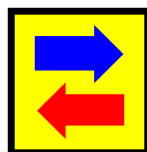
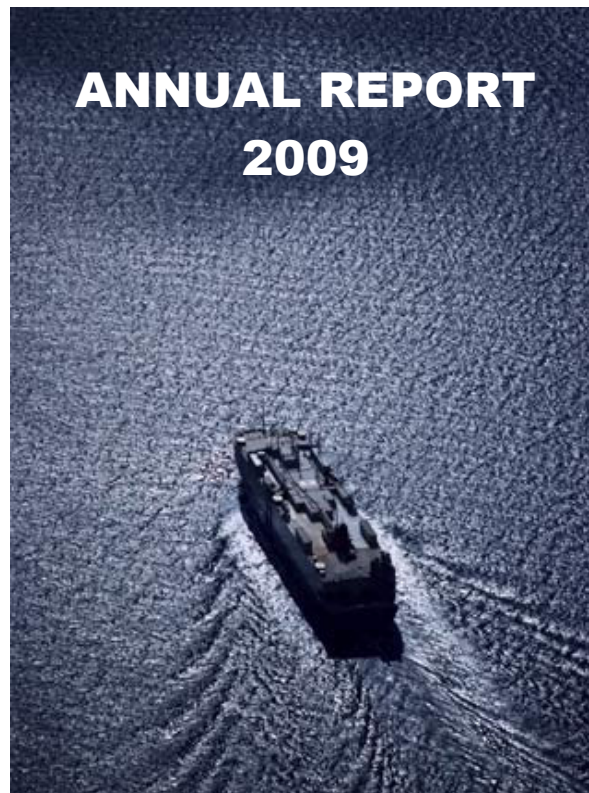




**NATIONAL TECHNICAL UNIVERSITY OF ATHENS  
SCHOOL OF NAVAL ARCHITECTURE AND MARINE ENGINEERING  
DIVISION OF SHIP DESIGN AND MARITIME TRANSPORT**

## **LABORATORY FOR MARITIME TRANSPORT**



<http://www.martrans.org>

February 2010

Laboratory for Maritime Transport  
National Technical University of Athens  
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## Foreword

This is the second year that an Annual Report of the Laboratory for Maritime Transport at NTUA is being produced, and this one gives a general picture of what happened in 2009. The year was full of activities for our Laboratory, as can be attested by the contents of the report. Year 2010 promises to be equally full, with the launching of new EU project SuperGreen, among other new activities, and the continuation of our work in other projects. We shall keep you updated on these activities via our newsletter and web site.

We hope that you will find the contents of this report interesting, and any comments are welcome.

Best regards,

Harilaos N. Psaraftis  
Professor, NTUA



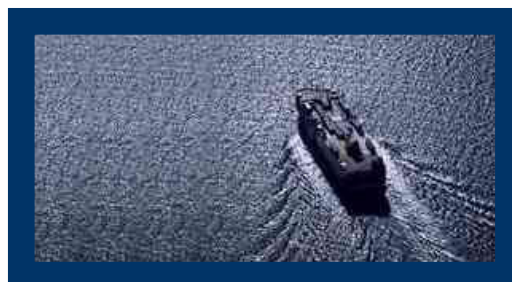
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## 1. INTRODUCTION

### 1.1 About LMT

The establishment of the **Laboratory for Maritime Transport (LMT)** was officially approved by the National Technical University of Athens (NTUA) Senate in May 2006. Until then, and since 1989, LMT functioned as a research and educational unit within the **School of Naval Architecture and Marine Engineering (NAME)**, known as "NTUA Maritime Transport". LMT holds a long-standing experience in the design, development and simulation of maritime and intermodal transport, marine environmental protection, safety analysis and human elements. Following Greece's rich maritime tradition, LMT is active in practically all areas of maritime transport R&D, having completed or being involved in projects in areas such as technology, management, economics, logistics, telematics, human aspects, environment, and safety. It has also been involved in projects and studies with a substantial policy analysis element. Linking R&D with education, LMT is also fully active in the School's undergraduate and post-graduate educational programs.



### People

#### Faculty Members

Harilaos N. Psaraftis (Professor)  
Dimitrios V. Lyridis (Assistant Professor)  
Nikolaos P. Ventikos (Lecturer)

#### Post-Doctoral Associates

Konstantinos G. Gkonis  
Panagiotis Zaharioudakis  
Apostolos G. Psarros

#### Doctoral Candidates

Stefanos Chatzinikolaou  
Konstantinos Dimitriou  
Stelios I. Iordanis  
Christos A. Kontovas  
George Lykos  
Nikolaos Manos  
Vassilios Zagkas

#### Other Research Staff

Pantelis G. Anaxagorou

#### Administrative Staff

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You are warmly encouraged to visit our website ([www.martrans.org](http://www.martrans.org)) for further information and to contact us about your enquiries by email at [ntua\\_lmt@naval.ntua.gr](mailto:ntua_lmt@naval.ntua.gr) or for other contact options at <http://www.martrans.org/contact.htm>. Your feedback will be highly valued.

### 1.2 About this report

This report is a summary of LMT's achievements and activities during calendar year 2009. LMT's electronic newsletters inform regularly during the year about current and forthcoming activities and you can find them, as well as subscribe to our emailing list, at <http://www.martrans.org/news.htm>.

## 2. YEAR 2009 HIGHLIGHTS

### 2.1 LMT open Workshop on Environmental Risk Evaluation Criteria



On February 27, 2009, LMT hosted an open one-day workshop on the subject of environmental risk evaluation criteria, with a focus on oil pollution.

The development of criteria that can capture the environmental dimension of the risk associated with maritime transport is still at its infancy. At the International Maritime Organization (IMO), this difficult matter has come under the umbrella of Formal Safety Assessment (FSA), IMO's prime scientific tool for the support of proactive safety regulation. Yet, FSA's current evaluation criteria deal only with risk associated with human life or the ship itself, and the quantification of environmental impact is yet to be decided in a satisfactory way. For the subject of oil pollution, the determination of such criteria is important for evaluating on a cost-benefit basis Risk Control Options (RCOs) for reducing oil spill pollution risk. This subject is currently under investigation by IMO's Maritime Environment Protection Committee (MEPC), which has established a correspondence group since mid-2007 to address this issue.

This correspondence group is under the coordination of Greece, and is coordinated by Prof. Psaraftis of LMT (more on this in section 2.17.2). The Feb. 27 workshop itself was an initiative of LMT, and, although not officially connected to the work of the correspondence group, substance-wise it provided very much a flavor of the relevant issues. There were several presentations and a panel discussion by key international experts from Germany, Greece, Japan, the Netherlands, the United Kingdom and the United States. Those attending the workshop had an opportunity to hear first-hand from these experts what is the state of the art and the main challenges on this subject and how one may come about to tackle them. Some 85 participants attended the workshop, which, in terms of feedback received, was a big success.

