

# FINAL REPORT

## The Ship as A City Award #: 70NANB21H174

### Program Goals

This program aimed to create educational material to strengthen the resources available to promote the understanding of documentary standards, standards development, and standardization for personnel entering and currently working in the U.S. maritime industry.

The materials developed in this project are valuable as nearly every decision made in marine vehicle design, construction, and operations must include consideration of existing standards and requirements. Students enter the maritime industry with limited knowledge of the incredible influence of developed standards, rules, and regulations in marine vehicle design, construction, and operation. The materials were developed to reinforce that mindset early in students' professional careers. The materials are intended to serve the short-term goal of providing guidance and references for student capstone projects (senior year projects) and as valuable reference sources throughout their college-level education. After graduation, these materials will provide the long-term benefit of building foundational knowledge of this aspect of the industry, which will serve the graduates whether they become marine vehicle operators, designers, port engineers, shipyard managers, or regulators.

The materials produced are intended to serve:

1. Graduate and Undergraduate-level maritime technical programs (both marine engineering and naval architecture) and capstone projects
2. Undergraduate-level maritime license programs (both Deck and Engine Licenses)
3. Non-degree technical programs for both licensed and unlicensed mariners

The materials produced focus on the following subject areas:

1. **Standards and the Maritime Industry:** What standards are used in marine vehicle design, construction, and operations, and why and how are standards developed in the maritime industry?
2. **The U.S. Commercial Maritime Industry:** Commercial marine vehicle specifications, national and international maritime regulations, and the classification and compliance verification process.
3. **The U.S. Government Shipbuilding Industry:** Government combatant and non-combatant ship and small craft specifications and standards, national and international requirements, and classification variations for Government assets.
4. **Applying a Standardization Process to Innovation:** Applying standards to innovation and new technology.

All materials produced in this project are available to the public free of charge via a webpage accessible from Webb Institute's webpage - <https://www.webb.edu/ship-as-a-city-standards-in-the-maritime-industry/>.

## **Program Outcomes**

The project produced a collection of educational materials that can be used in several ways. The presentations can be used together to deliver a multi-hour short course that explores standards in the maritime industry in depth. Alternatively, the individual program modules may be used ala carte, allowing instructors or students to choose the components that best fit their educational objectives. Finally, the presentation materials will be available on request in an unlocked form, allowing educators to extract specific slides, graphics, and text for use within their course materials.

At the time of this report, ten modules were produced and posted to the program's webpage.

The program modules are assigned to five categories.

- 1. Ship as a City Introduction**
  - a. Ship as a City Introduction Video
  - b. Program Introduction (18 Slides)
  - c. Standards, Codes, Specifications, and Regulations (20 Slides)
- 2. Standards and the Maritime Industry**
  - a. Standards in the Maritime Industry (42 Slides)
  - b. Introduction to the Maritime Regulations (47 slides)
  - c. Sources of Standards and Regulations in the Maritime Industry (51 Slides)
- 3. The U.S. Commercial Maritime Industry**
  - a. The U.S. Commercial Maritime Industry (54 Slides)
  - b. Commercial Ship Lifecycle and Standards (19 Slides)
- 4. The U.S. Government Shipbuilding Industry**
  - a. The U.S. Government Shipbuilding Industry (69 Slides)
- 5. Applying a Standardization Process to Innovation**
  - a. Applying a Standardization Process to Innovation (36 Slides)
  - b. The Future of the Maritime Industry & Decarbonization (80 Slides)

Descriptions of each of the modules are found in Appendix A of this report.

The individual modules include relevant references and links to additional information and resources. A question bank has been developed for educators and is posted on the program's web page. This question bank supports the development of assessment tools.

Matthew Werner of Webb Institute will continue to add materials to the web page, such as new presentations, educational videos, references, links, and relevant industry news. The web page invites industry and academic partners to request additional content and contribute materials to the program for public distribution.

