

## ***Good Wind and Good Sea: Navigating Beyond Text, Illustrations, and Physical Artifacts***

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### **Introduction**

When I learned about the Nebraska Digital Workshop, I did not hesitate to send a proposal because I am convinced that this would be the perfect setting not only to share my experience, but more importantly to learn from the difficulties, challenges, and success stories of other projects and researchers in this fascinating discipline of digital humanities.

*“Good wind and good sea”* was a common sentence uttered to sailors and seamen—during the Age of Exploration—before departing on a voyage. It was intended to indicate that wind and sea currents were the two most important elements of nature for reaching a destination. In a metaphorical way, the same words describe the often unknown journey scholars embark on today in digital humanities initiatives due to copyright, software, encodings, standards, policies, practices, and properties of the collections and materials. My current research and past work in digital humanities illustrates some of these issues. In my presentation I will report on the Nautical Archaeology Digital Library (NADL), including the objects in the collection, the goals of the project, lessons learned, the infrastructure created, and some ideas for future work.

In the context of this workshop, the relevance of my work is three-fold: first, it shows how properties of the artifacts and materials in a particular discipline drive the creation of novel approaches and tools. Second, the work highlights mutual benefits for the infrastructure of various projects, though limitations emerge. Finally, new collaborations among institutions have been established based on the results of this initiative.

### **Project Description**

This project is a collaborative joint effort which began in 2006 between the Center for Maritime Archaeology and Conservation (CMAC) and the Center for the Study of Digital Libraries at Texas A&M University. The main goal can be summarized as: to provide an infrastructure for assisting nautical archaeologists in their research work and enhancing the dissemination of archaeological findings and seafaring-related information to the general public.

For millennia, seafaring was an important activity that enabled traveling and trading, as well as the exchange of ideas, ways of life, and knowledge among people from a variety of races, cultures and geographies. This exchange, in turn, influenced people’s lives and made possible advancements that had otherwise not been possible. Although numerous reasons influenced the development of seafaring, an important one was shipbuilding technology. Enhancements in the design and construction of ships made it possible to build bigger, safer, and faster vessels, increasing cargo space. Design improvements also made vessels more stable, thus reducing the duration of voyages.

The CMAC has carried out hundreds of excavations and surveys of underwater archaeological sites for over thirty years, generating a large amount of documents and supporting materials documenting the sites, ship remains, and artifacts. It is estimated that for one summer of fieldwork, archaeologists spend an average of seven years studying and analyzing the findings. In this context, information about underwater archaeological sites and the study of shipwrecks can be classified in seven large groups of data, pertaining to: a) the characterization of the site where the ship sank, b) the characterization of the historical period under analysis, c) the specific shipwreck under study, d) the

site formation process, e) the excavation, f) the reconstruction of the site, and g) history of the ship, its voyages and crew.

The complexity of the relationships among these sources is not limited to the ability of relating objects in the collection; rather, it requires the creation of a robust framework that enables scholars to properly identify, catalog, and describe artifacts as well as to identify and classify the components of the ships under study. Despite the use of computers and software tools by archeologists, the full potential of information science and technology is still underutilized.

### **Texts, Illustrations, and Photographs**

The textual and visual components in the collection of treatises and manuscripts come from a corpus that include the most renowned Italian, Portuguese, Dutch, and Spanish authors, such as: Fernando Oliveira's *O Livro da Fabrica das Naus* (1580), *Livro Primeiro da Architectura Naval* by Joao Baptista Lavanha (c. 1610), Manoel Fernandez's *Livro de Tracas de Carpinteria* (1616), and Bartolomeo Crescenzo's *Nautica Mediterranea* (1601).

Additional materials have been recently provided by the National Library of Portugal and include: *Livro Náutico (1575-1625)* containing important data pertaining to the organization of part of the Spanish Armada of 1588, and provides lists containing armament and victuals for India naus. *Memorial das Várias Cousas Importantes (1575-1625)* documenting the management of the kingdom of Portugal in the 16th and early 17th centuries, as well as important data related to the organization and manning of the crown's fleets. *Advertências de Navegantes (1640)* giving an overview of the Portuguese navy, including general rules and knowledge useful to every navy officer.

