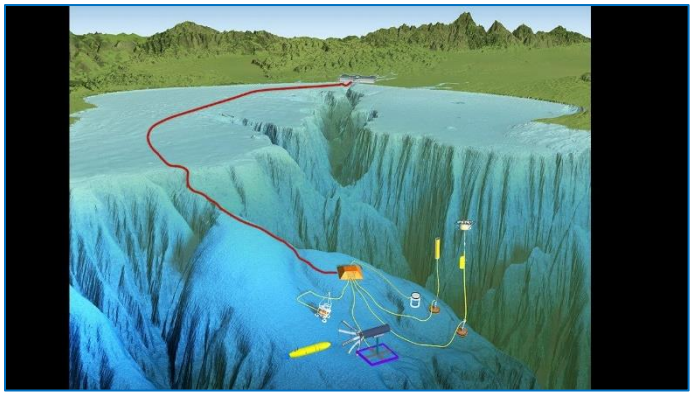
We needed more technology development. Night vision and thermal vision doesn't work under water.

I created an optical lure, which was tested in the Gulf of Mexico in 2004, programmed to collect four hours of data. Animals didn't pay any attention to me; they swam directly to the lights. We programmed e-jelly to come on after four hours. Just 86 seconds later, we recorded a squid over 6 feet long, completely new to science. All made possible by technological advances.



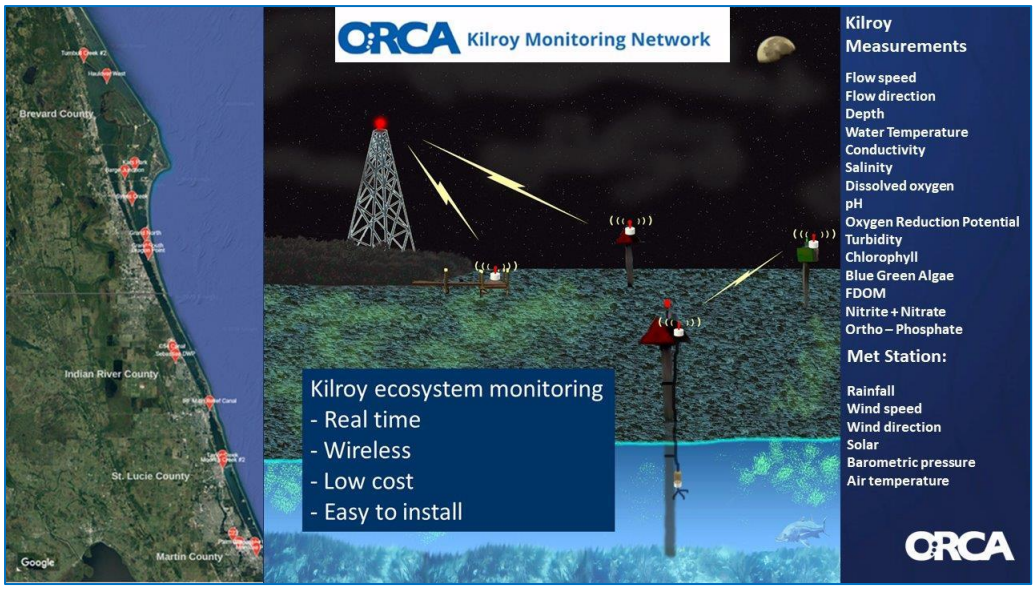
That led to a 32-mile-long undersea cable. This is at least as exciting as space exploration! Right, technology nerds? It was on site for 8 months, the world's first deep sea webcam.

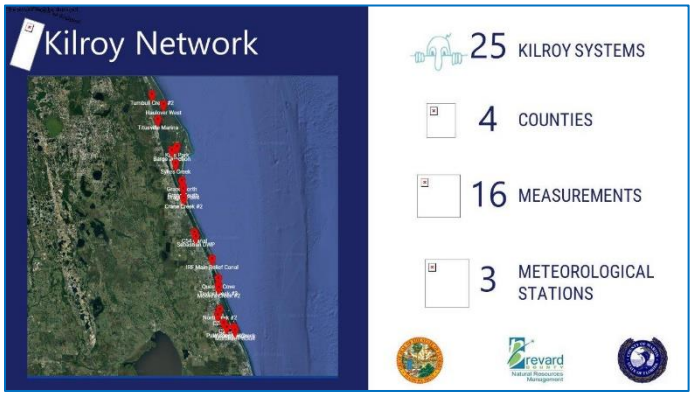
We developed ways to make technology smaller and cheaper, capable of being manually inserted over the side of the boat.

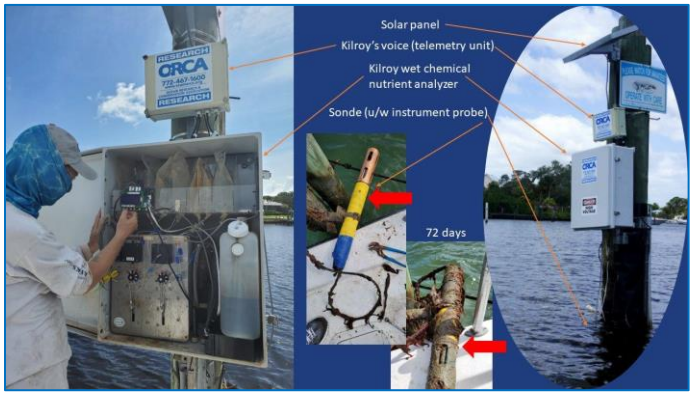


In Florida, Toxic algae and fish kills are affecting our oceans. Brown tide wiped out 47,000 acres of sea grass groves. In 2021, 1,201 manatee deaths were reported due to lack of sea grass.

We created the largest monitoring network in the state of Florida, Kilroy.

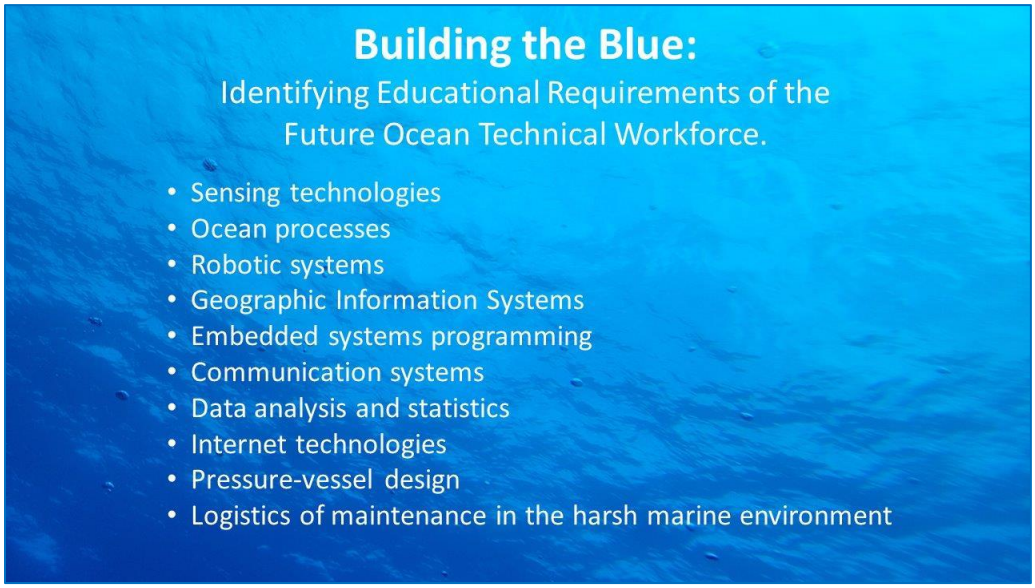






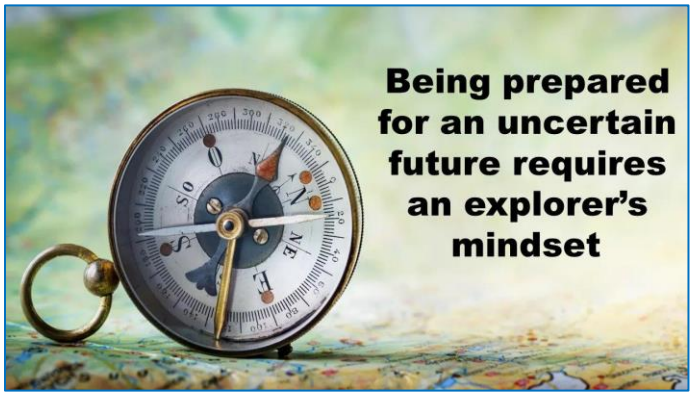
And all of these systems require a diverse set of skills to create, maintain, analyze, and communicate about.

So how do we build the blue?



This is a short-term list. But long-term, how do we begin? When I was a kid, I was told we would have flying cars by now. Not handheld devices to give us access to knowledge and contact with people across the globe and into space. That's transformative technology that has changed all our lives.

Being prepared for an uncertain future requires an explorer's mindset. Why? Because it demands adaptability.



Tina: Wow! Who learned something new?

Most of the hands in the room went up.

Now, we're fortunate that Dr. Widder is going to take some Q&A. Who has a question they'd like to ask her?

Keynote Q&A

Speaker: Does Kilroy data go into SECOORA network?

Dr. Widder: It does not.

Speaker: What kind of things are you looking for from students who want to get involved with team ORCA?

Dr. Widder: I have a lot of needs, but not enough funding. People with science training in environmental science, ecotoxicity. People in the field need a technology background and a willingness to work in brutal heat and deal with alligators.

Speaker: The ORCA system looks fantastic. Is future development of things like eDNA monitoring in your realm?

Dr. Widder: Absolutely. I have dreams of what we could do. I also want to tag and track fish. Interesting developments are coming along with using aerial ROVs to grab samples and bring them back to the lab. In an algae bloom, it would be great to sample a site and do molecular genetics on it.

Speaker: I'm fascinated that your PhD was in neurobiology. Can you describe how you came to be in that PhD program along the way? Some people assume they're born to discover the giant squid.

Dr. Widder: At 11 years old, I got to explore a coral reef. I was already crazy about animals. I wanted to be a marine biologist. In college, I realized there's no clear path forward. I loved physiology, behavior, neurobiology, and could work on marine organisms. There was a lot of technology involved in my thesis. My professor was great at getting funding for new toys and got a DoD grant for the latest, greatest spectrometer with an intensifier in front of it. I couldn't keep my hands off it and became the lab expert on it. My professor decided to start sending me to sea to measure these animals that no one could before. Just like that, I was a seagoing marine biologist. All through technology.

Speaker: At Tampa Bay Estuary, we're jealous of the monitoring capabilities you've been able to employ. Given your perspective on the long-term funding needed to maintain the monitoring systems throughout our coast throughout the globe, how do you feel funding has gone in the last several decades? Are you pessimist or optimistic that more funding will come in the future?

Dr. Widder: There are multiple levels to that. Funding for ocean exploration is pathetic. That's our greatest challenge. It's not depth; it's chronic underfunding, which is always less than 1% of space exploration funding. It makes no sense. Ocean exploration should be predominant while we deal with planetary challenges. Kilroys require government funding; $85,000 to install. Maintenance is $35,000/year. We get state funding, and are grateful. But the state budget is meant to cover the safety of its citizens. That means not letting them get poisoned by toxic algae. If we could have Bob's Barricades budget, that would be great.

Speaker: Regarding Kilroy, it's a beautiful system in Indian River Lagoon, but it's static. Have you given thought to an active component to that?

Dr. Widder: We have, but it's another layer of cost and complexity we can't undertake now. We're trying to figure out how to identify upstream sources of pollution. My chief engineer is working on a mobile system in his spare time.

Speaker: Every time we develop an ROV, we're dealing with noises we don't want underwater. Are you working on noise-free or silent technologies? Especially moving toward mobile devices.