### 2.2 LMT at MLOG 2009 in Singapore



LMT participated with three people (D. Lyridis, H. Psaraftis and P. Zacharioudakis) at the International Symposium on Maritime Logistics and Supply Chain Systems (MLOG 2009), held in Singapore on April 23-

24. Three LMT papers were presented. In addition, Professor Psaraftis delivered one of the two invited plenary addresses of the Symposium, entitled "Green Maritime Logistics". The talk took a look at the various tradeoffs that are at stake in the goal for greener shipping and may impact the cost-effectiveness of the logistical supply chain and presented some models that can be used to evaluate these tradeoffs. It is reminded that LMT is engaged in a 2-year collaborative project with the National University of Singapore (Profs. T.F. Fwa and Meng Qiang) in the context of the NOL Fellowship Programme (see Research projects section of this report).

## 2.3 LMT at the 9th Meeting of the Focal Points of REMPEC



Dr N.P. Ventikos was a member of the Hellenic Delegation at the 9th Meeting of the Focal Points of the Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea (REMPEC) which took place in Malta from April 21 to April 24, 2009. The meeting focused on important issues for the Mediterranean Sea such as the cooperation of agreements in the field of prevention and response to marine pollution from ships, the improvement of the level of enforcement of MARPOL Convention Annex I in the region, the activities related to ships ballast water management and invasive species etc. Dr. Ventikos is a member of the Mediterranean Technical Working Group (MTWG) of REMPEC.

## 2.4 LMT at IMDC 2009 in Trondheim



LMT was present at the IMDC (International Marine Design Conference) conference, a triennial event that this year was held in Trondheim (Norway) on May 26-29. IMDC 2009 was organized by the Norwegian University of Science and Technology (NTNU) at the Gloschaugen Campus. A variety of topics was covered related to design methodologies, innovative ship and offshore design, design for production, design for safety, design for operation, CAD/CAM systems and IT technology, risk consideration, naval ship design and naval design education.

Doctoral Student C. Kontovas presented a paper entitled "Ship Emissions: Logistics and Other Tradeoffs". The paper is co-written with Professor H. Psaraftis and deals with the various tradeoffs that are at stake in the goal for reduced ship emissions. An operational setting that is connected with the logistics of the ship operation, and specifically with its operational speed was examined. The paper examines possible effects of speed reduction as a measure to reduce emissions for a known type of ship. For that ship, no design or other major changes (e.g. an engine change) are assumed to be taking place, but speed reduction of a given design is investigated.

## 2.5 LMT student wins 2009 IMAREST student thesis contest



In this year's contest of the Institute of Marine Science and Technology (IMAREST) among student diploma theses submitted to NTUA's School of Naval Architecture and Marine Engineering, an LMT thesis won the first prize. The top award went to LMT student Panagiotis Kontoris with a thesis entitled: "Sewage Management Onboard Ships". The thesis was supervised by Lecturer Dr. N.P. Ventikos. In particular, a small award ceremony for the winners took place in the Multimedia Auditorium of the Central Library Building in the NTUA Campus at Zografou (June 17, 2009).

## 2.6 LMT and SNAME Greek Student Section



LMT's doctoral candidate Christos Kontovas was elected Chair of the Greek Student Section of the Society of Naval Architects and Marine Engineers (SNAME). The Greek Student Section at the National Technical University of Athens is SNAME's only section outside North America.

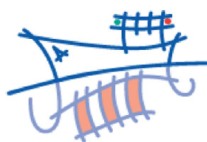
C. Kontovas attended the Student Chair Elect Seminar on June 12-14, 2009, an annual leadership conference for the incoming Student Section officers in Saddlebrook Resort outside of Tampa, Florida, United States. The purpose of "SNAME SCHOOL" is to assist and prepare the incoming section chairs and student chairs for the challenging year ahead leading their individual sections, to provide information and resources, facilitate the working relationships with the Regional Vice



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Presidents and other section chairs as well to create a spirit of camaraderie for the 2009 section leaders.

## 2.7 LMT at IAME 2009 in Copenhagen



LMT was present at the 2009 IAME (International Association of Maritime Economists) conference, an annual event that this year was hosted in Copenhagen (Denmark) on June 24-26. IAME 2009 organisers were the Department of Maritime Research and Innovation, University of Southern Denmark, in collaboration with the Norwegian School of Economics and Business Administration (NO), the School of Business, Economics and Law at Gothenburg University (SE), the Center for Shipping Economics and Innovation, Copenhagen Business School (DK), the Svendborg International Maritime Academy, Maritime Development Centre of Europe (DK), and the Department of Maritime Research and Innovation, University of Southern Denmark (DK). The IAME conference is directed at all segments of the maritime sector including shipping companies, industry, authorities, maritime associations, researchers, and educational institutions.

LMT's participation was with the paper titled "Game Theory Contributions to Terrorism Analysis in Merchant Shipping: An Application to Port Security" presented by K.G. Gkonis and co-authored by H.N. Psaraftis and N.P. Ventikos, which introduced a novel approach to the analysis of security and terrorism questions in the shipping industry.

## 2.8 LMT and Election of SNAME Fellows



On June 1, 2009, the Society of Naval Architects and Marine Engineers announced new additions to its rank of Fellows. The membership grade of Fellow is accorded to individuals who have contributed to significant achievements in naval architecture, marine and ocean engineering, and related fields in the form of advances in design, research, production, operation, education, and associated management. Prof. Psaraftis was among the 7 new SNAME Fellows. Quoting from SNAME's newsletter, "Professor Psaraftis was an outstanding professor and researcher for ten years at Massachusetts Institute of Technology, and for the past 20 years, at the National Technical University of Athens (NTUA). His accomplishments include the development of a methodology for evaluating oil spill response decisions at strategic and tactical levels, methodologies for routing and scheduling problems for ships and other vehicles, research in ship safety and environmental protection. Despite his academic background, and his lack of managerial or political experience, Professor Psaraftis managed to survive as CEO of the Port of Piraeus for more than five years, while container traffic doubled, the port was transformed into a corporation, and systems were computerized."

## 2.9 LMT and Port of Venice peer review



In early August Prof. Psaraftis visited the Port Authority of Venice in the context of a peer review of the port. Psaraftis was invited for this review along with some other colleagues by Prof. Paolo Costa, President of the Port Authority of Venice. The port of Venice is one of the major ports of the northern Adriatic, with significant hinterland connections to northern Italy and central Europe. In addition to the passenger port, which caters to cruise and ferry traffic, the port also handles a significant amount of cargo traffic in the Marghera commercial-industrial area. A visit of the port facilities took place and the current situation and future development plans of the port were discussed.



