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ShipQuest: a Bottom-Up Approach for Building a Modern Greek Maritime Ontology

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***Abstract*—The ShipQuest Ontology is a pioneering legal maritime ontology designed for modeling and integrating legal information in the Greek language. This standardized representation of legal concepts within the maritime domain offers a structured approach to managing legal data. By formalizing legal information in Greek, the ShipQuest Ontology ensures semantic interoperability and seamless integration of diverse legal data sources. It encompasses essential classes, subclasses, properties, and relationships pertaining to legal aspects of maritime activities, including legal entities, contracts, regulations, liabilities, and more. The ShipQuest Ontology plays a critical role in streamlining legal operations within the maritime industry, offering a unified and comprehensive knowledge base for legal practitioners, researchers, and decision-makers. Its adoption fosters collaboration and knowledge exchange within the maritime community, promoting standardized legal terminology and practices. This paper delves into the construction and utilization of the ShipQuest Ontology, detailing its architecture, development process, and implementation. Furthermore, we showcase its practical benefits by illustrating its application in real-world scenarios. By addressing the challenges of legal data heterogeneity and facilitating semantic consistency, the ShipQuest Ontology sets a precedent for enhanced efficiency and effectiveness in the legal domain of maritime activities.**

***Keywords*—Maritime Ontology, Knowledge Representation, Legal Information, Semantic Web, Standardization, Maritime Industry, Linked Data**

I. Introduction

Maritime terms texts are written resources about the marine industry, which includes all activities and features including the sea, oceans, and waterways. Academic papers, technical manuals, industry directives, historical records, legal treaties, and other types of maritime publications are all possible. They are crucial resources for marine professionals, scholars, historians, policymakers, and everyone interested in learning about and participating in nautical operations. Also, maritime law is the corpus of legislation that governs naval operations such as shipping, navigation, maritime pollution, and salvage. It covers a broad thematic element of naval operations, focusing on humankind's different links to the world's oceans, seas, and main rivers. A vast area of research in this topic necessitates the collecting and integration of data from numerous and disparate sources.

In the context of Greek maritime terms, flawless information assimilation is critical since it allows for correct data analysis and secure conclusions [7]. This is especially important when looking for answers to questions that require data amalgamation and consolidation, such as "determining the number of sailors per residential location that landed at a defined port and served as crew members on ships of a specific kind, such as Brig. Furthermore, when information is harmoniously integrated within a unified data model, it generates data of great significance and enduring reliability, extendable for purposes beyond a singular research endeavor or project. This enables the broader maritime community (including historical scholars) to integrate and leverage datasets collectively.

One of the important issues of Greek culture is the preservation and promotion of the cultural heritage of the sea in order to pass it on to future generations. In this context, it is considered that both the preservation of cultural heritage and new technologies can and should co-exist and complement each other, aiming at the promotion and protection of cultural traditions. New technologies therefore provide a range of tools and possibilities that can be used to promote, protect, restore and disseminate cultural heritage. One of the main applications of new technologies is the digitisation and preservation of cultural archives; virtual reality, augmented reality and interactive applications, which can be used to create educational and informative experiences around cultural heritage; social networks, web platforms and digital applications, which enable users to share their cultural events, stories and traditions by addressing Through all of the above, stakeholders can gain knowledge about naval history, art, literature and other cultural fields.

In conclusion, we would say that the design of the conceptual thesaurus of shipping with the introduction of the NAFKLIROS platform is necessary for effective specialization, effective communication and development in the shipping sector. The NAFKLIROS platform will incorporate the proposed semantic thesaurus known as ShipQuest. Through proper design and integration of the conceptual thesaurus, we can ensure the accuracy, consistency and communication of linguistic information in the shipping sector, thus promoting the effective operation and development of the industry.

The rest of this paper is organised as follows: Section II details the methodology and principles we have followed for building the ontology. Section III presents the ShipQuest

ontology, describes an example on how a part of the model was revised several times to incorporate new maritime knowledge, and provides its specification. Finally, Section IV concludes the paper and outlines future work.

