



STI Environmental Session 6A 12.00 – 13.15

Brian Boru Environmental Project



Aoife Parker-
Hedderman,
Climate Analyst



Gill Carver-
very active
environmental
citizen



James
Nightingale-
Chemical
Engineer



Charlie Lewis-
Chemical
Engineer
Recycling



Aoife LOB-
STI Blue Flag
Panel Chairperson

Dublin – Waterford – Cork
Kindly supported by:



SAIL TRAINING
IRELAND

Goal: develop ideas for environmental education on board tall ships

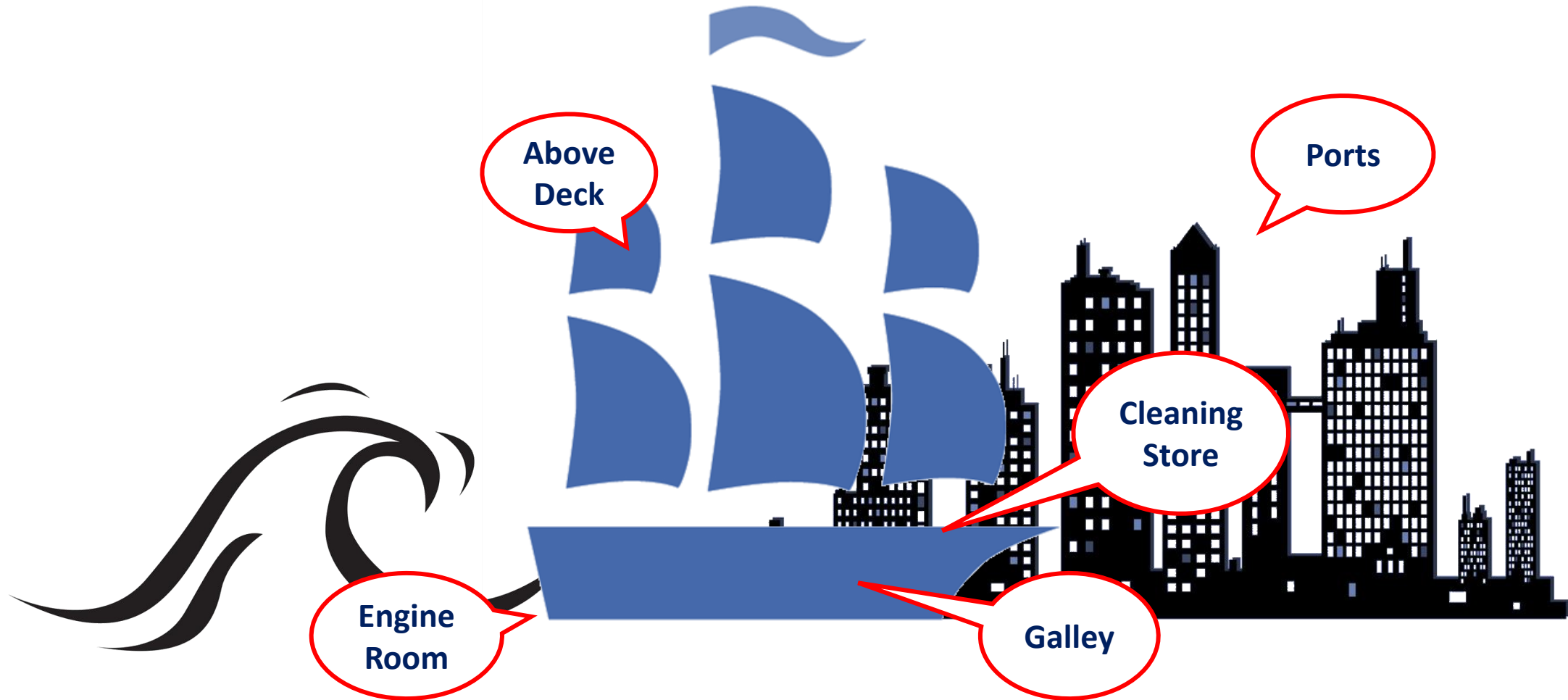
How's this session going to work?