Dr. Widder: Kilroys are completely silent. We do try to keep camera systems as quiet as possible. We haven't had problems with it because we don't have propulsion systems. Those give you the noise issues, right?

Speaker: At times. Sometimes it's other motors.

Dr. Widder: We don't have those on our camera systems. Noise does make a huge difference; from surface ships too.

Speaker: I teach students in a lab setting. Can you expand on your expertise in equipment and processes? I would love to give my students hands-on experience, but don't have much experience with technology. How did it fall into place? What were the challenges?

Dr. Widder: Just take the bull by the horns and figure it out. Rarely does a piece of equipment work the way it was intended. More than anything, you need persistence. I have a high school student trying to get an HPLC running in our lab and has to call tech support over and over again. This is what technology development is about. I've spent my life on the phone with tech support. You just have to do it. Down at 3,000 feet I got the blue screen of death telling me to contact technology support. *(Laughter)*

Speaker: You mentioned using scientific information to implement policy changes. Is ORCA doing policy work to promote funding?

Dr. Widder: We try to avoid that. We don't want to be finger pointers. We want to use facts to drive change. I present to city councils and Tallahassee. Advocacy can piss people off and we need people working together. When we find a pollution source, we go to the polluter first. Sometimes it's just ignorance. Grass clippings are a huge contributor to problems in Indian River. We started talking to garden clubs and HOAs. They're often movers and shakers in the community. That has been productive.

Speaker: Kilroy has monitors tracking measurements. Have you seen negative correlations during rocket ship launches?

Dr. Widder: Not yet. We're getting atmospheric sensors and are curious if they'll show anything. Another source is biosolids. Spreading sludge from wastewater treatment plant puts nutrients into the system. We had a nasty toxic algae bloom in Blue Cypress Lake. They were spreading it on ranchlands around it. Their calculations were right for Bahia grass that cattle were eating. They didn't, however, account for the phosphate, which triggered the bloom.

Speaker: I love Kilroy the data. When we identify temperature that causes these issues, what's your vision of what we do with the data? Where do we go from here?

Dr. Widder: The short-term fix is an oxygenator. Some of this is how we've messed up the hydrology of the state. Our canal systems build up a huge amount of muck on the bottom, another source of pollution. They're prone to overheating and fish kills and toxic algae blooms. We must rethink how we manage our waters. The challenge: The number of organizations involved. To put three Kilroys in Biscayne Bay, we needed seven permits and it took 1.5 years.

Speaker: Amazing work with Kilroy. Considering how overcommitted we've become pursuing funding, do you have a strategy for leveraging funding to explore experiential opportunities? How do you keep outreach from becoming an afterthought?

Dr. Widder: We have a great outreach program with thousands of kids involved in our Day in the Life program. Two scientists helping with pollution mapping. Citizen science is critical. When I started ORCA, I researched linking knowledge with action. The Packard Foundation studied it and found the most effective way is through citizen science. Get the community involved in collecting the data. On the other side, with Kilroys, I got funding to develop Kilroy Academy, still available online at Kilroyacademy.org. But the system needs upgrading. The idea was to provide the background information a teacher would need to use real-time data in the classroom. The reality was we found teachers were resistant to using the videos due to time and being intimidated by science. They don't want to show the video and get questions they can't answer. I didn't anticipate that. We now have teachers who go into classrooms, but it's limited.

Speaker: I work with Dr. Boehme. What are some things we should consider that don't involve water quality in our studies?

Dr. Widder: Measuring stormwater runoff is valuable. Land to sea is critical, so we're trying to develop living or buffered shorelines. We monitor before and after to document the difference made. Buffered shorelines make a big difference in phosphate levels.

Speaker: Regarding the spread in biosolids and affect with phosphate in the water, is there a marked difference between when we as consumers are allowed to fertilize our lawns and gardens vs. when we're not?

Dr. Widder: That's a very controversial subject these days. Some data suggests the fertilizer ban is at the wrong time. I don't have a strong enough background to defend one way or another.

Speaker: Any sensors you wish you had but don't due to funding or other reasons?

Dr. Widder: It would be very helpful on the public outreach and science levels to have better connection to biology and the ability to tag fish. We have a fish monitoring program doing pretty well. Fishermen donate fish and indicate where they were collected from and we monitor for ecotoxins. We looked at a camera system, but it's not worth it. The water quality is too bad. Situations to make people aware of the animal life. Osprey camera systems are addictive. Fish tagging is high on the list.

Speaker: I work for Tampa Bay Watch. We offer a variety of educational programs to the public and camps for high school students, along with internship opportunities for college kids. Do you offer any teacher or educator training to help get students interested in these careers and excited about what you're doing?

Dr. Widder: I used to do that when I was funded by NOAA. I'm not focused on that at the moment, but I'm a big fan.

Speaker: I'm the mom of a future marine scientist interested in knowing more about your oxygenators and what research you've done. It sounds like a short-term band aid. Where can we find more information about that and the longer-term goals?

Dr. Widder: It's definitely a short-term band aid. We focus our efforts upstream to determine where pollution enters the system. But in algae bloom situations, figuring out where nutrients come from that feed is more effective than oxygenating the water. But fish are smart and get out if they can.

Speaker: I'm an SPC student. What do you see as the single greatest human-related contributor to pollution in the ocean?

Dr. Widder: Wow. Carbon dioxide. Not only is it heating the planet, but acidifying 300 million cubic miles of water.

Speaker: There are amazing emerging developing technologies, great potentials. But there are issues with access to equity and inclusion for folks who may not have the means to get the education or get close to the water. Do you have thoughts about ensuring equity and funding for our future workforce to afford to do it? Sometimes the jobs just don't pay well.

Dr. Widder: I did a program with Sue Cook, an amazing educator. Got an NSF grant. I was impressed by what came out of that. Looking at diversity in oceanography, we have a terrible track record. We interviewed people and found a need for near peer mentoring. Sounds reasonable to me. When you see someone who looks like yourself, you believe you can do it. Sue went after post docs and grad students who were minorities working in ocean sciences. We had a workshop with hands-on activities with kids building ROVs. It was amazing the difference it made. I'm used to talking to audiences and can connect well. These kids were polite, but I'm an old broad they don't know anything about. After I spoke, a post doc got up who looked like them and they were scope locked, asking questions about money, and most didn't know you could be paid to be a grad student. They were excited. Another workshop like that would be great. I can give you Sue Cook's contact information. She got a standing ovation from the kids.

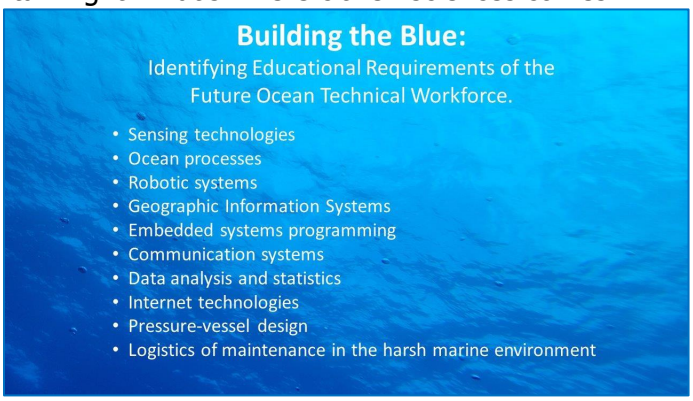
Speaker: I'm an SPC student dismayed by the disparity in funding between ocean and space exploration. We've only been able to achieve success in space exploration because of advancements in computing. Some came from government contracts, some from individuals. Government didn't see the space race as a place for private industry to make advancements. How can we better align development of technologies with things like defense and opportunity for private industry?

Dr. Widder: I can't speak for the Defense Department. But in terms of the private sector, a lot of submersibles are being developed and can be purchased for a couple million dollars, which is not that much really. The problem is maintaining them. You need a crew. We're still talking about wealthy individuals supporting it. There are Tritan tourist submersibles that will be used on cruise ships; a new egg-shaped, transparent one called AVA that can hold nine people. It exposes people to the largest habitat on the planet, but they can see something no one has ever seen and we'll never know about it. I wrote a letter to the Marine Technology Society saying that we need to learn from NOAA's exploration program and send out one to two experts to help with cataloging the data, ensuring it gets into the database, posting it on the website. NOAA needs to do the same thing and subsidize Sherpa's to go on the expeditions. People would get more out of it and they'd get the data. There are ways to leverage it to benefit science. But we must ensure it doesn't get away from us. We don't want individuals harvesting bamboo coral.

Speaker: At Tampa Bay Estuary, we're approaching questions from the human dimension requirements too. Social research science, etc. Can you speak to the need to integrate more multidisciplinary approaches in the work we do to foster communications and evoke change?

Dr. Widder: The only place people will want to live is where communities come together to address challenges like toxic algae blooms. We need communities educated in environmental life support machinery and invested in maintaining it. That's where citizen sciences comes in.

Tina: We have a lot of Blue Economy enthusiasts in this room. I'd like everyone to take a picture of this slide about educational requirements. Some of our brainstorming today will be around the jobs available in the field, skills needed, and how to align them with what we teach in the classroom or in the organizations represented today.



SPC Offerings

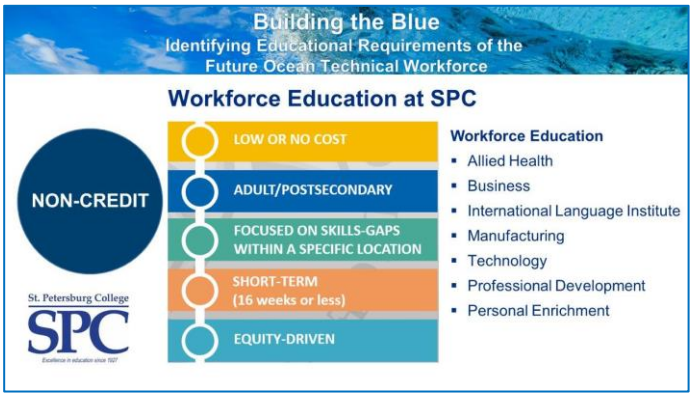
Tina: We're going to shift our focus now to SPC and how it's fitting into the Blue Economy. We'll hear from Dr. Natavia Middleton.

Dr. Natavia Middleton, Dean, Natural Sciences, SPC: Some of the programs we offer at SPC are credit based, some are non-credit based. They're primarily at the Clearwater campus and have class sizes around 24, an advantage to some programs that have larger class sizes. Students get to develop relationships with the faculty, many of whom mentor students.

Within the Bachelor of Science Degree in Biology, every student may select one of these two subplans/areas of concentration:

- Ecology, Evolution, and Organismal Biology
- Cellular and Molecular Biology

And we are thankful to those who have allowed our students to intern in their organizations, with internship tuition paid by our Foundation.



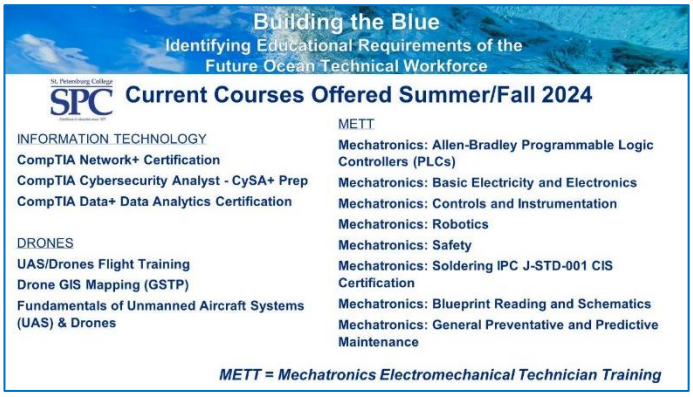
Students can choose internship or research toward their BS degree:

- BSC 4940 Internship in Biological Sciences
- Interdisciplinary research (all research students are required to present)

We also offer non-credit focus through our workforce training programs, which are no- to low-cost. Some courses are even at the employer site.