II. Design Methodology and Principles

In developing the ShipQuest Ontology for effective knowledge representation within the maritime domain, we adopted a design methodology that blends the advantages of specialized and generic thesauri. While specialized thesauri have traditionally served specific database needs, we recognized the importance of creating a more comprehensive and versatile ontology. Therefore, we incorporated elements from generic thesauri, which cover a broader spectrum of topics and can be applied to diverse databases and knowledge representation scenarios. The proposed ShipQuest Ontology leverages the strengths of both specialized and generic thesauri, striking a balance between targeted domain coverage and broad conceptual representation. By integrating this hybrid approach, we ensure that the ontology accommodates the specific intricacies and nuances of legal information within the maritime industry while also providing a foundation for seamless integration and interoperability with other domains.

A. Guiding Principles

To guide the design process, we followed established principles of ontology engineering and knowledge representation. The ontology development adhered to the open-world assumption, allowing for future expansion and accommodating emerging legal concepts and terminologies. Furthermore, we embraced the Linked Data principles, ensuring that the ShipQuest Ontology can be interlinked and interconnected with other relevant datasets on the Semantic Web, enabling more extensive data discovery and cross-referencing. Additionally, our design methodology incorporated a collaborative approach involving domain experts, legal practitioners, and stakeholders from the maritime community. This participatory process facilitated the gathering of valuable insights, domain-specific knowledge, and real-world use cases. Regular feedback and reviews from these experts were instrumental in refining the ontology and validating its efficacy in capturing the essential legal aspects of maritime activities.

B. Comprehensive Representation

Inspired by the success of widely adopted thesauri such as the UNESCO thesaurus [6], which seeks to cover the entire spectrum of human knowledge, and the OECD thesaurus [1], which focuses on economic issues, we aspired to create a similarly comprehensive resource for the maritime domain. While the ShipQuest Ontology does not aim for exhaustive indexing of all possible legal concepts, it does provide a robust and well-structured representation of critical legal entities, contracts, regulations, liabilities, and other pertinent aspects that are fundamental to the maritime industry.

C. Standardization and Collaboration

Standardization plays a fundamental role in providing a transparent and structured framework for achieving "agreement" and defining essential rules. Regarding the ShipQuest Ontology and related systems, standardization serves as a crucial means of enhancing the quality and suitability of developed products, processes, and services within the maritime domain. By adhering to standardized practices, the ontology ensures consistency, semantic clarity, and interoperability across various applications and knowledge representation scenarios.

Collaboration is a cornerstone of the maritime industry, involving a multitude of stakeholders ranging from legal practitioners and researchers to decision-makers and industry participants. Standardization facilitates seamless collaboration among these diverse entities by establishing a common language and set of rules. Through mutual understanding and shared best practices, stakeholders can efficiently exchange information, promote usability, and ensure interchangeability of data across different applications and systems.

D. Thesauri Standardization

In the rapidly evolving digital and networked world, standardization within thesauri design and knowledge organization systems holds even greater significance. It contributes to various essential aspects, including:

Concept and Term Identification, by identifying the appropriate concepts and terms that a thesaurus or similar system should encompass. In our case, the ShipQuest Ontology ensures the inclusion of relevant legal entities, contracts, regulations, and other essential aspects within the maritime domain.

Uniform Data Coding and Registration, so that data would be consistently coded and registered in a uniform manner, ensuring data integrity, accuracy, and ease of data management within the Shipquest ontology.

Data Transferability, to enable seamless data transfer between different systems; this is vital for efficient data exchange and integration within the maritime industry and beyond.

Data Interfacing, Matching, and Combining to allow for smooth interfacing, matching, combining, and exchanging of data between diverse systems.

Data Access and Evaluation to empower users to access, search, present, and evaluate data effectively within the ShipQuest Ontology and other linked systems.

Formulation of Implementation Rules, i.e., by adhering to standardized guidelines, the ShipQuest Ontology can lay down clear rules for a proper and effective implementation.

Major standardization efforts initiated in 1974 with the release of the initial version of the international standard ISO2788, titled "Documentation - Guidelines for the establishment and development of monolingual thesauri" [2], primarily focusing on the construction of monolingual thesauri, offering valuable guidelines for organizing concepts and terms within a single language. This standard was translated in greek as ELOT1321 standard and served as a reference for the

[1] https://bibliotecavirtual.clacso.org.ar/ar/oecd-macroth/en/index.htm

[2] https://www.iso.org/standard/7776.html

development of Greek-language thesauri and contributed to ensuring harmonization and interoperability with international counterparts. Subsequently, in 1985, ISO5964, entitled "Documentation - Guidelines for the establishment and development of multilingual thesauri," was released [3], addressing the challenges of multilingual thesaurus development, while providing guidance on cross-language consistency and representation of concepts across different languages.

