



مرکز دریایی و مطالعات راهبردی

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**PROVIDE A MARITIME INTELLIGENT TRANSPORTATION SYSTEM
ARCHITECTURE MODEL**

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Key Words: intelligent transportation systems, maritime, information and communication technology, information architecture, security

Introduction

Nowadays expanding range of ICT³ applications has led to the creation of Intelligent Transportation Systems (ITS) and marine transportation industry as a pioneer in using new communication technologies is no exception.

Ships move around the world and are dependent on international standards for information exchanges between ships and shore. Many such standards exist, but a more systematic approach to both communication and information management is needed to address emerging requirements for improved security and lower emissions. The IMO Greenhouse Gas Study [1] indicates that operational and technical measures can contribute equally to a future reduction in emissions of Greenhouse Gas. But to achieve this goal requires much closer cooperation between parties in the shipping business and thus new contract forms as well as much more extensive and transparent information exchanges and information management are needed. The increasing focus on transport security also has led to developments in information management. The International Ship and Port Facility Security Code (ISPS) [2] requires new information exchanges between ship and shore and the WCO SAFE Framework [3] relies on advanced information management to secure the trade lanes.

From the above it is clear that existence of a standard information architecture for improved information and communication management in maritime Intelligent Transportation Systems will be a necessary part of the future developments in the maritime sector.

Background

This section briefly reviews some of the proposed reference architectures for maritime Intelligent Transportation Systems like ARKTRANS [4], OASIS service oriented architecture [5], the new S-100 format as a basis for the e-Navigation architecture and etc.

Maritime ITS

The concept of ITS, developed since 1980s, includes all modes of transport. Relevant developments in road transport are the most advanced. Recently water transport, particularly

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maritime transport, has gained more attention in this respect, in connection with building and further developments of maritime ITS [6].

Information architecture

Reference model

According to ISO 10746-2 [7], an ICT architecture is a set of rules to define the structure of a system and the interrelationships between its parts. In this paper we will introduce an architecture which is derived from the OASIS reference model.

Components of architecture

In this section the main components of the proposed Maritime ITS architecture shown in Fig.1 will be introduced.

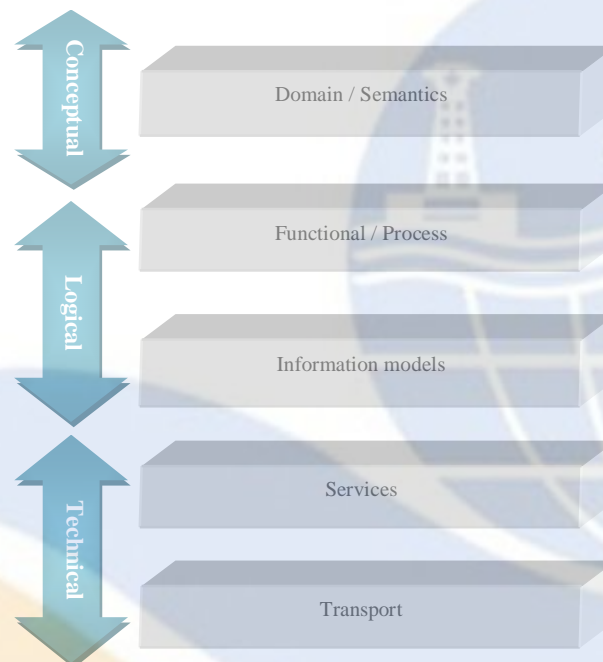


Fig.1) Maritime ITS architecture components

Conceptual and logical levels

As can be seen in the figure below, in this section Logical and Conceptual levels will be analyzed and a detailed description will be given.

