Towards Zero Collision - Hazard Perception at Sea

The IMO defines collisions as casualty caused by ships striking or being struck by another ship, regardless of whether the ships are underway, anchored or moored. This type of casualty event does not include ships striking underwater wrecks. The collision can be with other ship or with multiple ships or ship not underway.

The International Regulations for Preventing Collisions at Sea 1972 (COLREGs) are a set of rules to be followed by navigation officers to avoid collisions at sea. It is one of the most important International Conventions that all seagoing Officers must possess full knowledge of, as well as having the skills needed to apply them correctly. However, case law, as stated in the MARS and MAIB reports, indicates that many of the basic principles of the rules are improperly understood and applied such as it being common practice to use VHF Radio in collision avoidance procedures; although such radio communications are not part of the COLREGs (MAIB, 2004). Recent studies undertaken by Ziarati et al (2011, 2017) showed that almost 50% of seafarers disregard/ignore the COLREGs at sea when they are taking action. This case law is further supported by several reports such as (IMO, 2005) that 80% of accidents at sea are caused by human error and Ziarati (2006), Ziarati et al (2017) notes that mistakes are usually made not because of deficient or inadequate regulations, but because the regulations and standards that do exist are often ignored. The IMO MSC (Ziarati, 2006; Ziarati et al 2017) clearly indicates that the causes of many of the accidents at sea are due to deficiencies in maritime education and training of seafarers or disregard for current standards and regulations.

Collisions remain a major source of accidents at sea resulting in serious injuries and loss of life and property. The European Maritime Safety Agencies 2014 Maritime Accident Review found that between 2011-2013 in the category of 'accidents with a ship' Collisions were the second leading cause of accidents resulting in serious injuries (20% of accidents) and 15% of accidents deemed as a 'serious occurrence' were caused by collisions.

It is accepted within the global community that there will be no changes to the COLREGs regulations in the short-medium future, indeed the International Maritime Lecturers Association made its position supporting the IMO regulations clear in its IMLA Newsletter Volume 1 June 2014). where it stated that the "IMO, has provided a clear text for COLREGs" and that as for "COLREG specific" accidents these can be attributed to "the unsatisfactory results of maritime training" or "seafarers not being able to use COLREG properly at sea". Therefore with both the regulator (IMO) and professional lecturers association (MLA) supporting the current regulations it falls to the Maritime Education Providers to develop innovative approaches to better understand COLREGS themselves, and new methodologies to teach COLREGs to cadets.

Seeing the severity of this issue the initial research has been carried out by the partners to identify training needs, for COLREGs (www.marifuture.org/Reports/Development-Papers/ADP_11_2015_MARIFUTURE.pdf) and subsequent research (www.ecolregs.com) has shown the seriousness of the problem. The EU target of zero collision at sea can only be achieved by introducing a new means of avoiding collisions at sea viz., not only that rules are explain so that they are easy to understand and interpret but also hazards are evaluated with a view to avoid accidents happening. The is new means requires application of Predictive Analytics in application of COLREGs. All projects on collision regulations at sea has been on the basis that all vessels obey the internationally approved COLREGs. The new

project considers vessels which may break or disregard the rules, which is one of the main reasons for collisions at sea.

Key objective and aim - The main objective of the proposed project is to follow the findings of two recent EU funded ACTs and ACTS Plus project (www.ecolreg.com and www.advanced.ecolregs.com). The ACTs project concerned the development of an online methodology offering over 300 collision scenarios supported by ship simulator case studies. These scenarios were purely on application of one specific rule in a collision situation. ACTS Plus related to improve the existing knowledge and VET training practice of seafarers and to raise awareness of the correct application of COLREGs in the more complex multi-ship and multi-rule situations which occur in the real world. The main aim of this proposal is to improve situational awareness by developing an ICT platform for hazards developing in real situations. The proposal is expected to alleviate hazards from developing into a collision. The project will take advantage of Artificial Intelligence (AI) specially the use of neural networks (NN) to predict projections of ship movements in a given situation at sea in order to be aware of possible hazards that may lead to an incident/collision at sea. Hazard perception tests are becoming a common place in motor car and motor bikes licensing; the results shows their impact has led to substantial reductions in accidents on roads.