However, these earlier standards have since been withdrawn and replaced by the ISO25964 standard, titled "Thesauri and interoperability with other vocabularies" [4]. This modern standard is divided into two parts: *Part 1: Thesauri for information retrieval* focusing on providing guidelines for constructing thesauri specifically for information retrieval purposes and addressing aspects such as term selection, hierarchical and associative relationships, and preferred term usage; and *Part 2: Interoperability with other vocabularies* emphasizing the importance of interoperability within a networked environment by providing guides for alignment of vocabularies with other systems and ontologies and enabling seamless data sharing and integration. By adopting the principles outlined in ISO25964, the ShipQuest Ontology strives to enhance its interoperability, consistency, and effectiveness within the maritime domain, facilitating seamless data exchange and knowledge integration among various stakeholders.

When mapping different vocabularies, the representation elements of concepts used by each vocabulary play a critical role. As depicted in Table I, various vocabulary types employ specific elements to represent their concepts during mapping. By understanding and utilizing these representation elements, the ShipQuest Ontology can effectively map and establish interoperability with other vocabularies, enabling seamless data exchange, collaboration, and knowledge integration across the maritime domain and related domains.

TABLE I. CONCEPT REPRESENTATION ELEMENTS WHEN MAPPING DIFFERENT VOCABULARIES (SOURCE: ISO25964-2)

Vocabulary Type	Representation Elements of Concepts
Thesaurus	Preferred terms
Taxonomic scheme	Symbols
Taxonomy	Categories (tags or symbols)
Subject headings schema	Headings
List of established names	Names
Ontology	Labels
Terminology	Terms or other types of labeling (symbol or name)

Note that while ISO International Standard and corresponding standards of national organizations mainly focus on thesaurus construction issues, matters related to the web environment, web functions, and the Semantic Web are covered by standards from the W3C consortium. ISO25964 is designed to be compatible with W3C standards, providing a seamless integration of thesauri within the Semantic Web. ISO25964-1 introduces a data model that describes the representation and utilization of thesaurus data, encompassing its structure and semantic elements. The data model adheres to the conventions of the Unified Modeling Language (UML). Furthermore, the standard proposes an XML schema based on the UML data model, facilitating data exchange in parts or entirety between thesauri.

The SKOS (Simple Knowledge Organization System) is a format recommended by ISO25964-1 and the W3C, utilizing XML and RDF for encoding thesauri data. It is widely accepted in the Semantic Web community and promotes interoperability and data sharing across diverse applications, whilst playing a vital role in managing the description, operation, and versioning of thesauri within the context of the Semantic Web. By adopting a concept-centric approach, SKOS focuses on effectively representing and organizing concepts within thematic vocabularies. It utilizes relationships between concepts, as defined in the thesaurus standards, such as `skos:broader`, `skos:narrower`, and `skos:related`, to establish meaningful associations and hierarchies.

One of the key strengths of SKOS is its ability to describe and manage concepts effectively. It provides a structured framework for recording concept information, enabling seamless integration and interoperability across different systems and knowledge representation initiatives. The use of standardized relationships ensures consistency and facilitates easy navigation and exploration of the thesaurus's content. When recording and presenting specific types of thesaurus terms, particularly names, SKOS recommends utilizing relevant catalogs of established files as authoritative sources. Additionally, applying the rules provided by the Anglo-American Cataloging Rules (AACR)[5] and/or the RDA (Resource Description and Access)[6] standard is beneficial. These established rules and standards ensure uniformity and clarity in presenting names, facilitating better understanding and interpretation of the thesaurus content. Moreover, to enrich the metadata associated with the thesaurus, SKOS incorporates data elements from the Dublin Core[7] scheme. The Dublin Core elements provide a set of simple, widely accepted metadata terms, enhancing the thesaurus's discoverability and accessibility within the Semantic Web.

By leveraging the capabilities of SKOS, the ShipQuest Ontology can effectively describe, manage, and present maritime legal concepts in a standardized and interoperable manner. The use of SKOS relationships fosters a rich semantic structure, promoting better data discovery and exploration. Furthermore, adherence to established rules and standards ensures clear and consistent representation of thesaurus terms, enhancing user comprehension and facilitating knowledge exchange within the maritime community.