Workforce Program Articulations:

- Drones (4-6 weeks)
- Mechatronics Electromechanical Technician Training (METT)
- IT/Cybersecurity (16 weeks)
- Advanced Manufacturing (14 weeks)



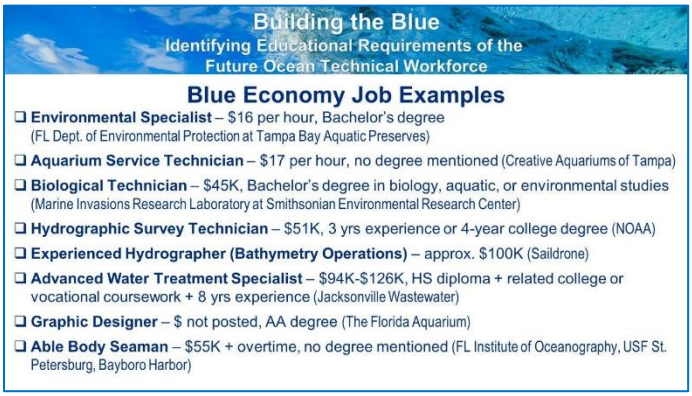
And you can see the list of current courses SPC is offering in those articulations Summer/Fall of 2024.

I want to share how the Electrical Lineworker Program came about at SPC. The utilities industry came to SPC saying they needed lineworkers. We collaborated and have made it a very successful program that continues to be full.

Is there an industry in the Blue Economy we should be looking at and partnering with you on?

If you are interested in any of these or more, we want to connect with you. We consider you great partners, and appreciate your feedback so we can ensure we meet your needs.

Tina: I have two kids who are SPC college students and one is taking some of these workforce classes. We think it may be advantageous to have an underwater drone class. The world is your oyster. *Laughter.* We have a wide variety of options here. These are just some of our offerings. We're hoping you can tell us what you need.



These are some job examples provided to us. Some don't require a degree. Some require experience or a degree. There's a wide variety. At SPC, we are focused on Better Jobs, Better Lives, Better Community. Our intent is for students to get a high-wage job. Sometimes they may need a jumping off opportunity. The first two (Environmental Specialist and Aquarium Service Technician) can be for that.

Team Breakouts Part 1 – Aligning Education with Blue Economy Workforce Needs: Job Opportunities and Preparing our Students

Tina: This is where we break out into teams. Breakout #1 is focused on job opportunities and preparing our students. You told us in your RSVPs if you were industry or education. Teams in this first activity are mixed so they contain people from both perspectives. We may condense the teams because some people weren't able to make it.

Tina reviewed the XLeap software participants would be using in the brainstorming sessions.

When you get to your team, you'll choose a keyboarder and a spokesperson. As you work, you'll only see your team's ideas. For job opportunities, you'll come to consensus on your top idea. Write down the number you choose on your sticky note for the report outs. For preparing the workforce, you'll brainstorm only.

Teams were combined from the original assignments, so some teams were eliminated. Participants brainstormed with their teams then reconvened for report outs:

Job Opportunities

What entry-level blue economy Job Opportunities do you see as available in our area to SPC students beyond traditional science careers? (Include Job Titles that might align with these opportunities)

Tina: Great discussion. I think I saw a total of about 150 ideas. We'll start with Team #1. Tell us what idea you chose as your top and why.

Team 1

Underwater drone operator. There are support opportunities for building them, maintaining them, and operating them. They're accessible to people with handicaps who may not be able to make it underwater to do research.


Team 3

Environmental consulting, whether in the field, GIS analysts, specialists, technicians, coastal engineers, or environmental consulting itself.


Team 6

GIS analyst/technicians. You don't need a four-year degree; shared with so many stakeholders.


Team 7

Data management and being able to break it down for analyzation. We also talked about how data management should include AI and applying AI.


Team 9

Life support technician. Not like resuscitating humans. Pool technicians may be able to transfer their knowledge to something else. Plumbing background could be helpful.


Team 10


GIS specialists. It's a broad career with transferrable skills whether in science, technology, industry, or manufacturing. A lot of the jobs involve data collection and this uses it to analyze it and show changes happening.

Team 11


Big data management for ocean observing enterprise. We were captured by the comment that only 5% of the ocean has been an analyzed. We also talked about how having students able to collaborate with industry professionals at career fairs, days specific to the industry like marine exploration would be useful to direct students to the options within it, and how it can be integrated into their degrees and getting industry experience.

Team 12


Marine equipment technician. We (Florida Institute of Oceanography) operate three vessels for Florida on the USF St. Pete campus. They all have acquisition data systems. We put generalists on board, with specialists for specific things. But we can train people to run, repair, and calibrate instrumentation. Data management is an important part of this position. Not to analyze it -- we have data systems for that -- but we need to manage and disseminate it to the science community. And research vessels have limited number of spaces available for people onboard, so we need people who can manage IT systems. We have remote access to the Starlink system. This is giving people the opportunity to be at sea virtually. Maintaining the tie to shore is important.

Team 14


Support technicians to troubleshoot all the technology. Fix things on board, understanding problems with biofouling, maintenance, and getting the science back on the road.

Tina: Very important, getting the science back on the road. Great work, everyone! Grab your cell phones. We've pre-loaded these top ideas and want you to select one idea and give it a thumbs up. Your favorite job opportunity in the Blue Economy.

Top Job Opportunities

Top Job Opportunities
• Marine Equipment Technician (calibrations, repairs, integrations, water sampling, data management) – 19 • Data management and breaking down data for analysis/ applying AI (example: acoustics research) – 9 • Environmental consulting: assessment and monitoring, living shoreline planning, dredging, interfacing with homeowner/community/retail associations, resiliency planning. – 8 • Support technicians *technology (biofouling, maintenance, sensor comms, troubleshooting) – 6 • GIS specialists - nonprofits, government, private companies – 3 • Underwater drone operator – 3 • Life support technician (water quality, making sure water can sustain animals in it, tanks) – 3 • GIS analyst/technicians – 1

Job Opportunities: These are the remaining ideas brainstormed by the teams.

- HR (business side, marketing, business, etc.)
- Climate resilience (local govt, industry ex/ engineering)
- Data Scientist (machine learning to make predictions)
- Formal educator
- Maintenance for Submersibles - Clean vessels / diving
- Informal educator
- Marketing / Media
- Public Relations
- Water treatment
- Social Scientist - outreach
- Diving and diving instruction
- Tidal turbine engineer and maintenance crew
- Environmental consultants
- Coastal engineering (living shorelines, geomorphology, hydrology, engineering, computer aided design)
- Technology (IT, stats, data analysis, drones, ROVs, remote sensing)
- Animal Care (non releasable animals, animal husbandry)
- Science staffer
- Restoration personnel (field science support)
- Education (environmental, outreach, non traditional education)
- Science advisor for policy maker
- Boat captain and crew - research, fishing, pleasure, education, transportation, ecotourism, industry, etc.

- Ecotourism
- Community Educator for Science (ie. Sue Cook) (someone local)
- Boat captains
- For a fully functioning vessel you need an array of positions - Culinary arts to 1600 captains (licensed); marine engineers; deck hands; Ordinary Seaman (OS); Marine Technicians (more important - to operate science equipment and integration of navigation systems/ships operations)
- Dive instructors
- Mitigation specialists (sea grass; sediment management, etc.)
- Taxonomists-AI/machine learning techniques
- Composition rates - Forensics - research fish populations, tagging, etc.
- Port/shipping industries
- Site supervisor/project manager (reads plans, material science, permitting, guides construction team)
- Marine mechanics
- Corrosion prevention/electronic specialists for sensor maintenance/management
- Marine/boat crew
- Uncrewed/unmanned systems developers and operators
- Aqua culture / Aquaponics / Aqua farming
- Crew mates
- Drone pilot
- Electricians/charging station technicians
- Environmental research - lab work, "boots on the ground where they will collect environmental samples"
- Data collection and reporting
- Marine construction
- Ocean mapping/GIS experts
- Mechanical, electrical and hydraulic work on vessels
- Manufacturing - creating materials and devices. Submersibles, Sensor systems, 3-D printing, Computer numeric control, Auto-CAD, other CAD, etc.
- Environmental observers
- Offshore energy specialist
- Data science
- Data analysts/statisticians
- Mediation - oversee settlement agreements
- Electrified boats - Mechanics / hovercraft / Airboats
- Social scientists to support understanding of Blue Economy needs and promote equity
- Boat machinists / manufacturers
- Post audio production and analysis for underwater exploration (acoustics)
- Data collection, analysis for mediation (environmental disputes)

- Maritime pilot/operations
- Computer programming / research tools and software
- Education specialists at nonprofits
- Photography
- Digital arts
- Chemistry of ocean, how climate change affects, chrophyll
- Journalism
- Aquarium work - taking care of animals
- Underwater welding
- Planning for community events, education, etc.
- Generative AI - Getting the data and asking the right questions. (AI testing)
- Engineers for: bridge inspections, AUV operators, materials development, circuit board development
- Habitat restoration interns/specialists
- Robotics
- Eco-tourism - on cruise ships, data collection, taking boat out tracking marine wildlife
- IT support/ marine techs aboard research vessels
- The grip - underwater lighting
- Marine debris /pollution experts to mitigate/managers
- City planning (may not be entry level)
- GIS - coastal flooding planning, permitting, scientific sample planning, wetland delineation and forecast, aquaculture and harvesting, tribal land coordination
- Drones and GIS mapping / GIS software
- Active and passive acousticians
- Work for an elected official and/or committees
- Environmental law and policy/Environmental Justice experts
- Earth mapping, update roadways and waterways. Build out the software to what you need.
- Military work
- Coastal engineering firms - interns/junior
- Wind/ solar/ clean energy
- Drone and ROV technicians
- Hydrography/marine surveying technicians
- Developers, system monitors, technology specialists
- Applied AI
- Military
- ROV - remote operator vehicle - to view an area onscreen.
- Offshore Chefs (using third party services due to void)
  Food safety, dietary restrictions, logistical planning
- Marine education (formal teachers or informal educators)

- Tech sales
- Systems engineering and automation (prototyping)
- Big data management for ocean observing enterprise
- Networking background

Preparing our students for the blue economy workforce

These ideas were brainstormed by the teams and were collected for informational purposes. There was no prioritization or reports out for this question.