## 2.10 LMT at the 10th IAEF European Conference in Vienna



LMT was present at the 10th IAEF (International Association for Energy Economics) European Conference, that this year took place in Vienna (Austria) on September 7-10 under the title "Energy, Policies and Technologies for Sustainable Economies". The Conference was organised by IAEF and the Austrian Association for Energy Economics (AAEF) and was hosted at the Hofburg Congress Center, a palace complex and former imperial residence of the Habsburgs.

LMT's participation was with the paper titled "Caspian - Black Sea – South East European Gas Corridors and the LNG parameter: A scenario bundles approach" presented by Dr K.G. Gkonis and co-authored by Prof. H.N. Psaraftis.

In this paper, a decision-making, planning, and analysis tool was proposed for use by ministries, national or regional (e.g. EU level) authorities, national or international companies, and think-tanks, among other, in anticipation of future developments and in response to crisis events related to natural gas supply through pipelines or as LNG (Liquefied Natural Gas).

## 2.11 LMT at the ECOMEDITERRANEAN Conference



Lecturer Dr. N.P. Ventikos was invited at the ECOMEDITERRANEAN Conference: "Towards a Sustainable Management of the Mediterranean Sea", that was held in late September at the city of Palma de Mallorca (Balearic Islands, Spain).

The conference was sponsored by the Government of Balearic Islands. In the context of this conference Dr. Ventikos gave a presentation entitled "Maritime Transport and the Environment: The Mediterranean Fairy-tale" in which he focused on issues related to maritime safety, the preservation of the marine, littoral and aerial environment and the possibility for sustainable shipping within the basin of the Mediterranean Sea.

## 2.12 LMT and Life Cycle CO2 emissions



LMT participated at the RINA Conference on the Design and Operation of Bulk Carriers, held in Athens in late October, via a paper that takes a critical look at life cycle CO2 emissions.

The paper, co-authored by Gratsos, Psaraftis and Zachariadis compares life cycle emissions of two alternative bulk carrier designs and concludes that ships built to more robust specifications emit less CO2 during their life time than other ships built to less robust specifications.

## 2.13 LMT at FAST 2009 and IMAM 2009



Other than the papers presented by LMT staff (see relevant section), Prof. Psaraftis delivered two invited keynote lectures in two respective conferences in October 2009. The first was entitled "Fast Waterborne Transport in the Emissions Reduction Era: in Search of Win-Win Policies," and was delivered at the 10th International Conference on Fast Sea Transportation (FAST 2009), held in Athens. The second lecture was entitled "Challenges in European Short Sea Shipping," and was delivered at the 13th Congress of Intl. Maritime Association of the Mediterranean (IMAM 2009), held in Istanbul, Turkey.



## 2.14 LMT at MEDAYS 2009 in Morocco



Assistant Professor D.V. Lyridis was invited and participated on November 20 & 21 in the Annual Conference MEDAYS (Mediterranean Days) 2009 organised in Tangier (Morocco) by the AMADEUS Institute and supported by the Moroccan Government through the Ministry of Foreign Affairs. The conference, attended

by Ministers of Foreign Affairs of many African States as well as Spain and by main high ranking officials of EU and African States, focused on many issues ranging from the Society, Economy and Energy to Safety and Security.

Lyridis' intervention/presentation and following discussion was part of the C2 Panel "Maritime security in the Mediterranean: An example of successful cooperation" and contained a summary of current security issues in the Mediterranean as well as suggestions on strategic and operational level measures concerning vessel/shipping security.

## 2.15 LMT and IAPH Africa/Europe regional meeting



The IAPH Africa/Europe Regional Meeting was held in Hamburg, Germany in mid November 2009, hosted by the Hamburg Port Authority (HPA). Nearly 100 IAPH members from 24 countries mostly in Africa and Europe participated in the event. NTUA-LMT,

an Associate Member of IAPH since 2002, was represented at the meeting by Prof. Psaraftis.

The three-day event officially started with two key note addresses by Jens Meier, CEO, Hamburg Port Authority, and IAPH President Gichiri Ndua delivered at the Opening Session on the morning of November 17. At the end of the meeting, IAPH President Ndua praised the excellent work performed by IAPH Secretary General Satoshi Inoue since 1999, who stepped down and handed over reigns at the IAPH Tokyo secretariat to Mr. Susumu Naruse effective 1 December 2009. NTUA-LMT participates in IAPH's Port Operations and Logistics Committee and in the Port Environment Committee.

## 2.16 LMT at the Green Corridor Conference



Close to 300 people participated at the Green Corridors Conference hosted by the European Commission (DG-TREN) in Brussels in early December 2009. Green Corridors are a European concept denoting long-distance freight transport corridors where advanced technology

and co-modality are used to achieve energy efficiency and reduce environmental impact. Launched in the Freight Transport Logistics Action Plan, Green Corridors support the EU's agenda towards decarbonising transport while emphasising the need for efficient logistics. The conference took stock of existing Green Corridor projects across Europe, discussed the main issues related to their implementation and launched a new initiative in support of the Green Corridor concept. Atle Minsaas of Marintek (Norway) and Harilaos Psaraftis gave a joint presentation on the launching of the new SuperGreen project.

## 2.17 LMT and IMO business



LMT involvement in IMO business in 2009 was on two fronts, MSC and MEPC.

### 2.17.1 Maritime Safety Committee (MSC)

Professor Psaraftis attended the 86th session of IMO's Maritime Safety Committee (MSC), held in London May 27-June 5, 2009. He joined the newly formed Group of Experts on Formal Safety Assessment (FSA) as the nominee of Greece.

The task of this group is to review several FSA studies submitted to the IMO and report back to the MSC in due course. At this moment, 4 FSA studies have been submitted, on LNG vessels, on containerships, on cruise vessels, and on Ro/Pax ships. All of these studies have been submitted by Denmark on behalf of EU project Safedor.

This was the first meeting of the Group of Experts and it involved presentations by the Safedor project team, preliminary comments on the presented FSAs and a general discussion on how the review would proceed.

The FSA review process has involved, among other things, the formation of a correspondence group under the coordination of Mr. K. Yoshida (Japan), who also chairs the Group of Experts.

On this same subject, Greece presented two papers at MSC 86 plenary, one on proposing to clarify the role of experts nominated for the FSA Experts Group and on database issues and one commenting on the 5 submitted FSAs and on the application of FSA IMO guidelines. MSC 86 generally agreed with the observation by Greece on database issues that there is a lack of information on root causes of casualties for general cargo ships and, having noted the view expressed by some delegations that data used in FSA studies should be transparent, instructed the Group of Experts to consider the database-related issue and advise the Committee accordingly.