1. Best practice regards the environment
2. Environmental education

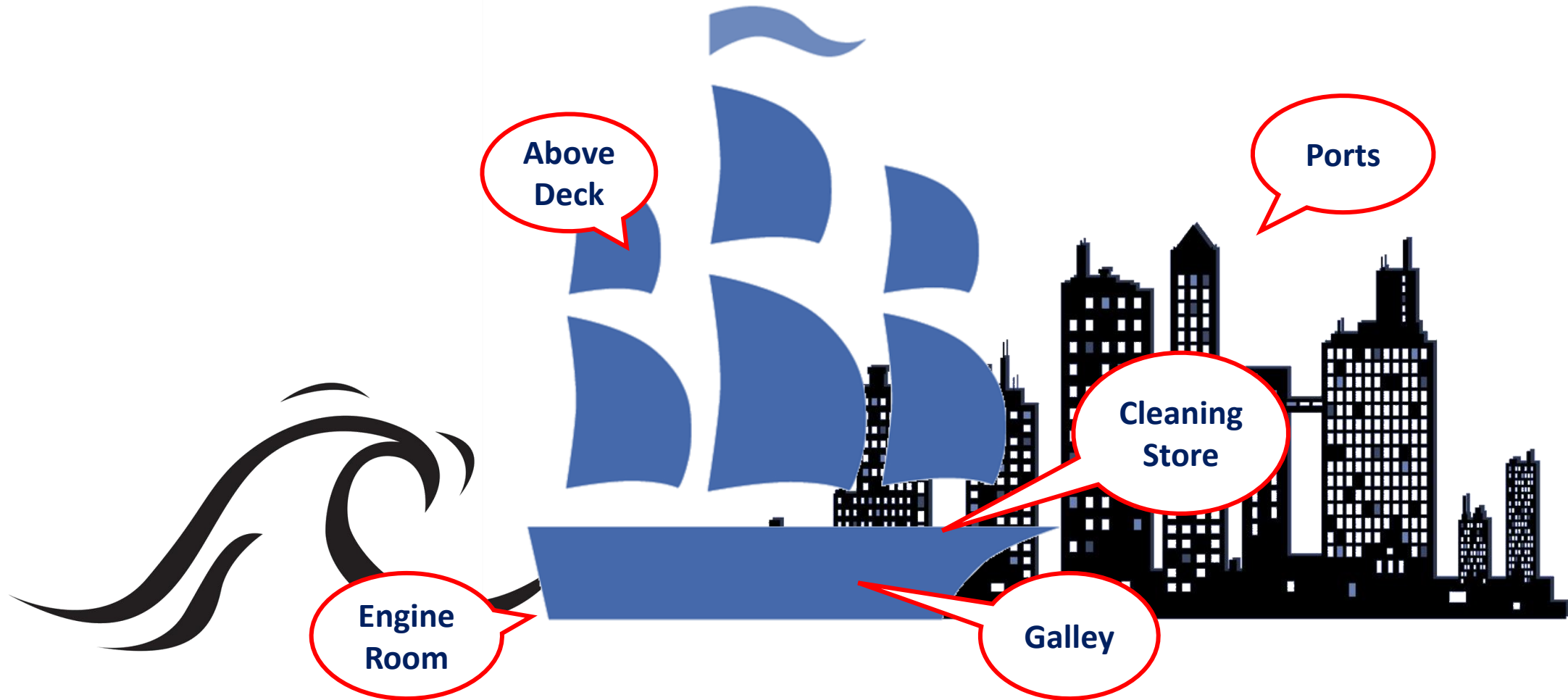
Your input is key

What does *good* look like?



Let's frame the things that matter under each heading

What is the *most* important? Mark with a *



Cast one vote per heading

Discussion Time . . .

**Above
Deck**

Things blowing off
deck

**Engine
Room**

Fuel consumption

Ports

Use shore power

Galley

garbage/rubbish separation

**Cleaning
Store**

Biodegradable cleaners
Control access

What are the challenges working against us in achieving these?

