



**Proudly Present**

## ***“Something STEM-ulating over, under and on the Water”*** ***April 20, 2020 at Nauticus, Norfolk VA***

version 2/13/20

Join hundreds of students and professionals from Hampton Roads schools, industry and government partners as we chart the course and navigate the opportunities for regional workforce and economic development. College, high and middle school students will explore STEM engagements and career opportunities, while some will compete in the 2<sup>nd</sup> annual Hampton Roads Tech Ramp Competition. Our professional partner sessions will help define the future of ground-breaking, forward-looking research and development that supports regional economic and workforce development and provides science, technology, and engineering expertise to develop technologies that benefit Hampton Roads and directly contribute to Virginia and national interests.

Register at: <https://somethingstemulating-techramp.eventbrite.com>

- Science Technology Engineering and Math Interactive Activities (Middle/High School and Colleges) presented by the Nauticus, Navy, Marines Corps, Coast Guard, Elizabeth City State University, and Destiny Aviation Services
- HR Tech Ramp 2020 Student Engineering Design Competition (Middle/High School and Colleges)
- Open Seas 2020 Maritime Challenge Presentation (college, business)
- Digital Shipbuilding Presentation (college, business)
- Strategic STEM Planning Workshops and Panels - Government, Industry and Schools
- Student Scholarships & Prizes
- Faculty/Civic Recognition and Awards
- Distinguished Civic Leadership & Faculty Recognition Awards
- Strategic Regional Planning Workshops and Panel Discussions
  - State of the Region
  - Charting the course
  - Call to Action/Workshops
    - Government
    - Industry
    - Academia



Join hundreds of students and professionals for  
*Something STEM-ulating over, under and on the Water*



HAMPTON ROADS

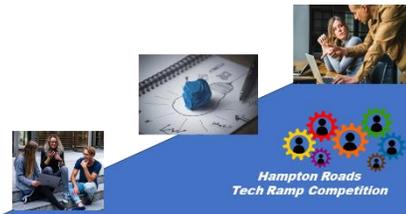


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# **SPECIAL SESSION 1**

## **Hampton Roads TECH RAMP 2020 Competition**

version 1-21-20



### What is the HR TECH RAMP?

**HR TECH RAMP** is an engineering contest for regional middle school, high school and college students who will identify an engineering problem to be solved by a fabricated device, through CAD, Mod Sim and hardware prototyping, demonstrate the solution. Engineering problems and solutions can be from any industry sector: ship building, drones (air, land, sea), logistics, maritime, tourism, any hardware or materials- based business.

**HR TECH RAMP's** goal is to highlight STEM and grow a regional engineering talent pool, while creating relationships between High School, College and Business.

### **Three Categories of Competition:**

- 1. Middle School STEM and Engineering**
- 2. High School STEM and Engineering**
- 3. College STEM and Engineering**



### HR TECH RAMP Collaborating Partners

The Hampton Roads Innovation Collaborative, the Governor's School of Science & Technology and the Tidewater Chapter, National Naval Officers Association (NNOA) are the collaborating partners for **HR TECH RAMP 2020**. NNOA facilitates strategic national and regional STEM partnerships.

### HR TECH RAMP Structure

- The program runs **Jan - Apr 2020**. Design, prototype, test, compete.
- Design competition will be held Monday April 20<sup>th</sup> at the Nauticus in Norfolk.
- Teams will gather at the Nauticus for 4 hours to;
  - Assemble their solution at the location.
  - Demonstrate their solution as part of the presentation delivered to judges.  
Thirty minutes will be given to each team for all communications, demonstration, and Q&A.



### 5,000 in Prize Money per Category (Middle School, High School and College)

- **Best Solution:** The best concept developed to solve a business problem via engineering.
- **Best Design:** The best use of CAD, Mod Sim, or other emerging technologies.
- **Best Build:** The best use of prototyping technology (electrical, metal, wood) tools.
- **Best Overall Project:** The best incorporation of other award criteria (and winner of at least one).

### **Regional Fabrication Assistance**

As required, HRIC will connect competing schools with business/technology mentors as well as prototyping/building assistance if required other than the school's resources.