The Group of Experts met a second time at IMO headquarters in London in early November 2009 in order to review the set of FSA studies submitted to the IMO. Based on the reviews of these FSA studies, the group is tasked to prepare a report for discussion at the next meeting of MSC (MSC 87), to be held in London in May 2010.

### 2.17.2 Marine Environment Protection Committee (MEPC)

Work on environmental risk evaluation criteria in Formal Safety Assessment (FSA) continued at the 59th session of the Marine Environment Protection Committee-MEPC 59 (London, July 2009). The chairman of the correspondence group on this subject Prof. Psaraftis reported on the work undertaken in the intersessional period and underlined that further progress had been made. Within the context of the CATS criterion (for "Cost to Avert one Tonne of oil Spilled"), he pointed out that the group was able to reach an agreement in favor of criteria that are expressed on a cost-per volume of spilled oil. The group also agreed that a volume-dependent non-linear scale of a CATS threshold would be preferable to a single CATS threshold. He noted that apparent agreement had also been reached on the frequency matrix in the Hazid step, as well as on the issue of how to handle the issue of collection and reporting of relevant data. However, divergent views still remain on issues such as the severity matrix and the specific non-linear CATS scale,

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and more time is required to reach convergence on the key issues that are open. Taking into account the need to complete this work as early as possible in 2010, MEPC 59 agreed to establish a Working Group on this subject at MEPC 60 (March 2010). In between, the work of the correspondence group will continue, with the following terms of reference:

- recommend in Step 4 of the FSA an appropriate volume-dependent CATS global threshold scale or function for ascertaining if a specific Risk Control Option (RCO) is cost-effective, including its integration within the FSA methodology;
- recommend a way of combining environmental and safety criteria for those RCOs that effect both environmental and fatality risk;
- conclude on an appropriate risk matrix or index for environmental criteria;
- recommend an appropriate ALARP region and F-N diagram, including an appropriate value for the slope of the F-N curve;
- address the issue of collection and reporting of relevant data;
- prepare draft terms of reference for a working group at MEPC 60; and
- submit a written report to MEPC 60.

In December the correspondence group submitted its report for discussion at the next MEPC (MEPC 60), to be held in London in March 2010. At MEPC 60 there will be a working group to further discuss these criteria.

### 3. EDUCATION

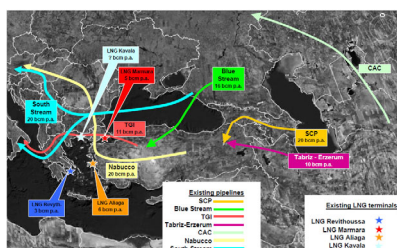
#### 3.1 Taught courses

- ECONOMICS OF MARITIME TRANSPORT I
- ECONOMICS OF MARITIME TRANSPORT II
- ECONOMICS OF MARITIME TRANSPORT III: Environment and safety analysis
- ELEMENTS OF FINANCE. SPECIAL TOPICS IN SHIPPING
- LOGISTICS IN MARITIME TRANSPORT
- RISK THEORY, ENGINEERING AND APPLICATIONS IN MARITIME TRANSPORT
- THE HUMAN ELEMENT - INTRODUCTION TO HUMAN RELIABILITY FOR MARITIME TRANSPORT
- WATERBORNE TRANSPORT SYSTEMS (postgraduate course)



#### 3.2 PhD theses

The Ph.D. title was awarded to LMT candidate Konstantinos G. Gkonis, who successfully defended on September 4 his thesis entitled “Analysis of Competition and Strategic Investments in the LNG market”. The thesis supervisor was Professor H.N. Psaraftis.



The motivation for this thesis was the dramatic development in recent years of the LNG (Liquefied Natural Gas) trade, as an energy shipping market, and LNG's growing role in the world energy scene. In the thesis, the LNG market is presented and its special characteristics are described. Game theory is identified as a methodology that can propose optimal strategies for the players involved in business contexts, but also in strategic interactions of geopolitical nature.

The first main set of contributions is developed under the title “Analysis of competition and strategic investments in the LNG shipping business”. The market players considered in this context are providers of LNG shipping services. A second main set of contributions is about “The role of LNG in the formulation of national gas supply strategy”, as LNG concerns decision-makers on a national planning level and in the formulation of gas supply strategies, given its geopolitical dimensions, as well as its importance for the security of gas supply regionally and internationally.

#### 3.3 Diploma theses

- Asimomitis, I. (2009), "Methodologies of recording, monitoring and analysis of ship operational data as a safety improvement measure", supervised by N.P. Ventikos.
- Austin, D. (2009), "Feasibility Study of LPG and LNG Vessels in Modern Shipping", supervised by D.V. Lyridis.
- Christou, N. (2009), "Analysis of the Event of Ships Waiting to Load/Unload in Ports and its Effects on Shipping Market", supervised by D.V. Lyridis.

- Daleziou, S. (2009), "Trading Strategy for Shipping Derivatives Using Artificial Neural Networks in the Short- and Long-term", supervised by D.V. Lyridis.
- Karayannis, N. (2009), "Evaluation of Investments in Small Size Ships", supervised by D.V. Lyridis.
- Margaris, S.D. (2009), "Introduction to risk perception with the usage of influence diagrams", supervised by N.P. Ventikos.
- Metaxas, P. (2009), "Study for threat assessment for ships with the usage of game theory", supervised by N.P. Ventikos.
- Panayotou, S. (2009), "The Cypriot Shipping after the accession of Cyprus to the EU", supervised by H.N.Psaraftis.
- Papakonstantinou, C. (2009), "The new IMO Convention and its impact on ship recycling", supervised by H.N.Psaraftis.
- Ramantanis, H. (2009), "Elements of interaction between shipping and climate change", supervised by N.P. Ventikos.
- Skavaras, P. (2009), "Chemical spills from maritime transport: the case study of Greece", supervised by N.P. Ventikos.
- Tsioumas V. (2009), "Study of the Bulk Carriers Shipping Market. Latest Developments", supervised by D.V. Lyridis.
- Tzatzakis, S. (2009), "Scenario and risk analysis for the study of safety - Application to industry", supervised by N.P. Ventikos.
- Xiros, A. (2009), "Development of Web Application for the Assistance of Safety Inspections", supervised by N.P. Ventikos.

