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09.00-09.30 **COFFEE & REGISTRATION**

09.35-10.10 **CASE STUDY ON DESCON- INSTITUTE CONSULTANCY CELL: AN EFFICIENT LINK FOR INDUSTRY-INSTITUTE COLLABORATION**

Dr. K Sivaprasad, Associate professor, Department of Ship Technology, Cochin University of Science and Technology, Kochi, Kerala, India, Dr. Ajay Asok Kumar, Principal Surveyor, ClassNK, London, UK

Close association between institutes and industries are essential for holistic development of the both the organisations. Best examples of classical institute-industry interaction can be traced in literatures of ancient Indian wisdom where in great gurus had been very influential many action plans implemented in the societal and industrial domains. The same practice had been followed in the medieval and modern period when Indian supremacy in world trade was at its peak. The paper tries to analyse a similar concept evolved in the department of Ship Technology at Cochin University of Science and Technology, Kochi, Kerala, India. DESCON the DEsign CONsultancy wing of department of Technology has been actively involved in establishing and sustaining close association with industries and other maritime establishments in India. The paper analyses the role played by DESCON in making Department of Ship Technology to an institute of global reputation. The concept, characteristics and the collaborative works of DESCON as an Industry-Institute link have been discussed in this paper. The contributions made by DESCON in the field of Naval Architecture education training, ship and boatbuilding industry and to the state administration have been presented in this paper by providing typical and suitable examples. The salient achievements made by DESCON which can be set as models in Industry-Institute Interaction is yet another theme which has been outlined in this paper.

10.10-10.45 **PARTICIPATION OF STUDENTS OF MARITIME ENGINEERING IN THE NAVAL EXERCISE "MARSEC 2015" WITH WEBSITE OF THE SPANISH NAVY**

Ernesto Madariaga, Francisco Correa, Jesús M. Oria, University of Cantabria, Spain, Jorge Walliser, University of Cadiz, Spain. From May 25th to May 29th, 2015, Maritime Safety and Security students studying Maritime, Marine and Nautical Engineering at the School of Nautical Studies of University of Cantabria have participated with Nautical and Marine Engineering students of Cadiz University in an online naval maritime security exercise with the Spanish Navy. Each student has worked as a Company Security Officer, operating a vessel in which they defined all the characteristics, but non-existent in the real world. The Spanish Navy designed a conflict area for students affected by terrorist and piracy activities against maritime traffic in the Canary Islands, made up of two coordinated transit corridors. Students have used the Web application of the Navy "ENCOMAR" (Maritime Collaborative Website of the Spanish Navy) to send the required maritime security online forms required by the NCAGS (Naval Cooperation and Guidance for Shipping) tool. In turn, for greater interaction, the Spanish Navy has provided students with the use of 'MAPA' (navigation system which shows all seaborne trade and student participating ships) within the ENCOMAR website. In turn, they also had access to a chat for communication between students, professors and participating naval officers. The Spanish Navy defined the vulnerabilities of each vessel by its nature, with this; students have learned what corrections should be made in the design or transformation of vessels to avoid terrorists or piracy actions. Once the exercise was finished, we generated a Likert survey that allowed us to measure the acquisition of knowledge and skills gained by Maritime Engineering students.

10.45-11.20 **DEVELOPING NAVAL ENGINEERING WORKFORCE THROUGH UNDERGRADUATE RESEARCH AND EXPERIENTIAL LEARNING**

*Jennifer G. Michaeli, Paul Moses, Orlando Ayala, Gene Hou, and Sebastian Bawab, Naval Engineering and Marine Systems Institute, Old Dominion University, USA.*Old Dominion University (ODU) is located in Norfolk, Virginia in the Hampton Roads region that is home to approximately 83,000 active duty military personnel. ODU maintains close partnerships with the US Navy, as well as the maritime, shipbuilding and ship repair industries in the Hampton Roads region. In 2014, ODU introduced the Naval Engineering and Marine Systems Institute (NEMSI) within the Batten College of Engineering and Technology in response to the needs of this stakeholder base. NEMSI serves as a focal point to connect the Navy and industry partners with high-quality research carried out by university faculty and also serves as a pipeline for engineering students, exposing them to different facets of marine engineering, and helping to create the next generation of future naval engineers. This paper discusses the implemented methods for student engagement and highlights several of the Institute's recent successes through in-classroom and distance learning, project-based learning involving undergraduate and graduate students in sponsored research, and experiential learning to produce seasoned graduates that are well prepared for permanent positions at naval research facilities, design offices and shipyards, both regionally and nationally.