### **Example of Tech Ramp Engineering Challenges (may be updated with new/additional challenges). Any design challenge degree of difficulty will be relative to the category (Middle School, High School, College).**

1. A system to count and record the revolutions a freely rotating body.
2. A wearable system to provide auditory or tactile directions for the visually impaired to walk to a desired urban location using GPS.
3. A system to provide directional auditory awareness to an autonomous car, of emergency vehicle siren, screeching brakes, other road noises and give signals to the passenger.
4. A local air hazard warning system to detect the occurrence, severity, and diffusion of harmful pollutants in an urban setting.
5. A chemically powered vehicle to carry a specified cargo a specified distance.
6. A robotic solution to real life problems in the agricultural arena.
7. An operating solar powered home.
8. An operating solar powered vehicle.
9. A machine that uses the most complex process to complete a simple task.
10. A system to solve maritime problems.
11. A system to solve logistics problems in distribution.
12. A proposal to pursue a business-sourced problem of the team's choosing.

### **Regional Tech Expo Visibility**

HRIC would provide space at the Regional Tech Expo for any team who would like to demonstrate their solution to the attending business audience.

### **Statement on Intellectual Property**

With any design competition the notion may come to mind that the entry can be patented and/or commercialized. All individuals, groups and organizations participating in HRIC's Tech Ramp certify that their contest entries are original works and do not contain any elements that violate any third party's copyright, trademark or other intellectual property rights. The participants accept all responsibilities arising from any breach of intellectual property rights relating to their entries, and shall indemnify HRIC, its agents and partners and competition organizers against any claims and liabilities arising from any such breach. HRIC claims no property rights in and to the designs and submissions other than for the purpose of exhibition and administration of the Tech Ramp Competition. By participating in the Tech Ramp Competition, you acknowledge and agree to the terms and conditions established by the organizers.

### **Statement on Insurance and Liability**

All school teams are expected to be insured allowing participation in the competition at the off-site location. HRIC assumes no liability or responsibility for any related activity and is acting only as the coordinator. By participating in Tech Ramp, you acknowledge and agree to these terms and conditions and release the Hampton Roads Innovation Collaborative from any liability or responsibility for any injury.

### **Tech Ramp Judging Criteria**

Judges will have a detailed scoring rubric with descriptive words for each level of achievement under each competition criterion, per classical rubric design.

## Design Process (80%)

The team has maintained an engineering design notebook to record and demonstrate that they have:

1. Defined clearly the engineering problem to be solved or new opportunity to be created.
2. Performed thorough and adequate research of potential end-user needs and preferences to identify the most important product design characteristics, constraints, and performance specifications.
3. Created multiple alternative solutions to the chosen problem or new opportunity, having studied and learned from existing designs, methods, and applications.
4. Chosen and implemented the best solution among the alternatives using appropriate engineering decision making tools.
5. Measured, collected, and analyzed critical performance data at every design iteration, demonstrating continuous improvement and refinement of the prototype design.
6. Provided adequate and well-supported justification for end-user requirements that were not modeled or tested in the prototype design.
7. Provided a full description of the final product that included consideration of health, safety, and environmental concerns and regulations; sustainable manufacturability; applicable industry standards; and other design requirements and constraints, to assure the marketability of the final product.

## Design Presentation (20%)

The team has used visual presentations, computer displays, and individual team member interviews to demonstrate that they have:

1. Provided a clear and complete presentation of their prototype design process and methodologies.
2. Communicated persuasively the merits of the final product and the process to be followed to achieve it.

The presentation will include a table on which the team will provide:

1. A standard 36 x 48 tri-fold poster that displays:
  - a. Project name, team (school) name, and student names with grade levels
  - b. Problem statement or opportunity proposal
  - c. Engineering Design Process
  - d. Samples of performance data
  - e. Final Product Description
2. A running computer slide presentation of the design process, including, for example, narratives, photographs, drawings, data displays, videos, etc.
3. The prototype design with opportunity for hands-on performance demonstrations.

## How to Enter a Team – 2 Step Process

**Step 1: Register at <https://somethingstemulating-techramp.eventbrite.com>**

**Step 2: Do Step 1, Then Select Tech Ramp Competition registration option as an add-on**

*Dan G. Bell*

**President**

**Hampton Roads Innovation Collaborative**

**757-373-6517**

**[danbell@hric.email](mailto:danbell@hric.email)**

The Hampton Roads Innovation Collaborative (HRIC), is one of ten technology councils in the commonwealth of Virginia. Originally formed in 1996 as a 501(c)6 nonprofit, the Hampton Roads Technology Council (HRTC) now HRIC, is solely focused on advancing technology business in the Hampton Roads region.