### 3.4 Training seminars

#### HELMEPA - LMT cooperation



Continuing the cooperation that started in 2008, LMT participated in the Hellenic Marine Environment Association's (HELMEPA) series of training seminars during 2009. The lectures dealt with the study and assessment of safety as currently one of the most important developments within the framework of maritime transport. The IMO has launched to date many relative activities focusing initially on the introduction of Formal Safety Assessment (FSA) and then on its effective enhancement and amelioration, by taking onboard specific operational needs, new areas of interest etc. In this outline, the lectures covered in brief the basic theory of risk, risk analysis and risk engineering (e.g. definitions, types of risk, techniques etc). Moreover, they presented and analyzed case studies (marine accidents) from the international literature in order to provide practical and hands on guidance for the implementation and exploitation of risk-oriented approaches and methods. Hence, the main target of such efforts is to identify the causes of accidents, both as starting points and escalation factors of the event under examination, to assess the accident producing conditions and to make realistic recommendations for the strengthening of the safety and environment friendliness of the maritime industry. Speakers from LMT at the HELMEPA seminar series were Stefanos Chatzinikolaou, Harilaos Psaraftis and Nikos Ventikos.



## 4. RESEARCH PROJECTS

(listed alphabetically)

### 4.1 ABS – NTUA



Since mid-2008, LMT has been engaged in its first US-funded research in the form of a three-year project sponsored by the American Bureau of Shipping (ABS), under the study name “Assessment of Environmental Impact In Marine Transportation and Related Activities.” The project studies the impact of environmental protection on marine transportation, including shipbuilding, and will marry practical industry data and information with academic research. The intent is to develop tools that can be used by designers, shipowners and other stakeholders to identify and select effective, environmentally positive policies and procedures. The research will focus on two principal areas: environmental risk evaluation criteria and ship emissions and energy savings.

The research program is expected to assess current approaches to evaluating the risks associated with a given design and will attempt to identify solutions and methodologies that take the environmental dimension into account. Already this topic is being debated within IMO’s Marine Environment Protection Committee (MEPC).

The second element of the study will examine the complex challenge of reducing ship air emissions while promoting operational efficiencies. LMT has been tasked with developing rational, realistic and effective proposals that address the need to further reduce emissions. Comparisons with other modes of transport will be made and specific scenarios will be reviewed for different ship types, sizes, trading patterns and fuel type.

### 4.2 CHINOS



CHINOS (Container Handling in Intermodal Nodes-Optimal and Secure!), which ended in 2009, was a 3-year EC funded research project that addressed RFID enabled innovative container handling procedures.

CHINOS results are ready-to-the-market IT tools (Automatic Container Identification Unit, Damage Documentation System, Communication Controller(s), Chain Event Manager) as well as technical and organisational recommendations of how to efficiently exploit these new technologies.

CHINOS has been a technological success, its real power being the fact that it provided tailor-made solutions to existing needs of the logistics supply chains. Its impact, however, could be much higher, if seen as an integral part of business processes. The evolution of the waterborne transport industry and the responsiveness of the shipping companies to market needs due to their relatively small size are factors supporting the sustainability of the results of this project, given that container transport gains further momentum from the constantly increasing international trade. IT will change business patterns at an enormous speed and CHINOS can serve as a starting point with large potential.

It is worth stressing that CHINOS software applications and hardware components are already available to enter commercial use, as long as users other than CHINOS members are willing to pay in order to acquire the appropriate hardware, software and the right to use it. The reliability of

the system is considered very high, as none of the parties involved has recorded any technical failure beyond the testing phase of the applications.

### 4.3 DNV – NTUA



This project is in the context of a 3-year strategic research and development collaboration agreement signed in late 2007 between Det Norske Veritas (DNV) and the National Technical University of Athens (NTUA). DNV has for years cooperated with the Norwegian University of Science and Technology in Trondheim (Norway), M.I.T and Stanford University (USA), and others.

The collaboration with NTUA focuses on the maritime industry and is with the university's School of Naval Architecture and Marine Engineering. Year 2009 was the second of a 3-year initial phase, with NTUA's LMT and Ship Design Laboratory having a central position in the programme. Effective bulk transportation and ship design optimisation are respectively the two main topics.

In the context of "Effective Bulk Transport" and LMT's work, Sub-objective 1 is entitled "Emission/Logistics tradeoffs" and examines various tradeoffs that are at stake in the goal for reduced ship emissions and may impact the cost-effectiveness of the maritime logistics chain. Sub-objective 2 is titled "Impact of security using game theory", and its purpose is to address maritime security problems with the use of game theory.

Various papers in the context of this project have been produced.

### 4.4 FLAGSHIP



FLAGSHIP is an EC Integrated Project under the 6th Framework which aims to reduce the risks to life, the environment and vessels from waterborne transport while enhancing the competitiveness of European maritime transport. FLAGSHIP is focusing on onboard and onshore inspection, maintenance and operation support systems, to shorten the time required to identify and prioritize equipment or elements that need maintenance or repair.

Within 2009, the LMT's involvement was in sub-project D2; in particular LMT concluded Task D2.2 whose overall target was to analyse and address how new technology is impacting upon selected work processes onboard ship. In effect, LMT has wrapped up Deliverable D2.2 after taking onboard comments from the internal reviewers for enhancing the focus of the Deliverable. It is reminded that in the scope of this effort, LMT developed a novel work process analysis framework based on a dedicated questionnaire and conducted a set of interviews/case studies with officers to obtain the necessary data for the analysis. The implemented analysis framework managed to provide useful results, e.g. regarding the way the interviewees assessed onboard technology within the framework of the selected work processes and for the margin of potential strengthening of the selected work processes in terms of efficiency. Moreover in the context of Task D2.3, LMT is contributing to the development of a solid methodology capable to identify and subsequently assess new technologies that will or could be installed onboard vessels. The evaluation of the impact of innovative technologies onboard the performance and behavior of crews is not a trivial task and therefore it demands extreme caution and an efficient approach to come up with a realistic estimation of each system/pattern under examination; Task D2.3 is currently drafting the development of such an approach.

Project website: [www.flagship.be](http://www.flagship.be)

## 4.5 KOS PROJECT

NTUA-LMT was awarded a programmatic contract with the Municipal Port Fund of the island of Kos for a prefeasibility study for the new commercial port of the island (February 2009). In particular, due to the increased traffic in the existing port of Kos, the Municipal Port Fund is considering the creation of a separate, exclusively commercial port so as to decongest the port currently in service and furthermore to upgrade the provided services at both ferry/cruise and cargo shipping. In this context, LMT will provide to the Municipal Port Fund of Kos a realistic, practical and viable prefeasibility study for the new commercial port in order to contribute in the best possible manner to the progress and further development of the island.