11.20-11.50 **COFFEE**

11.50-12.25 **RAPID PROTOTYPING AND PHYSICAL MODELS IN TEACHING SHIP DESIGN**

N Bradbeer, R Mead, N Willmore, UCL, UK

As part of its MSc courses in naval architecture and marine engineering, UCL delivers a three-month ship design exercise, where groups of 3-4 students develop a ship design from requirement to concept level. A key challenge in this course is communicating geometric information, within the group as well as to external advisors and examiners. This process has traditionally been based on 2D engineering drawings, which can be time consuming to prepare and require skill to interpret. In recent years the rise of 3D CAD has allowed the preparation of design images more quickly, although interpreting a 2D image still requires skill and experience, with room for misunderstanding. One approach which UCL has found to be useful is the rapid production of physical models during the design process. Physical models have the advantage of being very easy to interpret; their chief disadvantages being production time and cost. UCL has experimented with a variety of methods for producing physical models to find methods which are fast enough and inexpensive enough to be suitable for various stages of the ship design exercise, including various forms of 3D printing and fabrication from laser-cut cardboard. This paper presents an overview of the various model production methods that have been tried at UCL, with a summary of their relative advantages and disadvantages, and suggests useful developments that may occur in the near to mid-term future.

12.25-13.00 **SIMULATION AND VISUALIZATION EDUCATION IN MØRE REGION IN NORWAY**

Fang Han, Faculty of Maritime Technology and Operation, Aalesund University College, Norway

Simulator is an integrated engineering tool for the management and training of maritime operators. It is used to reduce operational risk and prepares operators for most possible and impossible scenarios. However, training courses usually cannot guarantee the operators use the product rightly and appropriately in reality. Hence, in order to scope all possibilities of risks, university opens several simulation and visualization courses to help industries to train the future developers to have a solid understanding of maritime operation and risks. The courses are developed to provide not only fundamental knowledge for students to understand the operators needs regarding to developing high-fidelity solutions for any scenarios, but also can help the maritime industries to reduce the distance between simulation and system in use in reality. The aim is to make the training courses more effectiveness and useful.

1.300-14.00 **LUNCH**

14.00-14.35 **HUMAN RESOURCE DEVELOPMENT IN SHIPBUIDING TECHNOLOGY FOR INDUSTRY AND EDUCATION IN BRAZIL: A CASE STUDY AT FEDERAL UNIVERSITY OF PERNAMBUCO**

Armando Hideki Shinohara, Ayako Ono, Hissae Fujiwara, UFPE - Federal University of Pernambuco, Brazil. State strategy to become Pernambuco State in one of the main global hubs of goods and services in oil, gas, naval and offshore, and a plan for exploration of vast and huge oil and gas reservoir estimated in 80 to 100 billion of barrels in offshore, to support these developments, in August of 2010, undergraduate course in naval and ocean engineering was established at UFPE. Aiming to high level human resource development in shipbuilding technology for industry and education in medium and long term, in October of 2010, a human resource formation program financially supported by Brazilian Oil & Gas Company was started selecting more than 100 undergraduate students of naval and mechanical engineering courses to develop research works in this field. Furthermore, due to the lack of experts in this field in Brazil, international agreements were established with top Finish Universities (TUAS, SAMS, LUT), The University of Tokyo, National University of Yokohama of Japan, shipyards. As a result, International agreements have allowed delivery of several intensive courses by experts in shipbuilding (welding, productivity in shipyards, fracture mechanics, propulsion systems, ship design), organization of workshops with participation of shipyards, improvement of foreign language skills (English, Japanese). Additionally, students are being sent to top universities of those countries and also to UK, USA, Korea for higher education, conduct internship in shipyards and in related industries. To improve skills of students in design, construction and performance of ships, participations in domestic and international contests as in Switzerland, Japan are supported.