## **Evaluations of Work**

The materials for these presentations were delivered to a varied audience, including undergraduate students, college faculty, and industry professionals. The presenters received positive feedback on the presentation and materials from audience members. Academic reviewers found the material appropriate for students in scope and depth.

## Findings and Lessons Learned

A centralized resource addressing the use of standards in the maritime industry did not exist before this project. The completion of this project has created such a centralized resource. A web-based hosting platform makes the materials accessible to students, educators, and industry professionals. In addition, the web-based platform makes it easy to augment and update the project materials. Collaborators are invited to submit content to add to the project library and to request additional content and topical focuses.

The academic audience preferred in-person presentations over recorded lectures. Faculty members welcomed the ability to have access to the presentation material in a format that allows them to incorporate select material into their course lectures. For this reason, editable PowerPoint files will be made available to educators on request.

Many standards organizations have outreach efforts to share the importance of standards and how their organizations develop and maintain their standards. The project materials have embedded references to these resources rather than recreating what is already available in the public domain.

## Outreach Activities

Outreach for the project took several forms. First, presentations using materials developed for the project were delivered primarily to undergraduate students. Engineering students from at least four different naval architecture, marine engineering, and ocean engineering programs attended these presentations. (NYS Maritime College, Stevens Institute of Technology, United States Merchant Marine Academy (USMMA), and Webb Institute)

Table 1 lists presentations made by the project participants using the products of this project.

Table1. Project Presentations

Title of Presentation	Name of Presenter	Date of Presentation	Presentation Venue	Audience of Presentation	Description of Presentation
Introduction to Classification Societies	Richard Delpizzo	3/21/2022	Webb Institute  In Person	Undergraduate Students	Explored the role of Classification Societies and how they support technology development in the marine industry.
	Richard Delpizzo	3/22/2022	SNAME NY Met Section Meeting  In Person	Professionals and college students from Webb Institute, USMMA, NYS Maritime College, Stevens Institute	
The Ship as a City: The Use	Richard Delpizzo	9/16/2024	ANSE Fleet Maintenance	Professionals seeking	Overview of the project and the

of Standards to Design, Build and Operate Marine Vehicles	and Jorge Segovia		and Modernization Symposium  In Person	continuing education	discussion of the role of standards with a focus on government ships.
US Government's Ship Acquisition Process	Richard Delpizzo	Fall 2024	United States Merchant Marine Academy  In Person	Undergraduate students in Ship Management Class	Explored the US government's ship acquisition process, including the use of Mil-Specs and Mil Standards
Introduction to the Maritime Regulations	Matthew Werner	11/7/2024	Webb Institute – NA1 Class  In Person	Introduction to Naval Architecture Course	Introduced the regulatory structure of the international maritime industry and the role of classification societies.

The second approach discussed the project, its goals, and its products with colleagues teaching naval architecture, marine engineering, and ocean engineering programs in US higher education institutions. These conversations and meetings were facilitated through participation in the annual meetings of the Society of Naval Architects and Marine Engineers (SNAME) and the American Society of Naval Engineers (ASNE).

The third approach announced the availability of the finalized project deliverables on the publicly accessible website. On request, the materials can be provided in an editable format to facilitate future updates and collaboration and allow users to utilize specific content for educational purposes. Table 2 lists the methods used to announce the availability of the program's materials.

Table 2: Project Announcements

Announcement Source	Communication Channel	Target Audience
Webb Institute	Email	SNAME's Faculty Advisor Committee
Webb Institute	Email	SNAME's Education Committee
Webb Institute	Email	Institute of Marine Engineering, Science & Technology email distribution list
Webb Institute	Social media channels <sup>1</sup>	Students, Parents, Alumni <sup>2</sup> , Industry Supporters.
Webb Institute	Social media channels	Tagging SNAME, ASNE, IMarEST, RINA, ABS, and other industry organizations.
Webb Institute	Posting on website	Visitors to Webb Institute's website, including prospective students and individuals interested in naval architecture and marine engineering

1 – Social media channels include Facebook, Instagram, Twitter, and LinkedIn.