The ISO25964 standard recognizes the versatility of the TMF (Terminological Markup Framework) model [9], which is described in the ISO16642 standard[8] and specifically designed for data representation in terminological applications. While TMF offers valuable features for managing terminology, it is acknowledged that none of the proposed formats fully cover the thesaurus model as described in the ISO25964 standard. As a result, an XML format is recommended to address this gap, providing a flexible and interoperable means of representing thesaurus data.

For describing and expressing ontologies, the ISO25946-2 standard recommends the use of the W3C recommendations,

[3]https://www.iso.org/standard/12159.html
[4]https://www.iso.org/standard/53657.html
[5]http://www.aacr2.org/
[6]https://www.loc.gov/aba/rda/
[7]https://www.dublincore.org/
[8]https://www.iso.org/standard/56063.html

specifically RDFS (Resource Description Framework Schema) or OWL (Web Ontology Language). Both RDFS and OWL are well-established Semantic Web languages that offer advanced capabilities for modeling and expressing complex relationships between concepts and entities. By leveraging these W3C standards, the ShipQuest Ontology can effectively capture and convey the rich semantics and interconnections within the maritime domain.

Furthermore, the ISO25964 standard acknowledges the significance of Linked Data and the importance of combining thesauri and ontologies using standards such as SKOS and OWL. SKOS (Simple Knowledge Organization System) provides a convenient and straightforward means of representing thesaurus data, while OWL offers a more expressive language for modeling ontologies with intricate relationships and logical constraints. By combining these Semantic Web language standards, the ShipQuest Ontology can achieve seamless integration with other linked knowledge organization systems, promoting interoperability and data exchange.

Based on the information provided, we can conclude that the ISO25964 standard offers a comprehensive and detailed description of the various aspects related to the construction of thesauri, making it a valuable resource for other thematic indexing systems as well. Notably, its most significant innovation lies in addressing the challenges and complexities of using thesauri in the digital environment, particularly within the context of the Semantic Web. The standard recognizes the need for uniform standardization in the representation and exchange of data, aiming to enhance interoperability and data sharing across different systems.

Over time, the standardization efforts have evolved to encompass various issues related to the construction and use of thesauri, taking into account emerging digital and web-based environments. The development of post-merge indexing systems and the growing standardization in the construction and use of thesauri have highlighted the necessity for terminology standardization in specialized thematic areas of documentation and information science. This demand arose due to the rules required for the construction of thesauri, and it is further underscored by the increasing number of thesaurus-based applications that require consistent and harmonized terminology.

III. SHIPQUEST ONTOLOGY

The Maritime Heritage Platform, called as NAYKLIROS, functions as a gateway for accessing digitized emblematic documents in the scope of the National Research Infrastructure ENIRISST and ENIRISST +. Additionally, the NAFKLIROS platform will integrate the proposed semantic thesaurus ShipQuest.

A. ENIRISST+ National Research Infrastructure

ENIRISST+ is an extension of the only national research infrastructure in Greece in the fields of shipping, supply chain, and transport - ENIRISST. The MARINDoc action is an extension of the services of the ENIRISST infrastructure, as it creates an electronic archive of maritime literature, legislation, and policy. Its aim is to create a platform of information sources and to consolidate digitally available bibliographic and other maritime history and research documents in various institutions in the country.

B. Thesaurus Construction

Thesauri are widely used as tools for the conceptual representation of knowledge in specific thematic fields and for thematic search in these fields. They were initially combined with information retrieval systems in bibliographic databases and later utilized in various other applications such as library systems and internet search engines.

In bibliographic databases, thematic searching often relied on terms from a thesaurus, which was used to index the publications corresponding to its bibliographic records. Controlled terms/descriptors, taken from a specific thesaurus, were used alongside uncontrolled terms, which were provided by indexers and represented concepts not found within the thesaurus. Examples of such applications include the Engineering Index database (later known as Compendex and later as Ei Village[9]) with the Thesaurus of Engineering terms [4], the Inspec database produced by the IEEE with the Inspec Thesaurus [10], and the ERIC database with Eric Thesaurus [11], among others.

The construction of the ShipQuest thesaurus was based on the above-mentioned standards, as well as works by Aitchison and Gilchrist [1], Gilchrist [5], Soergel [10], Hjørland [2], Roe and Thomas [8] and Currás [3]. The thesaurus construction process involved collecting concepts and their corresponding terms and then conducting terminological and linguistic checks based on relevant rules, standards, and the creation of thematic groups (classes) and relationships between them.