14.35-15.10 **EXPERIENCE-BASED INNOVATIVE PROGRAMME IN VARNA, BULGARIA**

Petar Vankov, Naval Academy Varna, Bulgaria,
Desislava Vankova, Medical University - Varna, ACRO, Bulgaria

We live in the "ocean" of cyber-society and this speeds up the growth of all businesses. As a result, the maritime industry is making rapid progress. The sector of higher education has to develop even faster in order to be adequate to the changing needs of the maritime labour market. Therefore, the contemporary education of naval engineers requires the creation of modern programmes which deliver new competencies and skills. Such strategy is a key to success for a university which aims to educate and train marine professionals ready for real-life challenges. Moreover, academic collaborations between universities which are near neighbours could combine expertise and infrastructure and be real success-stories. The traditional teaching methods offer too much theoretical knowledge which creates a stressful atmosphere. As a result, a lot of students are working bellow their intellectual capacities during tutorials. This excessive theoretical accent does not reflect the dynamics of the rough sea circumstances, for example. It has been proven that basic practical tasks cannot be understood and solved by the traditionally educated students. A sustainable education of naval engineers is not possible if it is not "alloyed" with real-life cases. A novel experience-based model has been developed and applied while teaching some subjects in the Naval Academy Varna, Bulgaria. The innovative approach respects the fundamental principles of interactive teaching and positive education. Further, the potential of technologies is utilized. The essential prerequisite for the successful application of the model is the effective communication during classes/lectures. This is possible if the tutor has not only theoretical competencies but also field-experiences. The contemporary educator has to be an expert both in theory and practice in order to effectively teach his students how to cross "the bridge" between science and practice "coasts".

15.10-15.40 **COFFEE**

15.40-16.15 **SKILL DEVELOPMENT IN THE MARITIME SECTOR THROUGH E-LEARNING**

Sohan Roy S K, Aries International Maritime Research Institute, UAE

Availability of well qualified teachers is a serious problem faced by maritime training institutions across the globe. E-learning which includes education via the Internet or other IT enabled means involving electronic transfer of skills and knowledge through a technology interface can solve this problem to a large extent. Success of E-Learning package depends on the skills of the designer/ developer. Successful e-Learning development includes design of the course structure where Subject Matter Experts (SME) play the key role, content development including instructional designers, course developers, graphic designers etc, content review by editorial and SME Reviewers and deployment which involves the packaging and delivery of content to the learners. E-learning offers flexible access and use of information and resources at a time, place and pace that is suitable and convenient to individual learners rather than the teacher and/or the educational organization. The potential for this area is broad. Learning becomes more effective, and it easily accessible across the globe. The possibilities of animation in e-learning are tremendous. Real time situations in the industry can be simulated virtually in 3D in order to provide a better understanding for the students for both on board and ashore application. E-learning packages are force multipliers for teachers. Properly developed e-learning packages can reduce the student-teacher interface and eventually lead to a teacherless teaching concept. The initiatives and methodology adopted by the Aries International Maritime Research Institute in developing E-learning as an industry focussed training method for the marine sector are presented in this paper.

16.15-16.50 **THE TURMOIL IN GEOSPATIAL EDUCATION: IS E-LEARNING AN INDUSTRY-RELEVANT SOLUTION?**

Jaimie Cross, Brian Gamet and Richard Thain, The Marine Learning Alliance Ltd., UK

The establishment of distance e-learning as a mechanism to attract students to higher education has been advanced by the proliferation of courses that are available through both existing Universities and commercial enterprise. The general skills shortage in most geospatial professions has been discussed widely in recent years, and e-learning has often been touted as the solution to upskilling the existing workforce, and attracting new entrants into the profession. Ensuring that students remain fully engaged with online courses has, however, long been recognised as a key link to ensuring maximum value is obtained from any e-learning programme, from the perspective of both the student and their employer. The Marine Learning Alliance (MLA), a recent spin-out from Plymouth University, has significant expertise in designing and delivering education and training programmes to the scientific and hydrographic sectors. Presented here are the results of a study examining the extent to which students remain engaged with courses provided by MLA, by following the unique delivery system and method that practically aids continued engagement and uptake of learning materials. Pragmatic guidance and advice, developed in response to our comprehensive survey, is offered to those who similarly seek to maximise the value provided by any given education or training program.