In the context of the aforementioned programmatic contract, LMT personnel has been visiting the island of Kos in order to assure the best possible implementation of the prefeasibility analysis for the new commercial port of the island. Visits took place in July, with PhD candidate S.D. Chatzinikolaou and Lecturer Dr. N.P. Ventikos participating in meetings with local stakeholders (maritime agents, industrial representatives, port authorities and the Hellenic Coast Guard) to record problems, needs and perspectives of current/future port activities on the island. Meetings were also held in September with the participation of Prof. Psaraftis, the Mayor of Kos Mr. Kyritsis and the Vice-President of the Municipal Port Fund of Mr. Gerasklis to discuss the progress made on the project. Moreover the LMT staff made an on site survey of the current port and of potential sites/locations for the future new commercial port of the island.

The prefeasibility study was concluded according to the demands and targets of the specific programmatic contract and it was successfully submitted to the Port Fund. The study managed to obtain through the Analytic Hierarchy Process methodology a set of rankings for all candidate locations/sites depending on the criteria utilized in each set up, including economic, environmental, social, sustainable development, etc. A presentation of the study to the local community is scheduled to take place in Kos within the first months of 2010.

## 4.6 NUS - NTUA (NOL)

This is a 2-year research project of the NOL fellowship programme of Neptune Orient Lines (NOL) of Singapore, in cooperation with the National University of Singapore (NUS), which acts as the consortium leader. The project started in mid-2008.



The grant concerns the project "Optimal Containership Size and its Impact on Liner Shipping Operations". NOL is a global transport company with core businesses in container shipping and supply chain management. It wholly owns U.S. shipping company American President Lines (APL), which represents 80% of Neptune's revenue, and its sister logistics arm APL Logistics. NUS is Singapore's largest university with close to 2,000 faculty members and 25,000 students.

The project considers the optimal containership size problem applicable to the Transpacific and the Asia-Europe trade routes. The ocean container carriers industry experiences explosive growth of sector as well as increased competition within the sector. Mergers, collaborations and considerable new investments have led to more elaborate fleets and to complex service networks with mega hubs and mega carriers. Among the many issues, the issue of optimal containership size has been a topic of keen industry interest because of its wide ranging impacts that affect all stack players. The problem of optimal containership size will be addressed in the following aspects: (a) Containership operational and cost considerations; (b) Fleet size and mix optimization; (c) Fleet

## Research projects

deployment and routing optimisation; (d) Evaluation of impacts of containership size on hub-and-spoke operations, container-port operations and port infrastructure needs; and (e) a “holistic” approach to develop a decision support system consisting of an integrated framework of models and algorithms of distinct sub-problems.

During 2009, progress was made according to plan, and a meeting between the research teams of NUS and NTUA took place in Singapore. The NTUA team also visited with NOL/APL while in Singapore. Several papers describing the work on this project are foreseen.

## 4.7 SEA DIAMOND



According to the programmatic contract between NTUA and the Municipal Port Fund of Thira (signed in November 2008), LMT has undertaken two major tasks, namely the management of issues concerning the status/fate of the shipwreck of SEA DIAMOND, and the transfer of knowhow for the development of the strategic plan of Port of Thira. During 2009 NTUA-LMT was mainly involved in activities in relation to the shipwreck of SEA DIAMOND; more specifically, it proceeded with the assessment of the proposal for the removal of oil from the shipwreck of SEA DIAMOND submitted

by the British company Dronik Maritime Consultants Ltd. This was done in four consecutive phases: in Jan 2009, NTUA-LMT provided its first comments to the proposed (high-level) plan and required specific clarifications/explanations from Dronik; in March 2009 NTUA-LMT examined the detailed plan and provided a second set of comments asking from Dronik justifications on purely technical matters of the proposed plan; in May 2009 NTUA-LMT drafted a complementary set of technical comments to secure in the best possible manner the conditions needed for the success of the operation; finally in June 2009, NTUA-LMT came up with its last list of comments and points that proposed to Dronik to deal with, in order for the endeavor to have increased probability of success.

NTUA-LMT followed/monitored the whole operation of the removal of oil from SEA DIAMOND and reported on a daily basis to the Municipal Port Fund of Thira the progress of the operation; hence its role was to follow/record all activities and report back to the Port Fund any developments that were identified and documented adequately, in relation to the submitted proposal by Dronik. The operation lasted from May 16 to June 14, 2009. LMT staff N.P. Ventikos, S.D. Hatzinikolaou and P.G. Zacharioudakis were on site during that period.

## 4.8 New EU project: SuperGreen



In December of 2009, a new EU project entitled “Supporting EU’s Freight Transport Logistics Action Plan on Green Corridors Issues” (abbreviated name “SuperGreen”), with NTUA-LMT assuming the role of Coordinator, was officially awarded. The 3-year project is a Coordinated Action supported by the European Commission (DG-TREN) in the context of the 7<sup>th</sup> Framework Programme and has an

official starting date of Jan. 15, 2010. The purpose of the project is to promote the development of European freight logistics in an environmentally friendly manner. Environmental factors play an increasing role in all transport modes, and holistic approaches are needed to identify ‘win-win’ solutions.



## Research projects

The objectives of the SuperGreen project concern supporting the development of sustainable transport networks by fulfilling requirements covering environmental, technical, economic, social and spatial planning aspects. This will be achieved by:

- *Benchmarking of Green Corridors*. Based on a total picture of relevant parameters (KPIs) like energy consumption and emissions, operational aspects and SCM issues, external costs (including social and spatial planning aspects), infrastructure costs and internal costs: identification of areas and candidates for improvement (i.e. bottlenecks).
- *“Green technologies”*. Methods for improving the identified bottlenecks. Among the green technologies considered may be novel propulsion systems, alternative fuels, cargo handling technologies, new terminal technologies, cleaning technologies, heating and cooling technologies, or novel concepts of any kind relevant for the multimodal Green Corridors.
- *“Smarter” utilisation of ICT-flows* already available in the multimodal chain may improve the identified bottlenecks and make the Green Corridors even greener. The influence of issues like e-freight, supply chain management, smarter planning (vehicle navigation technologies), scheduling and track & trace need to be considered.
- *Recommendations for R&D*. Where the available “Green technologies” and present knowledge about “Smarter utilisation of ICT-flows” are not sufficient to improve the identified bottlenecks, recommendations for future calls for R&D proposals will be suggested.
- *Policy Implications*. The implications of related regulatory policies on the possible solutions proposed by the project will be examined, so as to provide assistance to the Commission in the formulation and harmonisation of policies on Green Corridors.
- *Dissemination and Awareness Raising*. The project is paying particular attention to dissemination and creation of awareness on its results. This would involve liaison with stakeholders involved in the topics addressed by SuperGreen (infrastructure managers, transport and terminal operators, shippers, logistics operators, national and local authorities, etc.). It would also include the development of a dissemination plan, promotional material, workshops and other events with stakeholder participation.