## **SPECIAL SESSION 2**



**Proudly Present**

# ***Hampton Roads “Open Seas 2020 Competition” as part of: “Something STEM-ulating over, under and on the Water” April 20, 2020 at Nauticus, Norfolk VA***

version 1-21-20

### **Institute for Innovation & Entrepreneurship**

Open Seas is a partnership between the ODU, the Virginia Institute of Marine Science (VIMS) and the College of William & Mary. The program will be heavily focused on three industry clusters - maritime, shipping and logistics; aquaculture and fisheries; and flood mitigation and resilience. Although they cover over 70 percent of the surface of the planet, the oceans of the world are under serious threat.



### **What is the HR Open Seas?**

**HR OPEN SEAS** is a marine science and maritime competition intended to promote the creation of marine technology businesses in Hampton Roads.

ODU's Institute for Innovation & Entrepreneurship is collaborating with the Hampton Roads Innovation Collaborative on an Open Seas effort to create maritime businesses to address ocean challenges.

### **What are the Top 10 Ocean Challenges?**

Discover the ten biggest problems in the oceans right now.

#### **1. Plastics**

- The ocean is increasingly becoming a plastic soup that is killing hundreds of marine animals daily.
- Sooner or later, these millions of plastic pieces will end up in our stomachs.
- The size of the Great Pacific garbage patch ranges between 700,000 square kilometers (270,000 square miles) and 15,000,000 square kilometers (5,800,000 square miles).
- Plastic and debris: they are killing our oceans.

#### **2. Trash**

- The amount of litter left on the beaches or thrown into inland waterways, such as rivers and streams, will end up in the ocean.
- The situation is more serious when it comes to non-biodegradable waste, such as plastics, which break up into smaller particles, microplastics, and are mistaken for food by many marine species.
- The microplastics present in hygiene products and domestic and industrial cleanings products will also have the same destination.
- The islands of garbage are already a reality in some areas of the oceans.

### **3. Pollution**

- Many fertilizers and pesticides used systematically in agriculture end up falling into the ocean.
- Some of these products cause irreversible and fatal changes to the species; for example, they affect the reproduction process. Also, if ingested by humans, they can cause health issues.
- Water pollution: pollutants destroy marine life and affect humans.

### **4. Overexploitation of Fishing Resources**

- Studies indicate that there has been a considerable reduction in the populations of some species of fish. For example, overfishing of cod in Canadian waters has almost led to the extinction of the species.
- In addition to overfishing, there is also a serious lack of fishing activity management or non-compliance with the rules.
- The absence of a definition of the size of the animals or the time of capture, which allows the capture of juveniles or females with eggs, are some of the recurring problems.
- Overfishing of species with long life cycles at the top of food chains, like sharks and tuna, or species used for luxury cooking and alternative medicine also cause irreversible changes in the harmony of marine life.

### **5. Unsustainable Aquaculture**

- Intensive aquaculture at sea promotes the proliferation of pollutants in marine waters.
- The production of fish and bivalves involves the use of antibiotics and other chemicals, some of them toxic to the ecosystem.
- This situation is clearly visible in Asian waters due to the intensive production of Vietnamese clams.

### **6. Marine Engineering and Oil Drilling**

- All changes in the marine environment caused by construction, deep hole drilling, and many others human-related interventions cause acute changes in the habitat, various disturbances and generate pollutants.
- All these factors contribute to the destruction of the natural element and compromise the survival of marine species.
- Oil drilling: causing various disturbances in the marine environment.

### **7. Destruction of Habitats**

Some habitats provide and represent a unique shelter for reproduction. Marine forests are being destroyed for various reasons, including the use of aggressive fishing gear and methods like trawling.

### **8. Ocean Acidification and Coral Bleaching**

- Climate change has a profound impact on the oceans. The increased levels of CO<sub>2</sub> in the atmosphere cause changes in the pH of the oceans.
- This situation is particularly evident in tropical regions where marine ecosystems are extremely sensitive and rich in biodiversity, and where habitats are undergoing irreversible changes, most notably in coral reef areas.
- Ocean acidification: changes in pH kill coral reefs.

### **9. High Levels of Mercury**

- Excess mercury causes severe illness in marine life and humans. It is a pollutant that accumulates in the food chain and reaches humans through the ingestion of fish.
- High levels of mercury can cause serious diseases. As a result, the consumption of several fish species like the black scabbardfish and tuna should be regulated.

### **10. Sea Temperature Rise**

- Rising sea temperatures cause dramatic changes in marine ecosystems, with severe and lethal consequences.
- The phenomenon is also responsible for changing migratory routes, causing imbalances in food chains. For instance, raising the water temperature by just 0.5 °C causes the death of coral reefs.
- Healthy coral reefs work as "maternities" and shelter areas for a wide variety of species that provide food for humans, and on which many fishing communities depend.