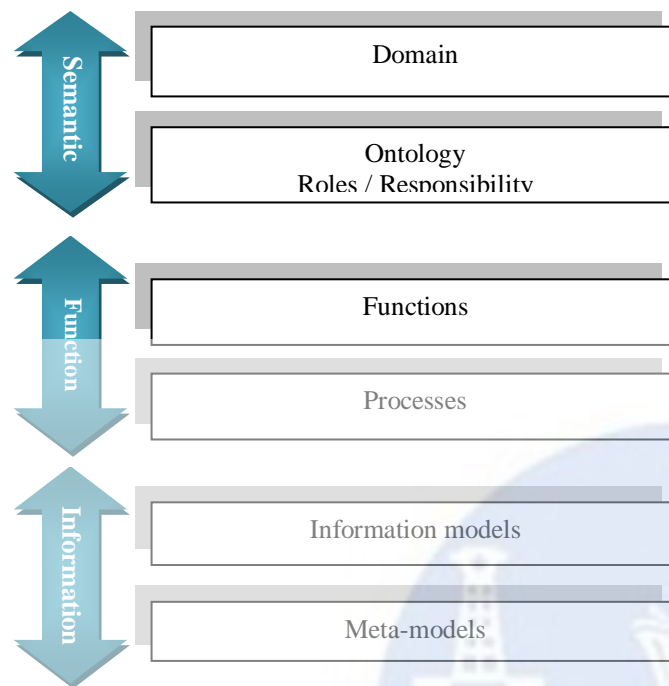


Fig.2)Details of conceptual and logical layers

Technical levels

Transport technology

In this section according to the following table, we will introduce transport technologies for ship/ship and ship/shore communications which may be significantly different in various situation [8].

Table 1) Communication carriers and access types

| Carrier | Special purpose | Real time message | Store & Forward messages | Connected |
|------------------------|-----------------|-------------------|--------------------------|-----------|
| WiFi, WiMAX | | X | X | X |
| Inmarsat C | X | | X | |
| Other satellite (VSAT) | | | X | X |
| AIS, VHF DSC | X | X | | |
| Digital VHF | | X | X | |
| Land Internet | | | X | X |

Service and Transport layers

This section will introduce a model for transport and service layers of Marine ITS which uses GMDSS and WWRNS to improve security [9].

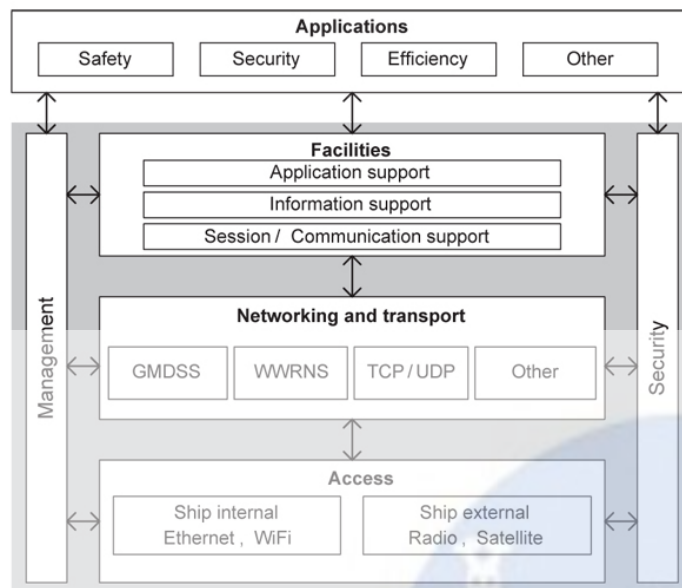


Fig.3) Maritime ITS Service and Transport Layers

Single window system

A facility that allows parties involved in trade and transport to lodge standardized information and documents with a single entry point to fulfill all import, export, and transit-related regulatory requirements.[10]

Conclusion

The need for improvement in security management and operational efficiency can't be satisfied without corresponding improvements in international information standards. This required novel standards must be developed in the context of a Maritime ITS architecture. Therefore, the development of an information architecture for this sector is necessary to achieve. This work that is currently ongoing in EU and IMO, seems necessary for Iran in order to improve information and communication management in maritime ITS.

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