- Internships and hands on experience
- Conferences (presentation practice, networking)
- Soft skills (interpersonal communication, conflict resolution, emotional intelligence)
- Panel discussion
- "day in the life" or job shadowing
- Informational interviews
- Being a member of professional organizations (MTS, IEEE, TBAEP, Limnology, MISS, AGU, Sea grant)
- Internships
- Partnering local colleges with local organizations in the community (company tours, meeting with employees to ask questions)
- Educating career and academic advisors
- Apprenticeship (paid, year+, integral part of team/project)
- Open house nights at the school such as networking nights, career fairs, etc at more centrally located places and then branch out to the smaller locations
- Job listing sites
- Teacher workshops/professional development programs (train the trainer)
- Mentorships
- Mentorship programs (ex. innovation district, near peer)
- SPC staff join educator councils
- Upskilling current workforce and bringing their expertise into the classroom
- Field work/outdoor job shadowing (going on a cruise, heat exposure)
- Paid internships
- Practical internships and undergraduate research experiences
- Partnering with CareerSource
- On campus activities with industry practitioners
- Identify knowledge and skill gaps.
- Tinkering - how do things work and how do you fix them?
- Bringing awareness to the students
- Advisor committees, bringing industry experts into the committees to speak in classrooms etc.
- Industry panel reviews

- Technology - Availability and orientation
- Soft skills (photography, web design, AI, public speaking, etc to enhance job opps and stand out)
- Learning to Interpret and explain data.
- Improved connection to job listings from industry partners in the region
- Curriculum review from the industry experts specifically
- Partnering with the area organizations to give them experiential learning opportunities
- Explorer mindset/persistence
- Internships-preferably paid to promote equity
- Working with the community and public schools to inform elementary, middle and high school students
- real world experience/internships/volunteer
- Building brand awareness for companies, while also having companies assist with funding such as scholarships and events
- Emphasize accessibility in marine science career paths and provide mentorship/ guidance to help students identify and navigate their options - from a young age (K-12)
- Coding and data analytics. Excel, Python, SQL, R, C+, Web-based data access, visualization (e.g., GIS, graphics, ESRI, OpenSource programs like GIS)
- Creative and art connections (design examples/portfolios, shower thoughts)
- Build awareness - all the different types of jobs
- Mentoring opportunities with experts outside your school
- Communication. Written, Verbal, Storytelling, Grant writing, Networking,
- field work experience
- exposure to technologies
- Workshops (don't be afraid to learn a new skill)
- Volunteer and service learning.
- Ways to learn about different opportunities (e.g., Handshake is limited)
- Catalog of mentoring or interning opportunities for students (Match.com for students/professionals)
- Utilizing collaborative labs to connect students to learn more about the industry
- Participation in professional conferences
- How to network? Where to network? Ongoing events, special conferences.
- Course offerings in the areas of study - Teach me what I need to know for the job.
- Career panel opportunities
- Guest speakers from the industry
- boating/seamanship skills
- Professional development for faculty and staff to better help students
- Resume and cover letter support
- basic computer skills
- Career fairs - they are often too broad, businesses with limited # of open jobs don't go

- Blue Economy "Round Table" series to educate students about potential career paths and job outputs/activities
- Wrap around services (social, financial, academic) to offset barriers to training
- More hands - on learning to learn how to use the technology
- Certifications/tangible/marketable skills
- Field trips
- Upskilling with certifications and microcredentials, learn the technical capabilities
- Outreach person who helps spread the word, campus docket system
- basic written and verbal communication skills
- Spread with word via clubs
- Microcredentialing / certificate programs / internships - provide specific experience and training to help students move into their field of choice and begin a career efficiently / quickly / affordably (coursework paired with real world partnerships)
- Education fairs with individualized sessions with employers/companies
- Underwater drone - Short-term training
- coding and programming
- Hands-on/field/experiential opportunities
- Internships - students are having challenges finding internships, need help knowing what to look for
- understanding AI
- Virtual meetings/sessions for education fairs
- understanding and interpreting statistics
- Questioning. Develop problem solving and inquisitiveness. Grit. Curiosity. Growth mindset. Outside comfort zone, inspire
- Partnerships with local businesses to better understand their needs and adapt nimbly at the college level (all stakeholders at the table, college admin, students, professors, business owners, etc.)
- Find industry partners to guarantee school to job pathway if successfully complete program
- have an explorers mindset (Dr Widder)
- exploration and entrepreneurship
- Informational interviews / coffee / job shadow
- SPC webinar - Better Jobs Better Lives webinar to connect local students to college recruiters and businesses to discuss job opportunities and academic programs
- Upskilling some of our programs to include different areas they can work in. (ie. law enforcement monitoring the coast.)
- critical thinking/problem solving
- Networking opportunities ie. Marine Science Happy Hour --include students (at non-bar settings)
- Cross-training. Integrative, interdisciplinary understanding. Ecosystem view.
- Lifelong learners

- Science Cafes, Career Fairs-STEM-focused
- Professional development workshop - faculty develop curriculum for how to prep for job search
- Linking students/ programs with other agencies such as Fish and Wildlife, USF research, etc.
- Learn multiple ways to take measurements (ex. sonde vs refractometer)
- continuing training for new advances
- Create more student-led peer-to-peer learning opportunities
- learning how to read academic papers and concisely synthesize information
- Teach students how to get an interview, finding options, networking/internships
- Experiential learning. Do the hard things. Sea sickness. Carry the gear
- grant writing
- Engaging students in the full research process to ensure that they understand it from start to finish
- More facilities on campus to expand hands-on experience (ex. STEM center has been great!)
- networking
- Provide incentives for participation in research and teaching/ presenting to others (awards, merit scholarships, etc.)
- More opportunities for student clubs
- Integrate arts into the sciences. More STEAM instead of STEM.
- Develop clear steps to transform internships into longer term job/career opportunities
- Host event with master connectors (people who know the breadth of the field) and students
- finding inspiration/passion/purpose
- Advocate for high level policy change in education budgets
- Marketing - knowing how your skills fit jobs. Skill set diversity. Applicable skills.
- Alumni mentorship of current students/ advocacy for internship programs they have participated in successfully
- Partner with groups that are manufacturing drones, to learn how to build them!
- Explore unique opportunities (be open to new things)
- Professional associations in the fields you want
- Educate voters to understand the importance of the Blue Economy
- Make sure that curricula align with needed job skills
- Cross promotion of Blue Economy opportunities between departments / interdisciplinary problem solving
- Peer-led teaching opportunities
- Mentorship. Life choices. Human side of a Blue Economy career.

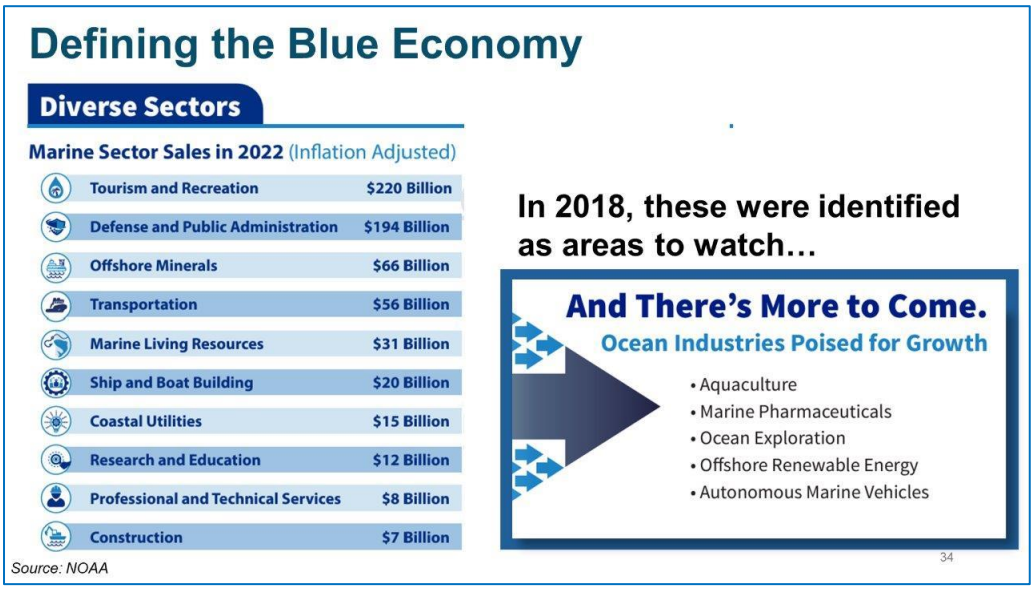
Tina: There's a lot of alignment in this group. You all did a fantastic job brainstorming great ideas!

Navigating the Blue Economy: Opportunities in Tampa Bay – Alison Barlow, St. Pete Innovation District

Tina: Next, we'll hear from Alison Barlow. I have so many wonderful connections with her: She used to manage Collaborative Labs, we served together on the board of Leadership St. Pete Alumni Association, and she was the Girl Scout Gold Award mentor for my daughter revolved around data collection; she is now doing data analysis in Texas.

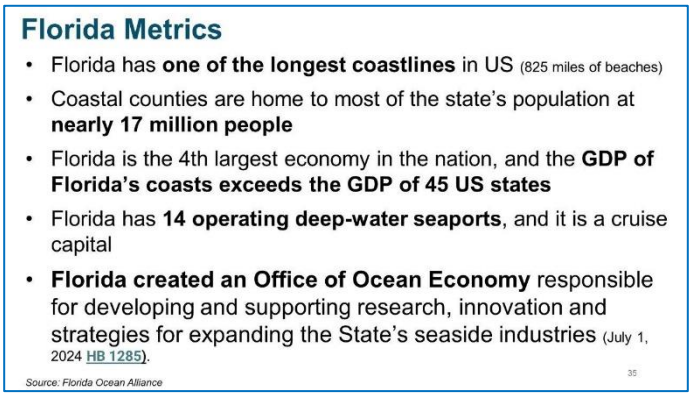
Alison Barlow, Executive Director, St. Pete Innovation District: How do we grow the industry side of the Blue Economy? We are a technology hub with 20 companies working in these spaces.

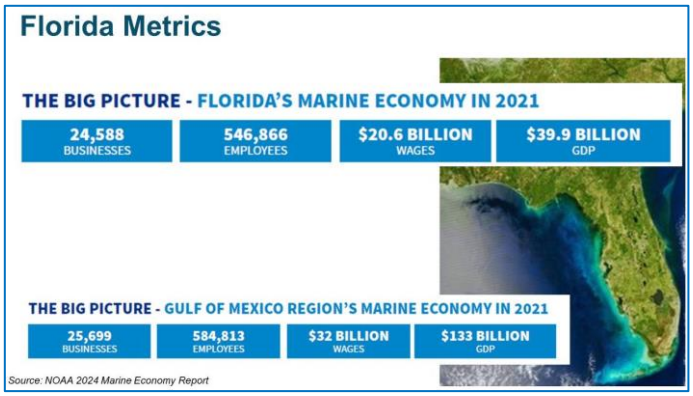
This is a 2018 report, but it's still incredibly relevant. It shows how important and varied the maritime Blue Economy industry is, and how much tourism and recreation drives it. Job analysis/wage analysis can also bring your average wage down. Some analysis pulls that out, some leaves it in.



NOAA was flagging ocean industries for growth:

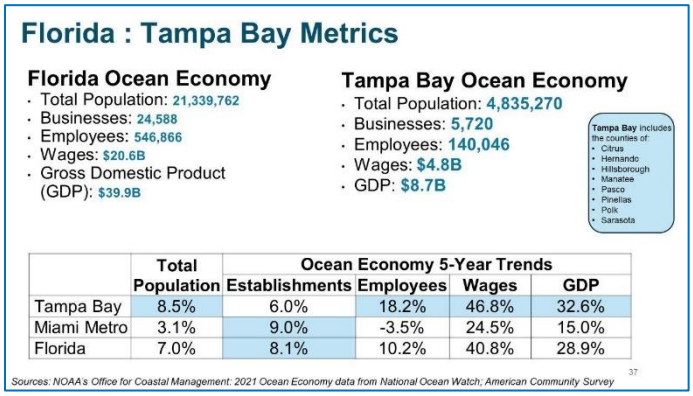
- Aquaculture
- Marine pharmaceuticals (more in South Florida)
- Ocean exploration
- Offshore renewable energy
- Autonomous marine vehicles