16.50- **GENERAL DISCUSSION & DRINKS RECEPTION**

08.30-09.00 **COFFEE & REGISTRATION**

09.35-10.10 **LESSONS LEARNED IN MARITIME SYSTEM DESIGN EDUCATION**

Yushan Pan, Sashidharan Komandur, Maritime Human Factors Laboratory, Norway, Sisse Finken, Department of Informatics, University of Oslo, Norway

Most universities and colleges open human-centred design courses for most design related programmes, majoring in human-computer interaction design (HCID), industrial engineering, ship design, mechanical design, architectural and urban design. However, most design courses teach student to manage human beings as human factors in a way to understanding design. This results in most students misunderstand human beings are also actors in technology use. An obvious result is designed systems are not applicable to users. Students overlook users' needs and ignore translating these needs into useful maritime systems, in cooperation with the users. Hence, preparing students for solving such situation in their work through education is not easy to achive. In this paper, we investigate ways to adopt theories in use-oriented participatory design (PD) from HCID into maritime engineering education. Here, we take a closer look at how prior and embodied and explicit knowledge of design that all of the maritime students have, combined with knowledge of design practice through the PD insight, shape them as maritime system designers. We discussed the effort of PD that can help to increase students' capability of understanding design, technology in use and in terms of perceptions of how well the design course can be structured students for the work practice.

10.10-10.45 **A STUDENT'S TAKE ON EDUCATION IN THE MARITIME INDUSTRY**

J.B. Souppez, Auckland University, New Zealand

Having Graduated from three major marine engineering courses over the past two years, namely the BEng (Hons) in Yacht and Powercraft Design at Southampton Solent University (RINA and IMarEST top student award), the Practical Boatbuilding course at the International Boatbuilding Training College Lowestoft, and the MEngSt in Yacht Engineering at the University of Auckland (Yacht Engineering Scholarship, two academic awards and teaching assistant position); this paper will offer a new perspective on education and professional development opportunities in the marine engineering field. Each course will be introduced and reviewed, highlighting the industry links and specificities it benefits from, including online learning resources and latest innovations. Finally, the case study of an eight month full-time distance learning research project realized in collaboration with to radically opposed institutions will be presented. The design of a wooden racing yacht has been undertaken for a client, with the intention of being built at the International Boatbuilding Training College, while being submitted as a research project to the University of Auckland. This is a perfect example of a modern academic collaboration occurring in an ever developing environment with an increasing use of technology and communication at an international level, which proved to be the most critical aspect. This paper will present the view of the primary stakeholder concerned by the development of education in the maritime industry: an international student, with the intent to review and share recent experiences and inherent conclusions to improve the delivery of education and academic collaborations in the future.

10.45-11.15 **COFFEE**

11.15-11.50 **TRAINING CHALLENGES IN AN EXPANDING ENGINEERING CONSULTANCY: GRADUATE TRAINING FOR THE MODERN MARITIME INDUSTRY**

Simon Pollard, Guy Dewdney and Tom O'Brien, London Offshore Consultants Limited, UK

London Offshore Consultants are engaged in marine engineering consultancy with a worldwide office and client spread. The technical staff cover the full range of disciplines including naval architects, structural engineers, marine and civil engineers and master mariners. Naval architects are recruited from academia through the company's graduate training scheme which is accredited by RINA. The scheme has been in operation for six years now and the first graduates are working with LOC. The growth of LOC and the increasing intake of other graduate disciplines has led LOC to re-examine the scheme with a view to broadening its remit. The paper will outline the scheme with contemporaneous accounts of the scheme's implementation, both good and bad experience. Issues involved in the scheme's future development will be discussed.