Additionally, the construction of the thesaurus took into account all requirements of the ENIRISST+ national research infrastructure, focusing on the specific properties of the maritime subject, potential users, stakeholders, and available sources used for extracting maritime-related concepts and terms. The thesaurus was built using a ”manual” approach, where human intellectual work was involved at all stages of construction. This approach ensured the creation of a controlled vocabulary capable of handling language complexities, albeit with a significant investment of time and cost. Regular updating and maintenance are ongoing efforts to keep the thesaurus current.

The proposed NAFKLIROS platform adopts an open cross-sector software platform based on the Semantic Web, supporting existing community standards and providing support for metadata originating from relevant content providers. The platform is modular, allowing the addition of various individual detailed (sub-)models at later stages, promoting interoperability at the semantic level while retaining the original conceptualization and richness of the data. It utilizes open access vocabularies for people, places, objects, physical parameters, etc., surpassing specific informational perceptions of different communities.

The platform's development process involves the construction of a single package that describes the model and its basic functions, potentially serving as the API for reuse and further exploitation of the platform. Object-oriented programming using PHP, and JAVA was employed in the development of

[9]https://www.engineeringvillage.com/

[10]https://www.theiet.org/publishing/inspec/

[11]https://eric.ed.gov/?multimedia-thesaurus

the relevant subsystems of the platform, with the content management system (CMS) incorporating customized standards for search engine optimization, multimedia functionality, and the integration of dispersed data and knowledge.

In the generic case, a term thesaurus serves as one of the main tools for post-merge indexing, functioning both as a tool to support information retrieval, particularly indexing and searching, and as a semantic, conceptual map to represent knowledge in the chosen subject area. The ENIRISST+ national research infrastructure platform's thesaurus has been created for maritime terms and the special thematic field they shape. It includes simple or complex thematic terms (or descriptors) representing separate concepts and follows a hierarchical structure with each term usually having a broader term. The thesaurus specifically covers the thematic field of shipping but can be easily extended to other (sub-)fields as well. Additionally, it is multilingual, making it easier to define correspondences between different languages.

The development of the maritime ontology (ShipQuest) within the NAFKLIROS (ENIRISST+ national research infrastructure platform) is based on two main sources of textual data in the Greek language: the Official Government Gazette of the Hellenic Republic (O.G.G.), containing legal texts related to maritime topics between 1975 and 1999, and a dedicated maritime vocabulary. The initial corpus from the O.G.G. comprised 80,000 words, which underwent pre-processing steps, including the removal of useless data, stop-words, and stemming. After pre-processing, the corpus contained approximately 5,000 unique words. Additionally, we used and extended a specialized maritime vocabulary, containing a brief description of every term and synonyms of them, to further enhance our understanding of the domain. These valuable resources serve as the foundation for the development of a comprehensive maritime ontology, ensuring a standardized and structured representation of maritime knowledge for improved data interoperability and knowledge discovery.

The proposed ontology presents a structured representation of maritime knowledge with classes such as Location, Entity, Group, Object, Legal Object, Name, References, Finance, and Trade (as can be seen in Figure 1). Each class has specific subclasses, providing a comprehensive categorization of maritime elements. The class "Location" encompasses subclasses like Country, Shipyard, Customs office, Infrastructures, Port, Zone, and Maritime Cultural Landscapes. Under the class "Entity," we find subclasses such as Owner, Tenant, Post officials, Crew, and Passengers. The class "Group" further expands into Corporate Alliance and Partnership. Meanwhile, the class "Object" includes Ship, Fuel, Equipment, Infrastructures, Documents, and Services subclasses. The class "Legal Object" involves subclasses like Property insurance, Mortgage, Date, Rental Map, Judicial sale, Maritime Law, and Security agreement. Lastly, the class "Name" has subclasses for Name of Vessel, Name of Port, Name of Company.

Additionally, the ontology incorporates classes for References, Finance, and Trade to enrich the representation of maritime knowledge and support broader applications. The Ontology schema is presented in Figure 2. Regarding the properties in the ontology, four key relationships have been defined: "is related", "it belongs to", "is related legally", and "is related locally". These properties establish connections between different classes, allowing for a more comprehensive and structured representation of maritime knowledge. With these properties, we can capture the associations, ownership, and localized relationships within the domain, enhancing data interoperability and facilitating a deeper understanding of maritime data.