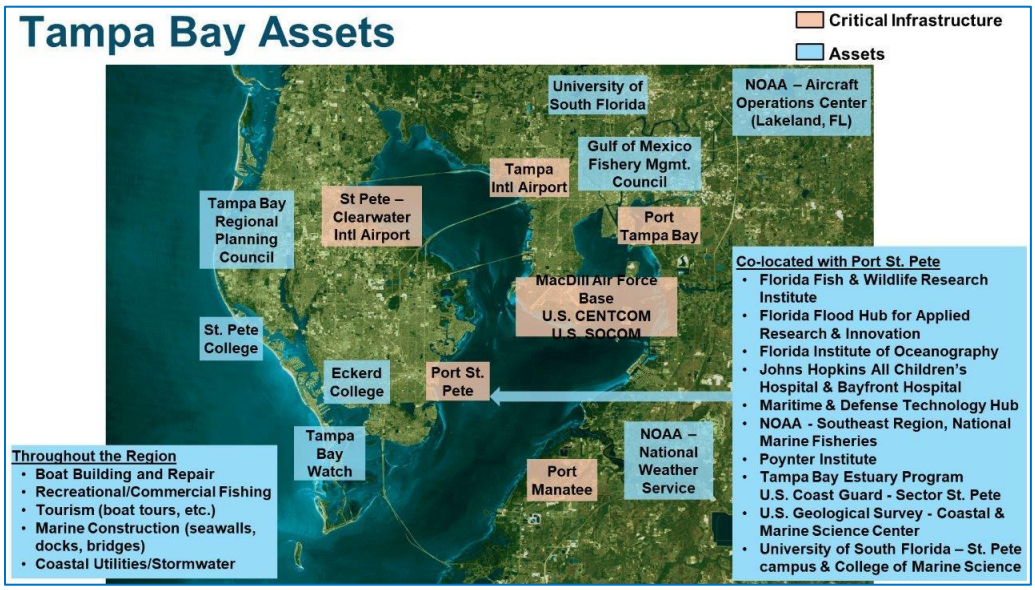


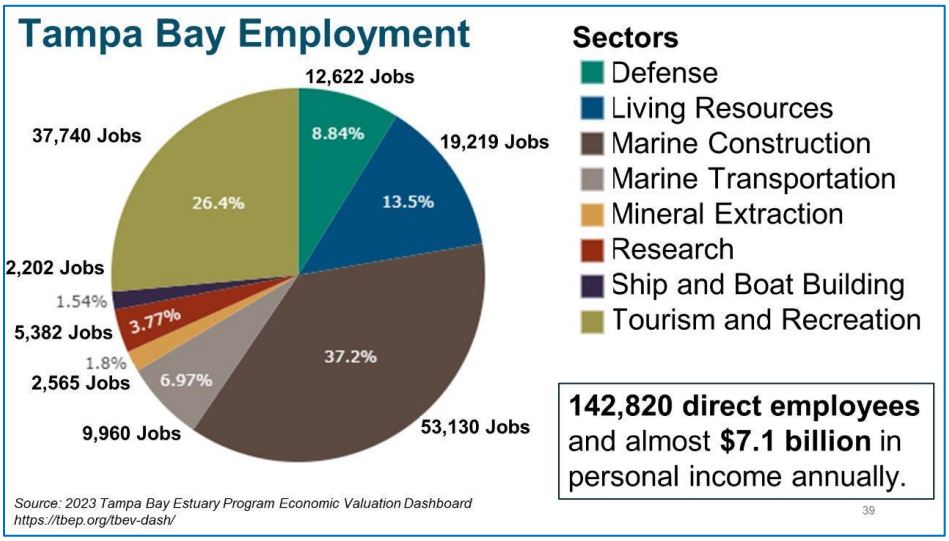
When we look at Florida metrics, the third bullet always stuns people, but it makes sense when you break it down. People living on the coast, tourism, but that's a great argument for how to build business around our coastline. The state created an Office of Ocean Economy, and it's being formed now. I included the Gulf of Mexico in these Florida metrics, and it's interesting that it pulls from 100 miles off the coastline from states that touch Mexico. The numbers aren't dramatically different, but you get more oil and gas production than the GDP of our area. We look at what's happening with maritime in Tampa Bay and St. Pete. The biggest challenge is that there's not a clear way to pull the data. We don't have industry codes. We have multiple codes that require interpretation.

I compiled the Tampa Bay metrics while preparing for a grant. What was most interesting to me is that we have strong employee growth, wage growth, and GDP, but we're falling behind the state and Miami metro. We're not incubating small business and entrepreneurs to grow.

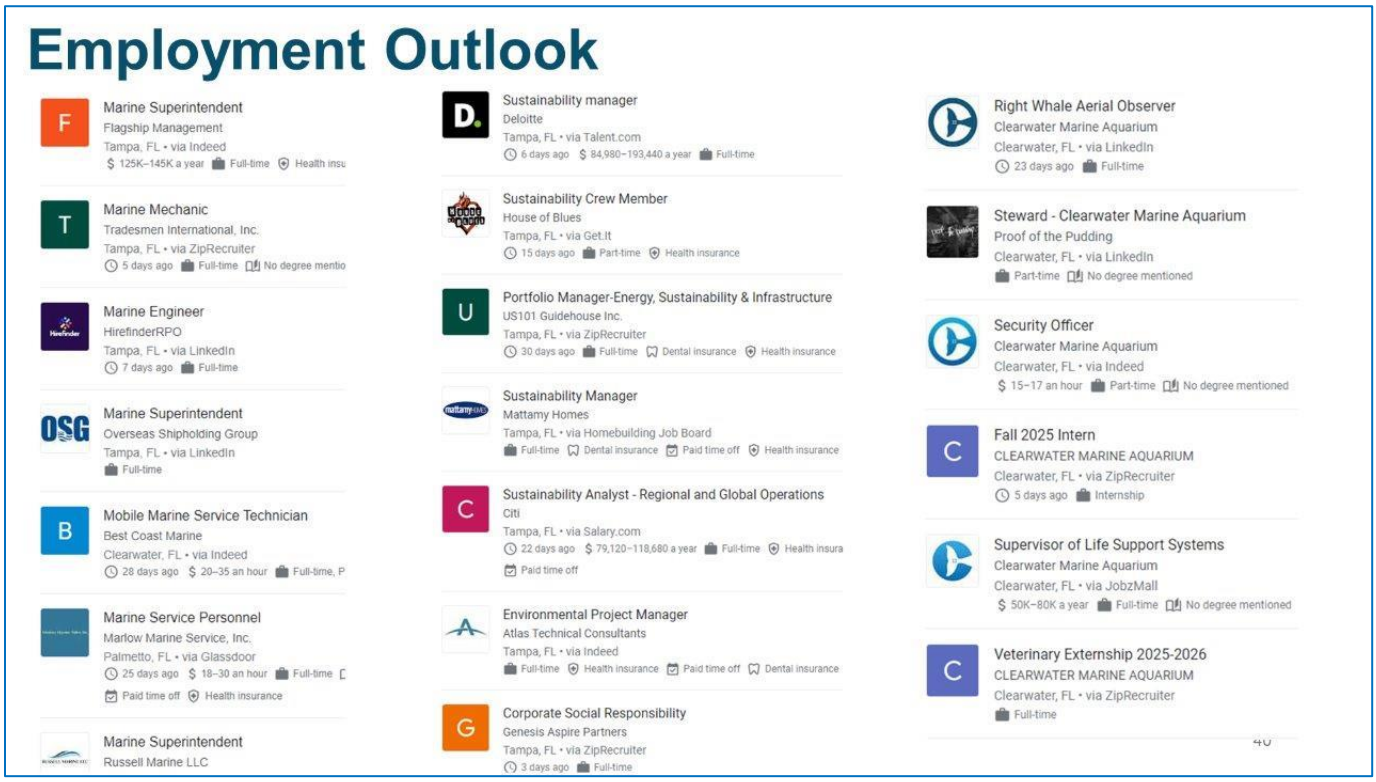


For the Tampa Bay assets, we looked at critical infrastructure and resources in the Tampa Bay area. This tells the concentration going on and the variety of types of employment.





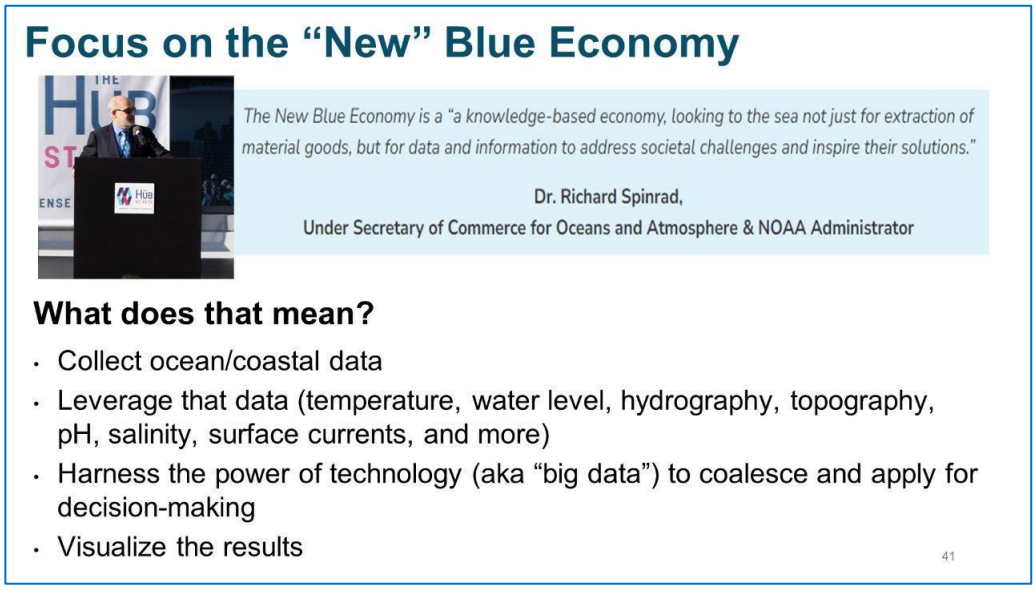
Kudos to Ed Sherwood from Tampa Bay Estuary Program. I pulled this from his report. It tells you the different sectors, the percentage of employment, and actual jobs.



I did three job queries last year.

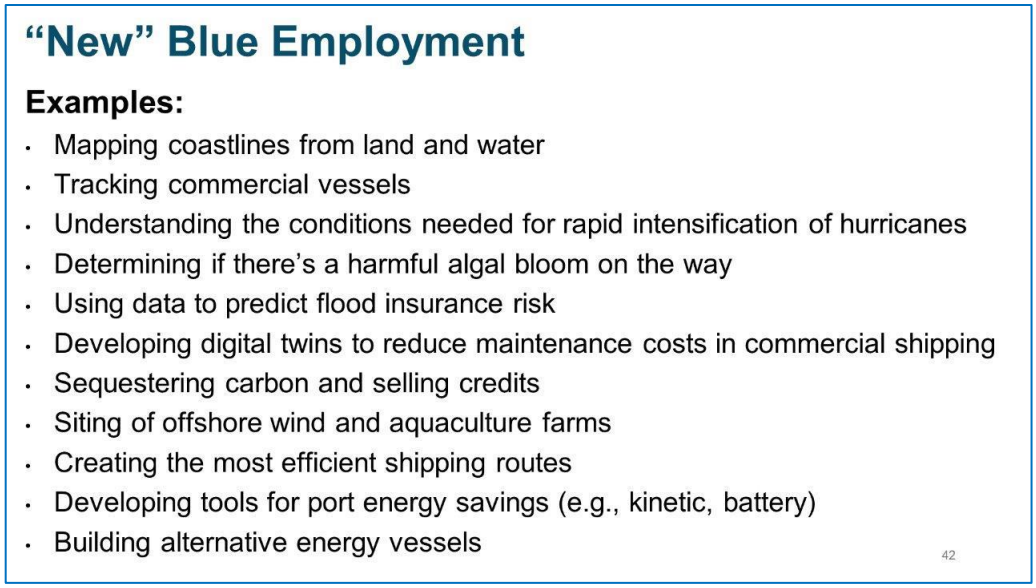
1. Marine science jobs in Tampa Bay in the left column.
2. Sustainability in the center, with a lot of corporations.
3. Animal care to the right. Young people who call me looking for internships say they want to take care of dolphins. There are only so many of those jobs. They don't know the breadth and depth of the roles. I love the fusion of two bodies of knowledge. We can all reflect on our own journeys: Starting in one track, moving to another.

For anyone not deeply aware of Blue Economy: Traditional Blue Economy is a lot of what we discussed today. Dr. Richard Spinrad wanted to put intentionality around the data and tech side of it.