11.50-12.25 **EDUCATION OF MARITIME DOCTORAL STUDENTS AS PART OF INTERNATIONAL UNIVERSITY NETWORK**

KUJALA, P., EHLERS, S, VEITCH, B. FAISAL, K, VANHATALO, J, LEIRA, B, Aalto University, Finland

Aalto University, together with three other universities has received significant funding for an international Research Centre of Excellence for Arctic activities from Lloyd's Register Foundation (LRF), a UK registered charity that invests in science, engineering and technology for public benefit, worldwide. LRF has established a Research Centre of Excellence in Arctic Shipping and Operations. The Centre is headed by the Aalto University (Finland). Also taking part are the Hamburg University of Technology (Germany), the Helsinki University (Finland), the Norwegian University of Science and Technology (Norway) and the Memorial University of Newfoundland (Canada). The Centre will support 10 doctoral dissertations on risk management in Arctic operations over a period of five years. The Centre is the first of its kind in the Nordic Countries and the only centre concentrating on Arctic challenges. The funding provided by LRF is a very significant contribution to the activities of the consortium allowing it to continue to develop global expertise in the challenging operational environment owing to the long distances involved, the great fluctuation in ice conditions, and the unpredictable behaviour of ice. The breakthrough innovations are only possible through on-going research and development, in which theoretical modelling, laboratory tests and full-scale observations are in balance, which can be achieved most efficiently by international networking. The mobility of the doctoral students has key importance for the success of the project. This paper will describe the basic principles of organizing the mobility of the doctoral students and analyse the first experiences gathered from this mobility. The network of the students and their thesis topics will be described together with main links between the studied topics so that the overall challenging targets of the research activities can be achieved.

12.25-13.30 **LUNCH**

13.30-14.05 **EMSHIP+ : AN UNIQUE EUROPEAN MASTER PROGRAMME IN SHIP & OFFSHORE STRUCTURES**

RIGO Philippe, University of Liege, Belgium

The EMSHIP+ programme has the unique experience of sharing the experiences of educators, trainers, industrial partners and students in the rapidly developing areas of marine and offshore engineering. Our paper related to the EMSHIP experiences as a relevant case study:

- of academic collaborations, partnerships, and alliances,
- of partnerships between industry and academia, and
- a formalised professional development programme set up within industry.

Maritime industry is looking for polyvalent engineers having expertise in 2 or 3 technological fields like naval architecture, mechanical engineering, production, CFD, etc. EMSHIP provides such opportunity. Indeed EMSHIP teaches graduates but also experienced professional looking to update their knowledge.

14.05-14.40 **SUSTAINABLE COLLABORATIVE POST-ACADEMIC EDUCATION: THE CASE OF THE MARINE PROPULSION COURSE IN THE NETHERLANDS**

Elena Stroo-Moredo MSc, Professional Training Manager, Netherlands Maritime Technology
Peter de Vos MSc, Assistant Professor, Delft University of Technology, The Netehrlands

This paper is on the collaboration between Delft University of Technology and the branch organisation of the Dutch Shipbuilding industry on a course on Marine Propulsion Systems. This course has been running successfully for over a decade now, which has cumulated into more than 200 maritime professionals having benefited from the course. This high-quality course deals with the topics related to the design of Marine Propulsion systems such as the different types of propulsion systems, characteristics of marine propulsors, drive systems (components) and matching of propulsion systems. Traditionally, the course is divided over 5 modules which can be taken separately. This course has attracted many maritime professionals from a variety of countries over the last decade. In order to meet the changing needs of the (international) industry the course has been reviewed such that it meets the requirements of the post academic maritime continuing education (PAMAS) accreditation. This accreditation is specific for the maritime industry and has recently been set-up in order to fulfil the need of the Dutch industry for an acknowledged qualitative continuing education programme. In the near future the course may also join other international maritime accreditation programmes as well, to properly reflect the quality of the course even more. The course itself (the structure of the course, materials used, etc.) will be the topic of this paper, as well as the recent review process that has been performed in order to fulfil all accreditation criteria. The fact that the course has such a successful (and long) track record and is still able to improve itself, is an accomplishment worth presenting.