The stakeholders that will be engaged in the SuperGreen project include: transport operators, terminal operators including ports, infrastructure operators, authorities etc. responsible for developing and maintaining the infrastructure, cargo owners (shippers), industry/consultants, Non Governmental Organisations (NGOs), environmental organisations, authorities responsible for social and spatial planning and R&D. In addition to industry partners, an external Advisory Committee of industrial and other stakeholders will be connected to the project. Through a 3-year programme of studies, networking, data dissemination and expert engagement, SuperGreen will work with all stakeholders to identify and seek solutions to bottlenecks.

The 22 partners of SuperGreen are:

- NTUA-LMT (Greece)- Coordinator
- MARINTEK AS (Norway)
- Sito Ltd -Finnish Consulting Engineers Ltd (Finland)
- D'Appolonia S.p.A. (Italy)
- Gijón Port Authority (Spain)
- Det Norske Veritas (Norway)
- via Donau (Austria)
- NewRail - Newcastle University (UK)
- CONSULTRANS (Spain)
- PSA Sines (Portugal)
- Finnish Maritime Administration (Finland)
- Straightway Finland Ry (Finland)
- SNCF Fret Italia (Italy)
- Procter & Gamble Eurocor (Belgium)
- VR Group (Finland)

**Research projects**

- Lloyd's Register-Fairplay Research (Sweden)
- Hellenic Shortsea Shipowners Association (Greece)
- Dortmund University of Technology (Germany)
- TES Consult Ltd (Ukraine)
- Turkish State Railways (Turkey)
- DB Schenker AG (Germany)
- The Norwegian Public Roads Administration (Norway)

The launch of the SuperGreen project was one of the presentations of a European Commission (DG-TREN) conference on Green Corridors, that took place on Dec. 9, 2009 in Brussels. The conference took stock of existing Green Corridor projects across Europe, and discussed the main issues related to their implementation and to launch new initiatives in support of the Green Corridor concept (see also section 2.16).

More information on SuperGreen can be found at [www.supergreenproject.eu](http://www.supergreenproject.eu) (to be fully operational soon) and will be also regularly updated via this newsletter and via other specialized newsletters and newflashes. People and organizations interested to link up with this project are encouraged to contact us at [supergreen@martrans.org](mailto:supergreen@martrans.org).



## 5. PUBLICATIONS



### 5.1 Papers in refereed journals

- Gkonis, K. G and H.N. Psaraftis (2009), "The LNG Market and a Game Theory Approach to Competition in LNG Shipping", *Maritime Economics and Logistics Journal*, 11:2, pp. 227-246.
- Gkonis, K.G. and H.N. Psaraftis (2009), "The scenario bundle method and the security of gas supply for Greece" in "Contributions to Game Theory and Management", Vol.II, pp. 92-113, Graduate School of Management, St. Petersburg University, Russia.
- Grigoriou, E., N. Ventikos, and N. Kakalis (2009), "Oil spill waste management", *Environment & Law*, 13(1), pp. 53-58 (in Greek).
- Kontovas, C.A., and H.N. Psaraftis (2009), "Formal Safety Assessment: A Critical Review," *Marine Technology*, Vol. 46, No. 1, pp. 45-59.
- Psaraftis, H.N. and C.A. Kontovas (2009), "CO2 Emissions Statistics for the World Commercial Fleet", *WMU Journal of Maritime Affairs*, 8:1, pp. 1-25.
- Psaraftis, H.N. and C.A. Kontovas (2009), "A web-based open emissions calculator", *Int. J. Ocean Systems Management*, Vol. 1, No. 2.
- Samuelides, M. S., Ventikos, N. P. and Gemelos, I. C. (2009), "Survey on grounding incidents: Statistical analysis and risk assessment", *Ships and Offshore Structures*, 4:1, 55-68.

### 5.2 Proceedings of refereed conferences

- Gkonis, K., H. Psaraftis, and P. Tsilingiris (2009), "Liner Shipping Costs and Logistics: A Literature Survey and Taxonomy of Problems," *International Symposium on Maritime Logistics and Supply Chain Systems (MLOG 2009)*, April 23-24, Singapore.
- Gkonis, K.G. and H.N. Psaraftis (2009), "Caspian - Black Sea - SE European Gas Corridors and the LNG parameter: A scenario bundles approach" (2009), 10th IAEE European Conference "Energy, Policies and Technologies for Sustainable Economies", September 7-10, Vienna, Austria.
- Gkonis, K.G., H.N. Psaraftis, and N.P. Ventikos (2009), "Game Theory contributions to Terrorism in Merchant Shipping: an Application to Port Security", *IAME 2009 Conference*, June 24-26, Copenhagen, Denmark.
- Gratsos, G.A., H.N. Psaraftis, P. Zachariadis (2009), "Life Cycle Cost of Maintaining the Effectiveness of a Ship's Structure and Environmental Impact of Ship Design Parameters: an Update," *RINA Conference on the Design and Operation of Bulk Carriers*, October 26-27, 2009, Athens, Greece.
- Kontovas, C.A., Psaraftis, H.N. (2009), "An Online Ship Emissions Calculator as a Decision-Making Aid and Policy Evaluation Tool", *13th Congress of the International Maritime Association of the Mediterranean (IMAM 2009)*, October 12-15, Istanbul, Turkey.
- Lusis K., Koimtzoglou A., Ventikos N.P. (2009), "The Risk of Wrecks or the Wreck of Risks? The Greek Paradigm", *New Perspectives on Risk Analysis and Crisis Response: 2nd International Conference Risk Analysis and Crisis Response (RACR 2009)* part of the series *Advances in Intelligent System Research*, October 19-21, Beijing, China.

- Lyridis, D. and P. Zacharioudakis (2009), "Analysing Tanker Market Elasticity With Respect To Oil Production Using FORESIM", International Symposium on Maritime Logistics and Supply Chain Systems (MLOG 2009), April 23-24, Singapore.
- Panagakis-Panagopoulos C. and N.P. Ventikos (2009), "Air Emissions from Passenger Ships at the Island of Santorini: A Difficult Puzzle in a Complex Environment", 10th International Conference on Fast Sea Transportation (FAST 2009), October 5-8, Athens, Greece.
- Psaraftis, H.N. (2009), "Challenges in European Short Sea Shipping," invited plenary address, 13th Congress of the International Maritime Association of the Mediterranean (IMAM 2009), October 12-15, Istanbul, Turkey.
- Psaraftis, H.N. (2009), "Green Maritime Logistics", invited plenary address, International Symposium on Maritime Logistics and Supply Chain Systems (MLOG 2009), April 23-24, Singapore.
- Psaraftis, H.N. and C.A. Kontovas (2009), "Ship Emissions: Logistics and Other Tradeoffs," International Marine Design Conference (IMDC 2009), May 26-29, Trondheim, Norway.
- Psaraftis, H.N., Kontovas, C.A., Kakalis, N. (2009), "Cost-effectiveness of Speed Reduction as an Emissions Reduction Measure for Fast Ships", 10th International Conference on Fast Sea Transportation (FAST 2009), October 5-8, Athens, Greece.
- Ventikos N.P., Chatzinikolaou S.D., Zagoraios G. (2009), "The Cost of Oil Spill Response in Greece: Analysis & Results", 13th Congress of the International Maritime Association of the Mediterranean (IMAM 2009), October 12-15, Istanbul, Turkey.
- Zagkas V.K. and D.V. Lyridis (2009), "An Analysis Of Seaport Cluster Models For The Development And Competitiveness Of Maritime Sectors: The Port Of Piraeus", International Symposium on Maritime Logistics and Supply Chain Systems (MLOG 2009), April 23-24, Singapore.