What does that mean? Collecting data. Leveraging the data. If you Google ocean data today, you'll find tons of pockets of it. What do you do with it once you get it? Harnessing the data: To visualize the result.

I'm always amazed at people who are really good at data analysis. They can draw conclusions in ways I've never thought of. What is the reputable data source to tell you how many people live in a house? It's water use. It's not the utility bill. If you get really smart at data, you can help scientists and policymakers. In a municipality, you overlay GIS with flood data and other things.



These are the jobs they're talking about. We have a $100 million mapping job going on. We have people using GIS and software engineers to track whether treaties are being violated. They did a "what if" analysis on COVID transmissions on vessels. They all have economic impact businesses will buy. We're starting to see more on flood risk predicted. Neptune Flood is doing parcel-based flood insurance based on analytical data using AI and other data sources. When it comes to port energy savings, I was part of the Ocean Exchange pitch competition and companies talked about using kinetic energy at ports to move things around. That's an immediate CO2 reduction saving on oil and gas. Really intriguing.

This is a job at a maritime company in the hub: Pole Star Defense. If you Google for this job and use the term "maritime," you may not get it.

Look at the salary. People may not even know to consider looking for these jobs. They're working with maritime GIS data, working with the Coast Guard, maritime law decisions, Lloyds of London and insurers of commercial shipping. They're in that space, but you'd never know that's the job.

And these are the sources for the data I've shared in case you want more information.

Tina: Judging by the looks on your faces during Alison's presentation, I know there are questions you have for her.

Q&A

Speaker: What is Digital Twins on your job slide?

Alison: We have a company doing this now. Digital twinning is making an online version of whatever you're looking at. Going into commercial vessels, taking 360 camera images, and storing that data so that when a commercial vessel is out in the world, if something goes wrong, they call headquarters, they ask what the next port is, they ship the part and the guy to fix it. While the ship is in port offloading, they jump on and make repairs. What was happening was ships showing up and the inside didn't look like the plans they had. There were changes made over the years. The visual image allows them to plan out the repairs so they have everything they need in port. Digital twinning is also moving into power plants. You don't want to turn off a power plant. When you do, it's better to turn it off for the shortest possible time. Digital twin allows you to plan that repair. In the water, they're using it to simulate different scenarios. It's all off the shelf software.

Speaker: On your slide about Tampa Bay employment, tourism & recreation is 26%, which is not insignificant. Your next slide had had jobs and most of them were Clearwater Marine Aquarium. How can we support tourism and recreation with livable wages?

Alison: As consumers, are we willing to pay more? If we can say yes, when my friends come into town and I take them on the dolphin tour I'm willing to pay $10 more/ticket. That's the bottom line.

Speaker: Did you tell the dolphin trainer person they'll make minimum wage?

Alison: I told them it was tough. Has anyone been to Dolphin Cove in Orlando? I went last year. The geek in me loved the experience. Then I huddled with the trainers asking them where they went to school and what they studied. 90% were sociology majors. None had marine biology or science as a major.

Speaker: What is your input about which of the industries in the employment outlook is the fastest growing here in Tampa bay area?

Alison: I'm seeing more and more jobs on the technology side. Anything that touches technology. Part of it is that our community is doubling down on tech more. We have target industries. There's more variety in that space. I chatted with a woman doing GIS. I said I'd double down on that now because you have more choices to build your career. At the hub, which is almost three years old, we had a building with one tenant and put in a bunch of companies. Two-thirds of the companies existed in Tampa Bay in nooks and crannies in houses or coworking environments. We have gained 70 employees in the building. That's where I see growth. They're all doing something different. That's the trick.

Speaker: Of the organizations within the St. Pete Innovation District, I know there's a lot of smaller businesses and entrepreneurs. Are any hiring intro level or AA degree grads, willing to train?

Alison: There are some, but they're limited. Pole Star employees work odd hours, but it gets you in on the ground floor of GIS. Some are hiring consultants. FWC has a great internship program. I would say start now. Informational interviews isn't discussed much anymore. FWC's internship program is so highly competitive, there may be off cycle opportunities but they don't advertise on the website. So you have to talk to people. There is a networking group called Tampa Bay Marine Science Happy Hour. Kudos to Mary who has held this project together for 10 years plus. Check out the Innovation District website for events. Get on the list serve.

Speaker: The monthly meeting this month is next week sponsored by the Marine Technology Society at Cage Brewing.

Alison: Good point. For students you work with, don't hesitate to join the professional association of the field you're interested in. It's often reduced rates or free for students. I'm going to the MTS (Marine Technology Society) conference and they have a whole student portion. There are even passes for students if they're interested in ports and shipping.

Speaker: Tampa Bay Association of Environmental Professionals also has a student membership.

Speaker: And a women's only group.

Speaker: For students or those of us who interact with them, do you suggest specialization or being a Jack/Jill of all trades?

Alison: I'll put it to the floor for those hiring now. Raise your hands for generalist. Now raise your hands for specialized.

Of the hands raised, about 2/3 were for generalist and 1/3 for specialized.

I'd say have some idea what you'd like to do. Know the organization you want to talk to and what they focus on. When we get Innovation District interns, we do so many different things. I love those with initiatives. I also think because we have so many in smaller organizations, the hiring or supervision manager is running around like a chicken with its head cut off. The more the student shows self-starting and ability to project manage and meet deadlines, they're golden. Taking a burden off that manager. That may limit our internship opportunities now. They can't handle multiple kids.

Tina: Do you want to do a plug for the science festival?

Alison: Of course! It's February 7-8 for the science festival. Marine Club is February 5th, 7th, and 8th. It's all things science. The science festival is at its 12th year. Weekdays allow opportunities for teachers to bring students to learn about different aspects of science. Saturday is the public day. Last year, we had 13,000 people. You can climb on a NOAA vessel, walk around a research vessel, do hands-on activities with Keep Pinellas Beautiful. It's free. Nothing is sold. The goal is to get kids and families familiar with science and our community and the jobs. The website is Stpetescifest.org and there's a link to Marine Quest, which has been going on for 30 years.

Tina: Let's give her a round of applause. Now, we're going to have a working lunch with a couple of polls.

Working Lunch – Information Discovery Polls

Poll: What is the one class you wish you took in college or you did take that added the most value as a blue economy technician?

- Time management
- Science communication skills (Photoshop, GIS, podcast)
- Public speaking
- Personnel management
- Budgeting
- GIS (5 entries)
- Professional development skills (tasks: resume writing, outreach activity, teaching portfolio, etc.)
- Capital Sourcing
- Grant Writing (2 entries)
- Field work summer course
- How to read and analyze data, grant writing
- Boat Trailering
- Environmental law and policy (3 entries)
- Accounting
- Environmental Communication
- Boat trailering and boat repair
- A graphic design class
- Ecology (3 entries)

Tina: I'm seeing trends in your responses. And I see time management, which is a good skill for any industry.

Poll: What one piece of advice would you give a student with regards to resume structure, when/how to apply, and what skills to highlight in order to qualify for an entry-level blue economy technician position?

- Do not copy paste from AI
- Don't put your address on; do put your LinkedIn
- Use a simple format so it doesn't get thrown out by AI system
- Join and list your professional Society memberships
- Manage expectations
- Have a portfolio of your accomplishments you can speak to during the interview.
- Take the first interview day available.
- Add bullets about what you did in your job/volunteer roles. Use strong words
- Include activities that show teamwork
- Succinct, but enough detail that you relay true experience gained in prior positions
- Clearly articulate skills learned, including technology
- If it's a job you really want, find out who the hiring manager is and communicate with them directly. Even if you don't get the job, they'll know your name in the future and might give great pointers.
- Research the job and company
- Gain experience through internships and highlight your skills learned through those internships.
- Don't put you are proficient at Microsoft Word/Excel. Everyone is.
- Utilize job description to update wording for skills, change resume for each job
- Connect transferable skills
- Don't be afraid to fail. Roll up your sleeves and get things done!
- Highlight Data analytical skills
- Build your resume around the skills in the job posting. Don't make me search for them.
- Target your skills and experience based on what each position is looking for. PERSONALIZE it
- Job descriptions are a wishlist, even if you don't check every box, apply and make a compelling case for yourself
- Be open to opportunities you may not have considered.
- Apply early, have a certifications section, get resume proofread
- Be honest about your skills
- If the job requires a degree or a certificate put it at the top of your resume. Don't make an employer hunt
- Be open to informational interviews, tailor your resume to the job role
- Apply as soon as possible, make yourself sound as smart as possible in your resume
- Use active voice and action descriptions
- Apply early
- Reread what you write, and highlight key points
- One page
- Put your education at the top, and be honest about your skills.
- Use spell check!!

Tina: These are some good pieces of advice.

Representative Lindsay Cross was in attendance and had the following words for participants:

Representative Lindsay Cross: It's so fun to be here with you. I represent parts of St. Pete, Pinellas Park, and unincorporated Pinellas County. My background is as an environmental scientist and I worked two plus decades in that field, with Tampa Bay Estuary for 14 years. I've worked in the non-profit sector. It's great that we have people here from the private sector, government, and students all looking at how to leverage beautiful ocean and coastal resources to support our Blue Economy, not just taking things from the ocean, but learning from it and providing jobs and opportunities. We've had bills related to the Blue Economy; I introduced one to address the climate change crisis we have. Reach out to me in my office if you have ideas for bills or funding requests. My personal cell phone number is 727-642-1563. I appreciate everything you're doing. I'm here as a resource to you and want to make Pinellas County and Tampa Bay Area the leader in the Blue Economy. Thank you.

Team Breakouts Part 2 – Aligning Education with Blue Economy Workforce Needs: Workforce Needs, Desired Skills, & Job Alignment

Tina: Thank you. That sets us up for the next breakout session. This time, we'll have industry teams and education teams, separate. We are condensing teams again. Each group will have two questions to address. Industry: Your primary focus is the #1 desired skill you're looking for. Education: Your primary focus is the #1 job alignment opportunity. On the second question, you'll once again reach consensus on your top idea. After you've brainstormed in teams, we'll reconvene for team reports.

Teams were combined from the original assignments, so some teams were eliminated. Participants brainstormed with their teams then reconvened for report outs:

Industry Teams

Tina: Your two questions are:

1. What are your current workforce and training needs that can be addressed by SPC and other Tampa Bay academic institutions?
2. What desired skills, technologies, and experience are needed for an entry-level blue economy technician and are any skillsets missing in your current applicant pool? (Choose top one)

Workforce & Training Needs

Workforce & Training Needs: These are the ideas brainstormed by the teams.