## 11. Maritime Specific Challenges

- Ballast Water: What to do with water taken in from an overseas port that is NOT allowed to expel in USA ports due to chemicals or marine animal infestation.
- Undersea mapping: The undersea terrain changes all the time due to currents and shifts. How to obtain accurate mapping of the undersea world for navigation and other concerns?

## Open Seas 2020 Business Launch Competition

Open Seas 2020 is a competition to design a maritime business to address either a listed problem or even another which can be suggested.

## Open Seas 2020 Business Competition Process

1. **Open Seas Reverse Pitch Day.** Entrepreneurs are used to pitching their business idea to investors, partners and anyone they might meet in the local coffee shop. In this competition, the tables will turn. Instead, ODU's Open Seas Team will pitch to the attending audience to challenge and stimulate their thinking toward solving maritime problems.
2. The Open Seas Reverse Pitch Day will be held Monday April 20<sup>th</sup> at the Nauticus in Norfolk at 2pm, in their auditorium.
3. At that session attendees will learn more about marine and maritime challenges to ascertain what direction they may want to take a new technology business idea into.
4. Over the next 90 days (till July/Aug date TBD);
  - Attendees use info to develop ideas/proposals on innovation to solve issues.
  - Attendees apply for an Open Seas Cohort.
5. At the 90-day mark (from April 20, exact date TBD) companies get to present their business pitches to the Open Seas team for cash prizes to assist in business launch.
  - The Open Seas team selects a cohort and works with them to create and validate a business model and do the planning required to stand up MVPs.
  - \$4,500 of cash prizes are available to help launch selected cohorts.



## How to Register for Open Seas – 2 Step Process

**Step 1: Register at <https://somethingstemulating-techramp.eventbrite.com>**

**Step 2: [Do Step 1, Then Select Open Seas registration option as an add-on](#)**

*Dan G. Bell*

*President*

*Hampton Roads Innovation Collaborative*

*757-373-6517*

*[danbell@hric.email](mailto:danbell@hric.email)*

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## **SPECIAL SESSION 3**



### **Who is VMASC?**

Virginia Modeling, Analysis, and Simulation Center is an applied research center of Old Dominion University. We build models, simulations, and visualizations to understand the future and its uncertainties. We formulate complex problems, design experiments, analyze data, and interpret results. We conduct scholarly research and publish results, adding to the body of knowledge. We teach and mentor students who become part of the 21st century workforce. Through modeling, analysis and simulation, we help mankind.

### **VMASC Focus on Digital Shipbuilding**

- Development of a digital shipbuilding curriculum outlines to upskill the current shipbuilding workforce and equip future workforce for advanced manufacturing jobs regionally and statewide.
- Continue ongoing efforts in economic outreach and regional outreach to businesses, industry partners, training providers, academic institutions and students through Digital Shipbuilding internships, conferences, job fairs, STEM outreach events, and use of VDSP labs

### **Future Engineers Dive into Integrative Technology!**

Guests will engage in real-world applications of STEM design modules through technology associated with the digitized transformation in manufacturing and engineering. The program and workshop empowers innovative, maritime industry practices within the digital age utilized advanced learning technologies, real time data, and integrative frameworks. The ODU-VMASC Digital Shipbuilding program is charting the course towards advanced manufacturing including 3D modeling, augmented reality, virtual reality, additive manufacturing, laser scanning and mixed reality.

## **Something STEM-ulating over, under and on the Water** **April 20, 2020 at Nauticus, Norfolk VA**

Join us on April 20<sup>th</sup>, 2020 3pm, at the Nauticus in Norfolk to learn all about our digital shipbuilding program.

1. Learn about the innovative technology being used in the maritime industry.
2. Have an opportunity for guests/visitors to try the technology for themselves.

Register at: <https://somethingstemulating-techramp.eventbrite.com> and select **Digital Shipbuilding** to attend our 1 hour long session.

For any questions, contact Jessica Johnson, M.Ed, Ed.S, PhD Student, Curriculum Coordinator  
Old Dominion University - VMASC [j17johnso@odu.edu](mailto:j17johnso@odu.edu)

### **How to Register for Digital Shipbuilding – 2 Step Process**

**Step 1:** **Register at <https://somethingstemulating-techramp.eventbrite.com>**

**Step 2:** **Do Step 1, Then Select Digital Shipbuilding registration option as an add-on**