14.40-15.10 **COFFEE**

15.10-15.45 **ACADEMIC AND TECHNOLOGICAL PARTNERSHIPS BETWEEN A NEWLY CREATED UNDERGRADUATE COURSE IN NAVAL ENGINEERING AND NEW SHIPYARDS IN NORTHEASTERN BRAZIL**

Silvio Eduardo Gomes de Melo, Paula Suemy Arruda Michima, Marco Antonio Ladislau Petkovic, Federal University of Pernambuco, Brazil

Brazil has established in the last few years new naval poles. Those poles, capable of building ships and platforms, were planned to meet the demands arising from new oil fields discovered off the Brazilian coast, since the capacity of the traditional hub in south-eastern Brazil did not allow further expansion. Among the investments in north-eastern Brazil there are two shipyards in SUAPE complex, in the State of Pernambuco - one large and one medium-sized. In order to supply skilled labour and also taking full advantage of the proximity between the University and the Naval Pole, UFPE has created an undergraduate course in naval engineering which is focused on shipbuilding technologies. Both shipyards and the newly created course faced the same initial problems such as lack of local skilled labour, non-existent infrastructure - which was after created with the implementation of projects - and a total absence of a shipbuilding-related culture. In order to reduce the time spent at the learning curve and speed up the training of high quality human resources and get the expertise demanded at the region, partnerships were created between the shipyards and academy. In this work, we intend to transmit our chosen approach to accelerate to obtain good results in expertise and human resources formation by presenting the first activities within these partnerships. In addition, we include the initial search of points of common interest, the results of the first months of implementation, and the prospects for future improvement.

15.45-16.20 **ITALIAN MARITIME CLUSTER AND GENOA UNIVERSITY: A COLLABORATIVE PARTNERSHIP FOR THE EDUCATION**

Gianfranco DAMILANO, ATENA - Massimo FIGARI, University of Genoa - Alessio GNECCO, AIPAM - Roberto ORVIETO, Board of Engineers - Carlo PODENZANA BONVINO, University of Genoa, Italy

The School of Naval Architecture and Marine Engineering in Genoa started its activity in 1870 as 'Royal School of Naval Architecture and Marine Engineering' with the aim to increase the scientific knowledge of ship designers and ship engineers for both the Italian Navy and the Italian merchant marine. Since the beginning in 1870 the topics of teaching and research were mainly focussed on merchant ships, passenger ships and naval vessels. In 1992 started a new School in La Spezia, the School of Pleasure Craft Design of the University of Genoa. Since that time the teaching and research activity was increased, including also the topics related to small ships and pleasure crafts. At the moment the University of Genoa has two degrees of 5 years, and one PhD course in topics related to Naval Architecture and Marine Engineering. The number of students is about 500 in Genoa and 500 in La Spezia. In this paper we discuss our experience of professionalising courses for students in naval architecture and marine engineering at the Polytechnic School of the University of Genoa. The aim of the courses is to describe the activity of professional engineers in different fields of the maritime industry and to give real world workplace context to the academic subjects studied. The project was initiated ten years ago in cooperation between the Department of Maritime Engineering of the University of Genoa and AIPAM, an association of independent surveyors particularly involved in maritime casualties. Over the years the scope of the courses was modified and widened leading to a recent reorganization involving professionals having different skills and knowledge: class surveyors, consultants, lawyers, brokers, claim managers, superintendents, technical managers and Coast Guard officers. The project is now based on seminars and lectures on ship management, design and project management, safety and certification, the tasks of maritime authorities, fundamentals of maritime law, financing and insurance. The modules are organized in different ways, depending on the matter described, and are based on presentations by the experts, a question/answer time, case studies and interactive sessions. The courses are concluded by a summary exercise after which a certificate of attendance is issued by the University and the relevant credits for the PhD are set. It is estimated that since they were established, more than three hundred students have attended the courses. The appraisals of the quality of the courses provided, based upon the comments expressed by the attending students, are given in the paper.

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