Photographs and drawings come from the various shipwrecks under study. As a test bed, the Pepper Wreck excavation yielded a large collection of artifacts dated from the late 16th and early 17th centuries, and led to the identification of this shipwreck as the nau *Nossa Senhora dos Mártires* wrecked on September 15 1606 on its way back from India. Work on this excavation generated a large amount of photographs, drawings, and physical objects that need to be related to be useful for analysis.

As this corpus suggests, language and time add another level of complexity. Therefore, automatic tagging of the transcriptions has been augmented with translations and definitions of terms from a multilingual glossary of nautical terms and concepts. This glossary includes taxonomies and categories, thus allowing temporal, spatial, and functional segmentation of the texts. We believe this approach can be applied to other domains with similar characteristics.

### **Significance of the project to Nautical Archaeology and History of Seafaring**

Nautical Archaeology and History of Seafaring benefit from the project as it allows long-term preservation, making the archives accessible both for specialized scholars and researchers as well as the general public. It also makes available priceless, and very often unknown, manuscripts and printed books pertaining to ship construction and historical documents of voyages and exploration.

### **Elements of Technical Innovation**

The capability to correlate and compare numerous texts, illustrations, and photographs across geographies and time provides a new perspective for scholars to better understand how construction techniques were adopted from diverse naval traditions, and how they evolved over time. This approach aims to be more than a presentation of resources, by connecting different abstractions of the same object, it provides new ways to explore the collections, enabling discovery and providing additional evidence to support or refute hypotheses. We have created a prototype for tagging technical

illustrations, with the use of taxonomies and categories, these visual aids can be helpful for disambiguation, especially with ancient technical terms and concepts.

### **Theoretical and Methodological Sophistication**

Our framework includes the design of a model for describing components of a composite object allowing linking across their textual, visual, and physical abstractions. This in turn enables scholars to project incomplete and damaged evidence. We have implemented a scalable architecture along a web-based interface for editing a multilingual glossary of nautical terms and concepts. With the collaboration of about thirty scholars scattered in different geographical locations it encompasses about two thousand terms in fourteen languages. Our architecture is designed to allow integration among other components such as transcriptions, illustrations, and photographs.

### **Creativity of Approach**

We are currently experimenting with a model called *Noodle Maps*. Based on a modified metaphor of Google Maps, the goal is the creation of a spatial interface for browsing and searching ships and their components, using them as a visual index for ancient technical manuscripts. Preliminary analysis on the properties of the materials documenting the Pepper Wreck suggests that ships are good candidates in the creation of visual indexes. However, an open question regarding the generalization of our model to other domains is the complexity in converting visual-rich composite objects into visual indexes.

As mentioned previously, various scholars joined the editorial team of the multilingual glossary after seeing its advantages. It is worth noting how the suggestions of an expert in Venetian shipbuilding tested the scalability of our architecture when we had to add Venetian to the original languages. He also pointed out issues regarding the change of meaning of naval terms and concepts over time, and the lack of one-to-one correspondence of terms across languages. The additional Portuguese treatises were provided by the National Library of Portugal after initial materials were available on the internet. We are currently using the browsing interface to showcase the possibilities of our model to a private collector in Spain, in hopes that he will make part of his collection, precious Spanish shipbuilding treatises, available to scholars and the public.

### **Conclusion**

My work, as is the case in digital humanities, is multidisciplinary and illustrates interesting crossroads among humanities, history, archaeology, computer science, and history of science and technology. It highlights the creation of novel interfaces, encodings, and approaches for accessing and manipulating these materials.

### **Links**

<http://nabl.tamu.edu> Nautical Archaeology Digital Library main page

<http://nabl.tamu.edu/treatises.html> Treatises Browser Interface

<http://nabl.tamu.edu/treatises/Glossary> Multilingual Glossary Editor (password required)<sup>1</sup>

<http://nabl.tamu.edu/treatises/DisplayText?id=1&copyname=oliveira> Advanced Browser (prototype)

<http://nabl.tamu.edu/treatises/image-tagging.html> Image Tagging Interface (prototype)

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<sup>1</sup> Please contact the author if the reviewers need access to the on-line editor.