2 - A large proportion of Webb Institute alums work in the maritime industry.

## Sustainment Plan

Matthew Werner and Webb Institute will maintain the program's web page and content library. This maintenance will include:

1. Posting updated versions of the program materials as they become available.
2. Posting videos of record lectures on standards in the maritime industry.
3. Posting updated links and references to relevant information sources related to maritime industry standards.
4. Posting materials and courses produced by contributors
5. Posting and sharing invitations to collaborate in developing valuable standards-related education content.
6. Posting and sharing information about conferences, meetings, and lectures related to topics addressed in this project.

The goal is to collect content from stakeholders from academia and industry to serve the needs of students and industry stakeholders.

## Conclusion

The project has successfully produced educational materials addressing standards' role in the maritime industry. The modules provide students with the opportunity to learn about

- The role of standards, classification, and regulations in the maritime industry.
- The relationship between standards, codes, classification, and regulations.
- The importance and approach to conformity assessment
- The organizations producing and utilizing standards in the maritime industry.
- The processes used to develop standards.
- The role of standards in the commercial maritime industry.
- The roles standards play in the lifecycle of a commercial vessel.
- The role of standards in the government shipbuilding industry.
- The approach to working with standardization when developing new technologies and products.

The presentations using the project materials have been well received by students and professionals. Feedback from academic partners suggests the material will be valuable for student learning and career preparation.

The ongoing maintenance and updating of the content on the program web page will allow the program's objective to be sustained over time with relevant content. Students exposed to the content will recognize the program's web page as a source of valuable information as they enter their professional careers.

Questions on this project and the final report should be directed to:

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## Appendix A: Module Descriptions

### 1. Ship as a City Introduction Video

A video introduction of the Ship as a City project and the content covered in the course modules.

### 2. Program Introduction (18 Slides)

This presentation provides an overview of the content covered in the educational materials. Discusses the concept of the ship design triangle, including specification, classification, and regulation.

### 3. Standards, Codes, Specifications, and Regulations (20 Slides)

This presentation explores the differences and relationships between standards, codes, specifications, and regulations.

### 4. Standards in the Maritime Industry (42 Slides)

This presentation provides an in-depth discussion of standards' role in the maritime industry. Explores how standards are formed, used, and enforced.

### 5. Introduction to the Maritime Regulations (47 slides)

This presentation outlines the international regulatory framework for ship trading, including the role of the IMO, Flag, Port States, and Classification Societies.

### 6. Sources of Standards and Regulations in the Maritime Industry (51 Slides)

This presentation explores how the maritime industry's standards and regulations are developed and maintained. It discusses the processes the IMO, flag states, port states, classification societies, and industry players use to create, promulgate, and enforce regulations and standards.

### 7. The U.S. Commercial Maritime Industry (54 Slides)

This presentation describes the US commercial maritime industry and its primary industry segments. It then explores the regulations and standards applicable to US flag ships and offshore infrastructure.

### 8. Commercial Ship Lifecycle and Standards (19 Slides)

This presentation starts with a ship's concept design phase and progresses through construction, operation, and recycling, highlighting standards' role in each stage of life.

### 9. The U.S. Government Shipbuilding Industry (69 Slides)

This presentation explores the US government's acquisition process and the role that

standards play. It addresses the concepts of Mil-Spec and Mil-Standard and the role that classification societies can play in the government's acquisition process.

#### 10. Applying a Standardization Process to Innovation (36 Slides)

This presentation describes the processes classification societies use to apply standards to innovations in design and equipment.

#### 11. The Future of the Maritime Industry & Decarbonization (80 Slides)

The presentation discusses approaches to decarbonizing maritime transportation, including new standards and regulations being developed to address the challenges of incorporating new technologies.