Kickstarting you own Environmental Programme

Examples:

1. Water Conservation
2. Waste Management
3. Energy Consumption



Some ideas to get us started

Kickstarting you own Environmental Programme

Now it's your turn:

1. Break up into groups
2. Grab some templates
3. Get brainstorming activities



Afterwards we'll ask each group to share their top activity

What am I going to do with all this info?



Ensure the areas of highest importance are included in the **Blue Flag application** where applicable

Feed back to the **Port Advisory Group** the port-focussed items for discussion and action

Polish off and **make publicly available the activities** for environmental education

Thank-you so much for you contribution



STI Environmental Session 6A 12.00 – 13.15



**Voyage of Discovery on a
Cruising tall ship Classroom**

Los Angeles Maritime Institute.

Resources, Underway Activities.

Mark.friedman@lamitopsail.org

We have two 110' 2 masted brigantines and a 130' 3 masted schooner with a several decades long, proud history of programs to serve inner-city youth & science enthusiasts.

- So you're going on a voyage with LAMI...



What do we do on the boat?



Student FAQ's:

- Will I get seasick?
- Do I need to know how to swim?
- Will I see sharks?
Dolphins? Whales?
- What will I learn?
- Will there be wi-fi?
- Can I climb aloft?



Our tall ship activities are correlated to Next Generation Science Standards (*NGSS*) and *Common Core* (CC) in the following subjects:

Biology, Advanced Placement (AP) biology, Chemistry, AP Chemistry, Physics, Robotics, Engineering, Ecology, Environmental Science, AP Environmental Science & Mathematics.

We invite you to share in our resources for your students and general population...which also assists **teachers** in implementing in-school science and math courses and special programs.

Biology & Marine Biology

Prior to departure a small group of students will assist an onboard educator in securing marine specimens from the dock to study while underway.

A plankton tow is another option.

Microscopes (*dissecting & compound*), slides, observation bowls, pipettes, identification sheets will be available so all can learn the **differences between zoo plankton and phytoplankton.** All students will

observe the differences between **prokaryotes & eukaryotes**; some organelles such as chloroplasts, vacuoles, and nuclei are visible.

We'll also teach microscope use & preparation.

Ecology/ Environmental Science:

Plastic/Microplastics Debris Investigation

First, a brief explanation of **microplastics and their impact on marine organisms and human body systems**. We shall examine multiple samples of sand from local beaches, harbors, rivers, the Pacific gyre, and general samples of types of plastics that could enter the ocean.

Participants are given a local **sand or substrate sample** and with tweezers and bowl, in teams of two, **separate plastic particles** and count them in a short competition.

Dissection and compound microscopes will be used for students to view locally obtained microplastic under magnification, and, in the process, be astounded at the pollution in the marine environment

Ecology & Environmental Science: *Macroplastics-Their Real Life Impact on Marine Organisms*

<https://www.youtube.com/watch?v=1qT-rOXB6NI>

<https://vimeo.com/102186626>

(start at 1 min run till 2:30)

Participants will receive a bolus (*stomach contents*) of a deceased juvenile albatross from Midway Island.

In teams of two, they will separate organic from inorganic matter {*biotic Vs. abiotic*}, consisting mostly of squid beaks (Squid is an albatross food staple) and plastic particles/pieces. (Competitive or noncompetitive way)

Result: Understanding that macroand microplastics & cause *death or severe harm* to marine organisms.

Chemistry & Water Quality Analysis

In this station we'll explore properties of seawater. Through the use of a **Secchi disk**, they'll learn **turbidity**. They'll take a seawater sample and with instrumentation, determine **temperature, density, pH**, and learn about **ocean acidification** (*A result of atmospheric carbon dioxide and carbon particulate impacts on earth's oceans.*)

Advanced classes will determine the amount of **dissolved oxygen (DO)** in water samples, learn the **relationship between temperature and oxygen** content across a **thermocline** including **aerobic** (*oxygen*) or **anaerobic** (*no or reduced oxygen*) impacts on marine plants/animals, por test for nitrogen, phosphorus and other elements.