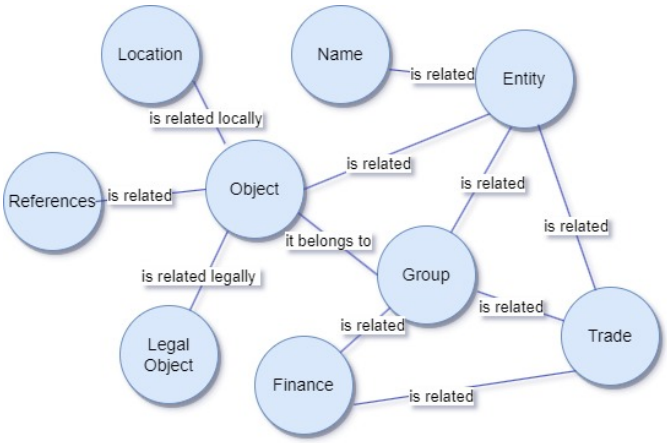

Fig. 1. Classes and properties

IV. Conclusions and Future Work

The development of a maritime ontology marks a significant milestone in the effective representation of maritime knowledge, providing a standardized and structured framework for the maritime domain. By creating a cohesive ontology, we have paved the way for seamless data interoperability, empowering researchers to gain deeper insights into maritime datasets. This enhanced understanding opens up new possibilities for practical applications, spanning from decision support systems to data-driven innovations, thus driving progress and advancements within the maritime industry.

Our focus on extracting concepts from legal texts within the broader context of maritime heritage has enabled us to tailor the ontology to the specific terminologies unique to the maritime industry. By integrating with existing maritime infrastructure, we have augmented the ontology's practicality and usability, making it a valuable resource for various stakeholders. The ontology's dedication to accommodating the Greek language further enhances its accessibility and relevance within the Greek maritime community.

In our pursuit of excellence, our future work will concentrate on refining the ontology to achieve greater accuracy and completeness. We are committed to seeking feedback from domain experts and users to identify any potential limitations and to incorporate new concepts that more effectively represent the intricate aspects of the maritime domain. Our ultimate goal is to ensure that the maritime ontology remains a cutting-edge and comprehensive resource, reflecting the ever-evolving nature of the maritime industry.

To further enhance interoperability and seamless knowledge exchange, we are eager to integrate the maritime ontology with other relevant maritime ontologies and adhere to standard semantic web technologies. In parallel, we will explore the expansion of the ontology's multilingual capabilities, enabling