### 5.3 Other conferences

- Minsaas, A., Psaraftis, H.N. (2009), "The Launching of the SuperGreen project," invited presentation, European Commission (DG-TREN) Conference on Green Corridors, December 9, 2009, Brussels, Belgium.
- Psaraftis, H.N. (2009), "Challenges in Maritime and Intermodal Logistics," invited lecture, Hamburg School of Business Administration, November 16, Hamburg, Germany.
- Psaraftis, H.N. (2009), "Fast Waterborne Transport in the Emissions Reduction Era: in Search of Win-Win Policies," invited keynote address, 10th International Conference on Fast Sea Transportation (FAST 2009), October 5-8, Athens, Greece.
- Ventikos N.P., Chatzinikolaou S.D. (2009), "Maritime Transport and the Environment: The Mediterranean Fairy-tale", Ecomediterranean Conference: Towards a Sustainable Management of Mediterranean Sea, Palma de Mallorca, Spain.

### 5.4 Other publications

- Psaraftis, H.N. (2009), "Environmental Risk Assessment: For a Fistful of (60,000) dollars", Naftika Chronika, May issue (in Greek).
- Psaraftis, H.N. (2009), "Market Based Instruments for Ship Air Emissions", Naftika Chronika, June issue (in Greek).
- Psaraftis, H.N. (2009), "Coastal shipping ticket charges for third parties: myths and reality", Naftika Chronika magazine, August issue (in Greek).

## 6. EVENTS CALENDAR

### Meetings and Events attended by LMT staff



- LMT “vasilopitta” event, Piraeus, Greece, Feb. 26
- LMT workshop on environmental risk evaluation criteria, Athens, Greece, Feb. 27
- CHINOS Final Meeting, Bremen, Germany, March 26.
- MLOG 2009 Symposium, Singapore, April 23-24.
- NOL-NTUA project meeting, Singapore, April 25.
- FLAGSHIP project workshop, Piraeus, Greece, May 13.
- DNV-NTUA project meeting, Trondheim, Norway, May 25.
- International Marine Design Conference (IMDC 2009), Trondheim, Norway, May 26-29.
- IMO MSC 86 meeting, London, UK, May 27-June 5.
- EFFORTS WP3.1 evaluation, Thessaloniki Port Authority, Thessaloniki, Greece, June 24-25.
- IAME 2009 Conference, Copenhagen, Denmark, June 24-26.
- IMO-MEPC, London, UK, July 13-17
- Port of Venice peer review, Venice, Italy, August 6
- 10th IAEE European Conference “Energy, Policies and Technologies for Sustainable Economies”, Vienna, Austria, September 7-10
- ECOMEDITERRANEAN Conference “Towards a Sustainable Management of the Mediterranean Sea”, Palma de Mallorca, Spain, September 24-25
- Municipal Port Fund of Kos, Greece, July-September
- 10th International Conference on Fast Sea Transportation (FAST 2009), Athens, Greece, Oct. 5-8
- ABS-NTUA project Steering Committee meeting, Athens, Greece, Oct. 9.
- 13th Congress of Intl. Maritime Assoc. of Mediterranean (IMAM 2009), Istanbul, Turkey, Oct. 12-15
- 2nd International Conference Risk Analysis and Crisis Response (RACR 2009), Beijing, China, Oct. 19-21
- First China-Europe Risk Forum, Beijing, China, Oct. 22-23
- SNAME Annual Meeting 2009, Providence, Rhode Island, USA, Oct. 20-24
- RINA Conference on the Design and Operation of Bulk Carriers, Athens, Greece, Oct. 26-27
- Formal Safety Assessment (FSA) Group of Experts meeting, IMO Headquarters, London, UK, Nov. 2-5
- Seminar on "Energy & Foreign Policy", Institute of Energy for South East Europe, Athens, Greece, Nov. 9
- 3rd Energy Week, Institute of Energy for South East Europe, Athens, Greece, Nov. 11
- Hamburg School of Business Administration Seminar Series, Hamburg, Germany, Nov. 16
- International Association of Ports and Harbors Europe- Africa Regional Meeting, Hamburg, Germany, Nov. 16-18
- MEDAYS (Mediterranean Days) 2009 Annual Conference, Tangier, Morocco, November 20-21
- 6th International Conference "Strategy 2009", Hellenic Institute of Strategic Studies, Athens, Greece, Nov. 24-25
- European Commission (DG-TREN) Conference on Green Corridors, Brussels, Belgium, Dec. 9.



## 7. 2009 IN PICTURES



LMT pitta-cutting event, February 2009



Workshop on environmental risk evaluation criteria, February 2009

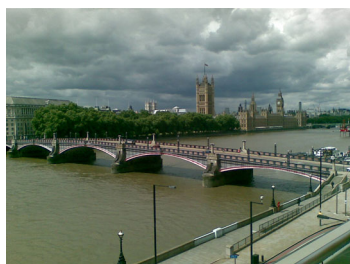
From left to right: Rainer Hamann, Kees Metselaar, Jon McGregor, Stefan Micallef, Elias Sampatakakis, Norman Meade, Yasuhira Yamada, Panos Zachariadis, Harilaos Psaraftis



Harilaos Psaraftis delivering plenary address at MLOG 2009, Singapore, April 2009



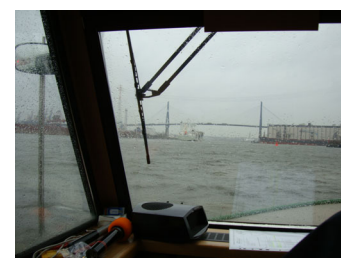
Dimitris Lyridis, T.F. Fwa and Panagiotis Zacharioudakis, Singapore, April 2009



London, MEPC 59, July 2009



Industrial/commercial port, Venice, August 2009



Hamburg port, IAPH Africa/Europe regional meeting, October 2009



Green Corridors Conference, Brussels, December 2009