- Water quality testing and data collection
- Vessel and trailer maintenance
- Life support specialist for any aquatic lifeforms
- Mariners training - ships captains, engineers/ systems, deck positions/ wheelhouse
- Interpersonal skills (emotional intelligence, conflict resolution, personnel management, separate work from personal, microaggressions, incivility)
- Environmental law
- Familiarity with oceanographic instrumentation and equipment
- Take initiative (ex in field work), entry level employee should feel empowered to do it
- Science communications
- Work independently and also work as a team member, knowing when to do each one
- Experience - workshops and internships
- Being self-directed, complete task at hand, and also be able to collaborate with others, knowing when to ask for help.
- Applicants for student business grants
- AI training related to data and imaging
- AI training related to ethics
- Programming skills needed - becoming very common (Java, Python)
- Digital twin imaging
- Continuous learning (non academic institutions) through professional organizations, attending talks with industry experts, networking, conduct informational interviews, utilizing LinkedIn
- Professional communication (ex grant writing, clear and accurate written communication, resumes)
- Arcpy (in GIS field)
- Professional etiquette skills such as representing the employer/company.
- FAA Certified for UAV
- Know how to engage (or not engage) with media for their job.
- Conflict resolution skills

- Ecosystem modeling for use in restoration and other projects
- Marine research instrumentation troubleshooting
- Understand and appreciate different learning styles, personalities and know how to tailor a task to fit the learning style and/or skill level
- Programming, coding, machine learning/ AI support
- Be able to assimilate complex information and distill it to basic steps
- General mechanical and electronic knowledge training
- Tool skills - handling sensing systems, technology, etc.
- Exhibit ethical behavior. Be able to request resources, as needed, to report unethical behavior.
- Lab skills
- Field skills/ sampling tools - deployment, recovery, etc.
- Aquarists/ animal care specialists
- Exhibit design and builders
- Writing skills - technical writing, science communication, education , grant writing
- Storytelling, photography, videography
- Maneuver equipment such as trailering a boat. Know how to maintain and repair equipment. Can SPC have a partnership with Coast Guard, FWC (Fish and Wildlife)
- Industry credential event (forklift, TWIC, cranes, slings, small boat, CDL, lab safety, etc.)
- How to navigate and read charts, know boating safety. Again, partner with Coast Guard, Boat USA, Sea Tow offer free courses
- Critical thinking skills, be able to take risks, feel confident to make decisions especially based on the unknowns. Advocate for self.
- Develop products such as data visualization, know science communication, core understanding of statistics and appropriate data analytical approaches
- Machine learning and AI technology, responsibility that goes with it (ethical)
- Marketing, sales, advocacy, fundraising
- Synthesize data AND manage the data so it's findable, accessible, usable. Ex Database coordinator. Tidy Data Principles.
- New paths that connect the tech and science fields
- Practicing data collection and integration
- Spatial statistics, data analysis

Desired Skills, Technologies & Experience

Team 1

Integration between technology and science. There's a distinct line between e-learning technology in GIS and applying it to an environmental field like the ocean or the environment in general. There was a strong disconnect. Follow one path and then apply outside of the field into it.

Team 2

Technical problem-solving skills and trouble shooting. The rationale was that 300 miles offshore you can't call for help often. You must be able to fix your own equipment.

Team 3

Ensure students understand the process involved with the tools they are using. Understand the larger task and know how to solve it as tools change over time. Understand the foundational concepts/language in the industry. Because tools change so rapidly. Understanding fundamentals of how they work helps and you can be at the cutting edge by understanding how something works.

Tina: I had a conversation with Dr. Middleton. SPC recently received a workforce grant from Governor DeSantis. Part of it will create an engineering technology lab on 22nd Street in St. Pete. We want to create a simulation lab. Industry partners all use a different machine; many have been modified to fit their product. We're trying to figure out how to create a simulation lab to prepare students so they can come in and use your equipment.

Team 6

Mariners training - ships captains, engineers/ systems, deck positions/ wheelhouse. We hire people all the way from culinary arts backgrounds to operators of 1,600-ton mariners. Including technician training.

Tina: Did you see the job posted that said able bodied seaman?

Speaker: That's ours.

Tina: Someone who won't get seasick. *(Laughter)* Great job, industry teams!

Top Desired Skills, Technologies & Experiences

Top Desired Skills, Technologies & Experiences
• Integration between technology and science • Technical problem-solving skills (troubleshooting) • Ensure students understand the process involved with the tools they are using. Understand the larger task and know how to solve it as tools change over time. Understand the foundational concepts/language in the industry. • Mariners training - ships captains, engineers/ systems, deck positions/ wheelhouse

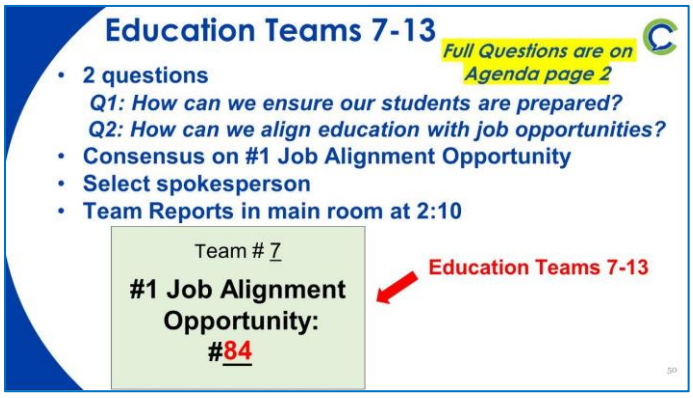
These are the remaining ideas brainstormed by the teams.

- Experience
- Programming skills/langs
- Arcpy
- Fieldwork
- Understanding blueprints
- Working with equipment
- Broad skills vs. specialized skills
- Soft skills
- Flexibility
- Understanding workplace culture
- Critical thinking and reasoning
- Communications skills with virtual, in-person, written, etc.
- Data collection, analysis, validity, and visualization (emphasis on emerging technologies like AI and machine learning, algorithms, digital twin, etc.)
- Willing to learn, put in effort
- Be inventive in how to solve a task.
- Know boat trailering skills
- Be able to communicate in different languages especially in an industry setting. Know more specialized language vs. conversational.
- Ensure common sense is used such as when measuring and knowing a typical range.
- Understand the Tampa Bay ecosystem.
- Previous outdoor, at-sea experience. (possibly through internship, volunteer, or personal experience) Or understanding of field work expectations.
- Be willing to relocate for a job (ex won't work with seals in Tampa Bay)
- Basic wildlife handling experience
- Having skills in plumbing, electrical, SCUBA, engineering, boat trailering
- Understand your comfort level. Are you ok with working on the water, in the heat, other environmental issues?
- Ability to thrive in the profession and out in the field, and open to opportunities.
- Need for core statistics, understand the scientific method, experimental design
- Ability to use hardware tools (hammer, screwdriver, etc.)
- Interfacing with the public, especially when engaging with stakeholders, such as active listening, managing emotions, proper decorum. Know the different decorum in different industries.
- Be mindful of safety protocols (SPC and others could offer CPS, first aid training), knowing SCUBA diving and have number of dives needed
- SCUBA Diving...just all of it

Education Teams

Tina: Your two questions are:

1. What partnerships, learning opportunities, and methods of communication can be used to ensure our students are prepared and employable by blue economy companies?
2. Where do you see these entry-level blue economy job opportunities aligning with our degree/certificate/educational pathways and how/where can we incorporate these emerging technologies and skills in the classroom? (Choose top one)



Preparing Students

These are the ideas brainstormed by the teams.

- "Job of the week" to share career opportunities with students related to course subject
- Providing students with a pathway from broad subjects to the specific opportunities of jobs
- Internships
- Job shadowing to better understand a day in the life
- Federal work study
- Volunteer opportunities
- Email etiquette (web link and examples) - attaching resume
- Ensuring partners and potential employers are involved in events to incentivize students to attend and marketing that they will be in attendance
- Career panels for specific or a broad range of disciplines
- Ensuring students are aware of potential careers and potential salaries
- Conferences (networking - connect with potential internships)
- "Day in the life" or on job shadowing
- Virtual reality opportunities for job experience
- Career services (office space to visit/connect with personnel) - review resumes/interview skills
- Communication skills (written, verbal, graphical)
- Workshop skills (photoshop/design, photography, web design, GIS)
- Volunteer opportunities to gain hands-on experience
- Providing avenues for volunteering and internship
- Class skills (assignments directed at skills) - mini proposal writing, data analysis
- Internships for hands on experience
- Promoting getting experience and knowledge in different areas since a lot of high schoolers/college students may not even know what they want to do yet, so building broad skills
- Making sure department heads are broadcasting and sharing information

- Mentioning the physical requirements of jobs in fields that might not be obvious
- Mentoring and networking
- Assigned readings/self-help books with discussion groups
- Clubs and extracurricular activities
- Educating the teachers in schools so that they know what industry partners are looking for
- Provide job listings that meet a student's needs
- Teaching soft skills - critical thinking, communication, etc.
- Internship/job connections (workshop) - table breakout sessions/speed dating style event
- Provide labs that go over the entire process of a job (ie. research lab)
- During internships, setting standards so students know exactly what skills to fine tune during internship to improve chance of getting jobs
- Help students network into a job/provide opportunities for businesses to reach students to give their needs
- CTE (Career and Technology Education)
- Build a personal resume style website/portfolio (photos, links, writing snips, video) - Rubric needed to help guide the process
- Follow groups/organizations on social media
- Market programs that help students adjust to working and applying
- Joining professional organizations (sometimes free version)
- Organize field trips/hands-on/volunteer opportunities for students
- Certification program to "graduate" skills such as ecology, manufacturing. Assists with including skills on resumes in a more formal way
- Certifications (weekend workshops specific to group - example UF nature courses in person or online)
- Compiling a list of resources
- Have industry professionals come into clubs/classes to give business cards/lectures/expectations
- Partnerships with workplaces to do job commitments/scholarships
- Improve student engagement
- Volunteering skills (event planning, communication, team building, design, wildlife data collection, aquarium maintenance, networking, hands-on skills, connection to local groups/problem solving)
- Field trips
- Short-term/Hands on internship/Act of Service (temporary work job)
- Experiential learning

Job Alignment Opportunities

Team 7

Certification programs. Skills based. A Blue Economy credentialing program showing mastery in target skillsets recognized and supported by stakeholders. Could be high school, college, or beyond. There are models out there.

Tina: A Blue Economy certification program is a great idea. It reminds me of the line worker program. They had the curriculum (Duke Energy and PowerTown) and we had a collaboration with industry leaders and formed that program.

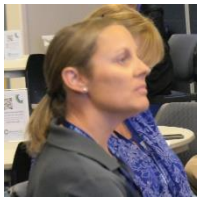
Speaker: I've been working with these programs for six years. The real bang is you have a vested interest. If companies want these people and support the entity with the credentials, they're more likely to hire the students coming out. Students recognize there are jobs waiting for them and can link credentials to other degrees like BA and master's.

Tina: So make the certificate valuable to the organization. Wonderful.

Team 8


Tours/class visit with equipment and jobs related to that equipment (like a Great American teach-in. For example: A mariner's time is sometimes split, so two months on blue water or brown water and then two months off. Without having people visit the classroom or doing tours, they may not know the opportunity exists for that type of lifestyle. With the lab we are putting down in the Midtown area, we will do the best we can to simulate for as many companies as possible.

Team 9




Make curriculum and labs more project based with transferrable skills and applicable to real world problems/current issues. Even though we know there are internships and volunteer opportunities out there, it doesn't mean students have the ability to take advantage. Sometimes they have work or other things take precedence. It would be nice if what they learn could be listed on a resume, or a long-term project they're involved in, here's the data we analyzed, tools used, etc.

Tina: That's thinking outside the box. I love that.

Team 10


Labs with industry leaders to prepare students with the information they need. Having industry leaders come in to teach a class so students can learn from someone in the field and show them how to operate machines.

Tina: Give yourselves a round of applause.