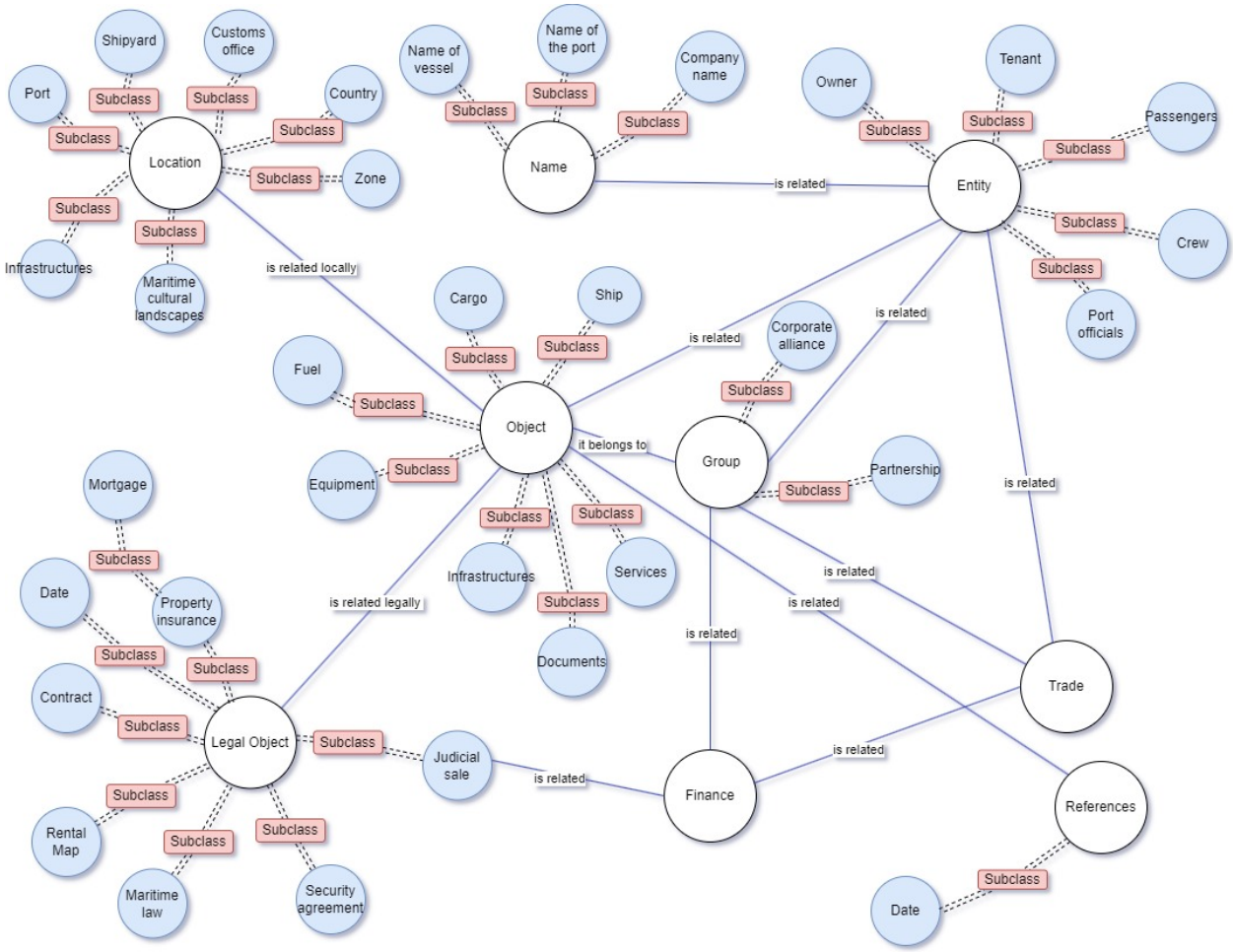

Fig. 2. Ontology Schema

the representation of maritime knowledge in multiple languages. By breaking language barriers, we aim to foster international collaboration and promote information exchange within the global maritime community.

Additionally, we recognize the potential of incorporating machine learning techniques into our ontology development process. By leveraging artificial intelligence, we can automate concept extraction and enrich the ontology with a broader range of maritime knowledge, making it more adaptable and responsive to the dynamic nature of the maritime industry.

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REFERENCES

[1] Aitchison, J., Bawden, D., & Gilchrist, A. (2003). Thesaurus construction and use: a practical manual. Routledge.

[2] Albrechtsen, H., & Hjorland, B. (1997). Information seeking and knowledge organization: the presentation of a new book. KO KNOWLEDGE ORGANIZATION, 24(3), 136-144.

[3] Currás, E. (2010). Ontologies, taxonomies and thesauri in systems science and systematics. Elsevier.

[4] Engineers Joint Council, & Project LEX. (1967). Thesaurus of engineering and scientific terms. Department of Defense.

[5] Gilchrist, A. (1971). The thesaurus in retrieval. London: Aslib.

[6] Litoukhin, J. (1980). Toward an integrated thesaurus of the social sciences. KO KNOWLEDGE ORGANIZATION, 7(2), 56-59.

[7] Mouratidis, D., Mathe, E., Voutos, Y., Stamou, K., Kermanidis, K. L., Mylonas, P., & Kanavos, A. (2022). Domain-specific term extraction: a case study on Greek Maritime legal texts. In Proceedings of the 12th Hellenic Conference on Artificial Intelligence (pp. 1-6).

[8] Roe, S. K., & Thomas, A. R. (2005). The Thesaurus: Review Renaissance and Revision. New Library World, 106(11/12), 562-563.

[9] Romary, L. (2001). An abstract model for the representation of multilingual terminological data: TMF-Terminological Markup Framework. In TAMA 2001-5th TermNet Symposium (p. 9).

[10] Soergel, D. (1974). Automatic and semi-automatic methods as an aid in the construction of indexing languages and thesauri. KO KNOWLEDGE ORGANIZATION, 1(1), 34-39.