Navigation Using Mathematics

- Under direct instruction by the captain or crew, students will discover the intricacies and complexities of actual **marine navigation charts**.
- They will learn how to use the tools necessary to **measure, compute distance and direction** of the ship and plot a course.
- **Participants will learn navigation and depth** measurements using basic arithmetic and **geometry**. They will learn how to **triangulate distances** and experience early seafarers' navigation methods using an historical **sextant**.
- They'll plot a real-time course to a local site.

Physics of Sailing and the Ocean

- This station educates students about **buoyancy, density, waves, mechanical advantage, Bernoulli principle**, and other aspects of **applied physics**.
- They'll determine **vessel speed**, experience firsthand the mechanical advantage of **pulleys**, develop an understanding of **waves** (*water and wind*) and their component parts, **transfer of energy** (**potential/kinetic**), relationship between sails, keel, and rudder ... all applicable to classroom physics instruction.
- Additionally, they'll determine meteorological **wind speed** and direction by using an **anemometer** comprehending weather impacts on sailing vessels.

Undersea Robotics Adventure with a **R**emote **O**perating **V**ehicle

- Students test their **navigation skills** in piloting a remotely operated vehicle before and/or after this voyage of discovery. They will feel and see firsthand, the impact of **current (knots)** on **navigation** challenges, **visibility**, quantity of marine 'snow' (**detritus**), **plankton** and the challenges in navigating underwater craft.
- The ROV, has a 100' tether, multiple **sensing devices**, and **camera**, which together provide expanded data **collection and analysis** of the marine **water column** and **substrate**.

And now ...to the Voyage

1. Cruise organizers will provide teachers in advance with background materials based upon their choice of 4-5 mini science stations. We encourage an extra station for climbing the bowsprit, setting sails, etc.
{These include: reading, videos, homework, pre and post assessments, games ...} (www.lamitopsail.org)
2. We are willing to come to schools/ classes beforehand to assist with sail background and instruction
3. **The program is free**... grants secured pay for the 1+ day sail costs. Schools provide student transport to the ships. Release forms are required for students. We encourage two teacher chaperones to assist crew.
4. Students can bring lunch to eat on-board or after sail.

Multi-Lingual Ocean Literacy Principles

NMEA WEBSITE www.marine-ed.org/page/oceanliteracy

- *Ocean Literacy Guide, Scope & Sequence for Grades K–12 and Ocean Literacy Framework* is at: www.oceanliteracy.net
- **Hard copies of the Ocean Literacy Guide** –: education@noaa.gov
- **Student produced bi-lingual (English/Spanish) videos on the 7 Ocean principles:**
 - <http://www.youtube.com/channel/UCBbHNdMYu9qrDGblwhzjqsg/videos>
 - **The Ocean Principles:** <http://www.youtube.com/watch?v=oxPsF6VfoVw>
 - **Introduction:** <http://www.youtube.com/watch?v=-irPPkM6YnY>

Ocean Literacy Survey in English: <https://tinyurl.com/IOLS-English>

Spanish: <https://tinyurl.com/IOLS-spanish>

Exemplary Practices in Marine Science Education

<https://dornsife.usc.edu/uscseagrant/ocean-literacy-summit-2019/>

Sylvia Earle speaks to 250 Inner-city youth (Animo High School Darwin Day)

Short 10 min version: http://youtu.be/03n2l_m1p9M

Full 25 min presentation, special interviews: <http://youtu.be/Wx84zGxE8K4>



Los Angeles Maritime Institute

Berth 73, Suite 2, San Pedro, CA 90731

310.833.6055 | info@lamitopsail.org | lamitopsail.org



Thank you for the opportunity to present LAMI and our in-the-field educational programs. All Aboard! Many materials are available on-line.

A complete 32GB flash drive with LAMI programs, logbooks, science materials related to each on-board station, and 2 full marine biology courses (general & advanced) is available from Mark during this conference. 5£ (donation for cost of flash drive)