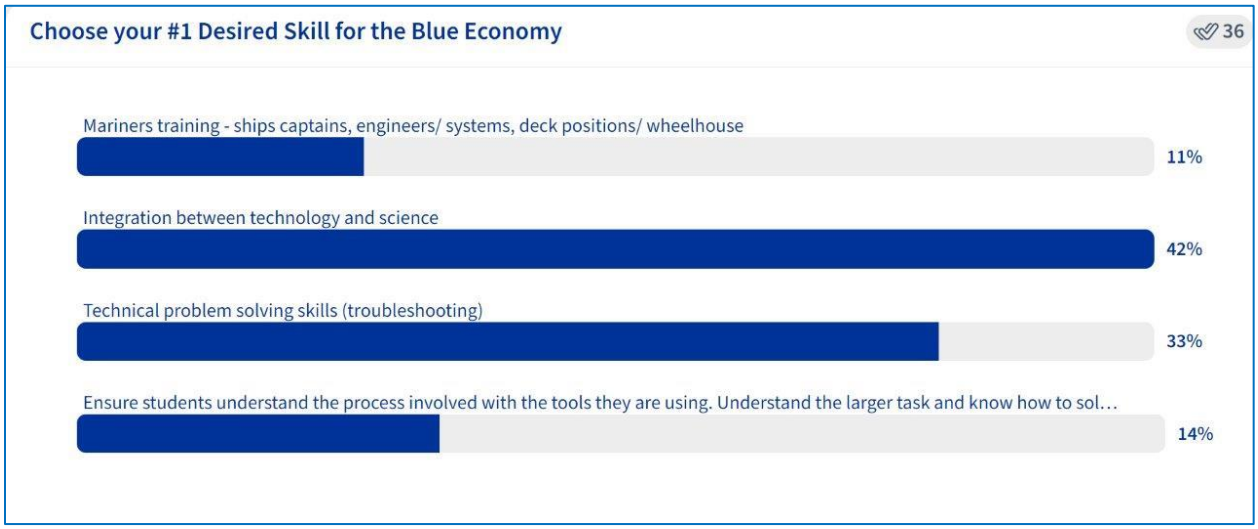
Top Job Alignment Opportunities

Top Job Alignment Opportunities
• Make curriculum and labs more project based with transferrable skills and applicable to real world problems/current issues • Certification programs (through organizations that are respected) • Labs with industry leaders to prepare students with the information they need • Tours/class visit with equipment and jobs related to that equipment (like a Great American teach-in)

These are the remaining ideas brainstormed by the teams.

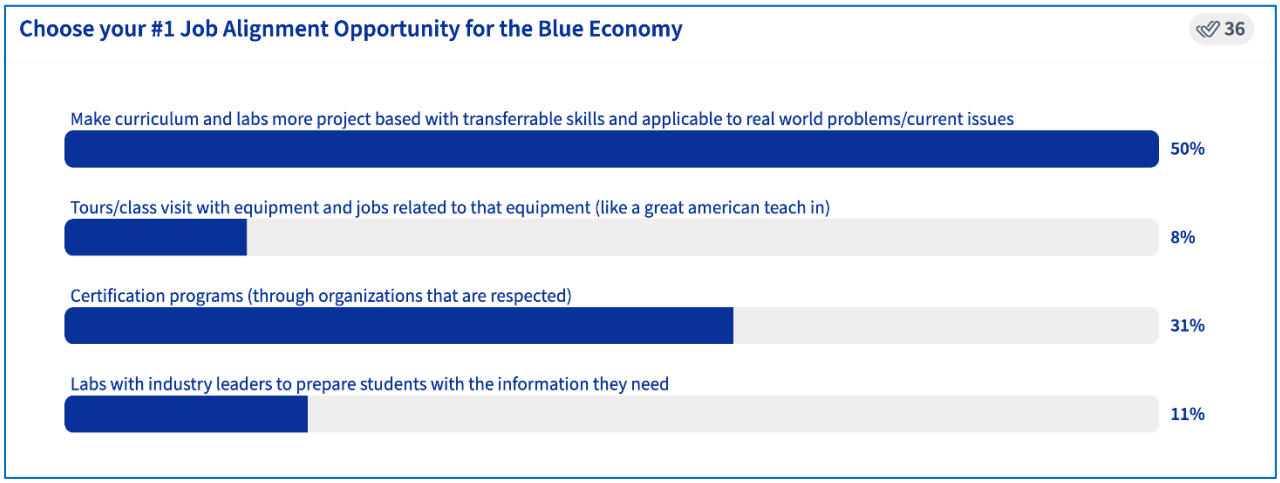
- Internship program through the Bacc Biology BS degree
- Independent internships/externships with local companies
- Linking certification requirements with courses required for degree so that students get credit for both
- Adding electives for data management (GIS, coding, machine learning, storage resources, cloud, mining)
- Incorporating guest lectures into curriculum
- Certificate programs (additional funding or outside of degree)
- Career-degree alignment (advisor meetings/info sessions with employers)
- Joining professional associations/societies
- Incorporating data analysis with current databases with ocean-related data (ie Kilroy)
- Opportunity to take classes to explore needs (interdisciplinary courses/degree)
- Providing job opportunities to students in varying degrees/majors
- Second tier certification such as becoming a Level 2 if you go and do a hands-on internship
- Lab experience/field research outside of the classroom
- Being connected to a mentor (sometimes students are nervous to reach out to employers so having an advisor or mentor to bridge the gap)
- Incorporate field trips and field work into curriculum
- Submitting proposals for research projects/apply for research experiences for undergrads (REU) through National Science Foundation
- The more you can provide, the better your chances are (multiskilled importance)
- Choosing to partner with organizations that have a buy in (ex/ an organization that donates to a school, then interning with that same organization)
- Knowing where to direct students for positions, and employers knowing where to seek out potential candidates
- Pushing students to make an initiative in their job search and their skill growth
- Post high school credentials that can harmonize with a degree or be on its own
- Provide internships to students and the community
- Provide short term opportunities to work (over spring break/summer break etc.)

Tina: That was such great work! Now, let's do a couple of polls to determine your top desired skill (industry) and top job alignment opportunities (education).



- **Integration between technology and science – 42%**
- **Technical problem-solving skills (troubleshooting) – 33%**
- Ensure students understand the process involved with the tools they are using. Understand the larger task and know how to solve it as tools change over time. Understand the foundational concepts/language in the industry. – 14%
- Mariners training – ships, captains, engineers/system, deck positions/wheelhouse – 11%

Tina: All got energy but there's a good run between the two in the middle: Integration between technology and science and technical problem-solving skills (troubleshooting).

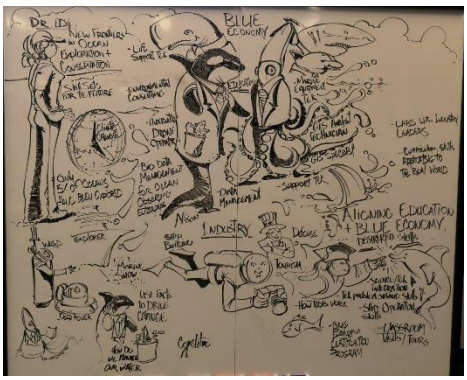


- **Make curriculum and labs more project based with transferrable skills and applicable to real world problems/current issues – 50%**
- **Certification programs (through organizations that are respected) – 31%**
- Labs with industry leaders to prepare students with the information they need - 11%
- Tours/class visit with equipment and jobs related to that equipment (like a Great American teach-in) – 8%

Tina: Make curriculum and labs more project based got the most energy. Then certificate programs. And the other two got some energy too.

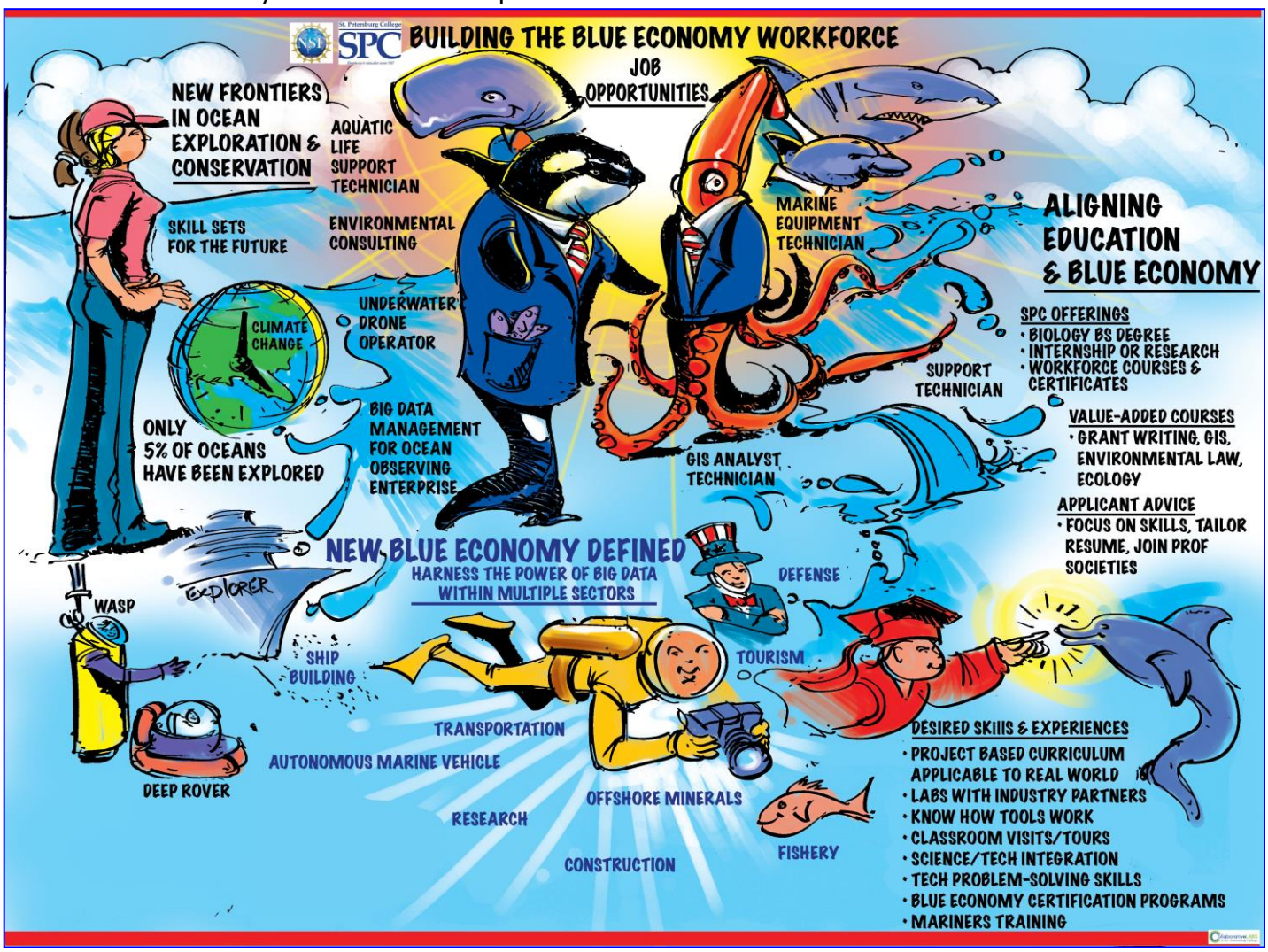
Visual Illustration, Wrap-up & Next Steps

Tina: Jonathan will now share the visual illustration. It's black and white now, and he'll take it back to his studio and make it full color.



Jonathan: We started this morning listening to Dr. Widder talk about exploration, climate change, WASP, and Deep Rover. I highlighted those and will include our other buckets. Started thinking about animals, whales, and squid. The squid has a suit on. Years ago we had personality profiles that defined you by animal. I added squid to that. A lot of these are multitask buckets so we need people with more than two hands to do some of the jobs. We'll give those to the squids. Around that is the education and profession buckets. Then Alison talked about industry, highlighting tourism and defense. Aligning education and the Blue Economy with desired skills. You'll find key words around your report out highlights.

Tina: Wait until you see the finished product!



Tina: Collaborative Labs would love to work with you. Laurie will work with you if you're working with a grant to build in Collaborative Labs' services. Erica, do you want to close us out for the day?

Erica: Thank you for being here. We look forward to getting you a full documentation of everything that happened today. You'll have access to the PowerPoints also. Next steps: We're looking forward to hearing from you. If we didn't cover something today that you'd like us to, we'd love to hear from you. And to partner with you on grants if you need an educational institution to provide partnership. We're always here for you. Lastly, post-production of all materials, Dr. Boehme and I will create a white paper to go to NSF. Their next step is to offer opportunities for funding for some of these things to happen. There's a real push for community colleges and smaller schools like SPC to provide these opportunities. There are an additional three to four of these sessions around the U.S. similar to this. We thank you for all the work you did today.

Tina: Thank you all for being here. We appreciate you.

Attendee information is available upon request.