

**IFSMA /CAMM AGM 2017**

# **Autonomous and Unmanned Ships**

**Captain George A. Quick  
Vice President – MMP, PMG**

## **Norway**

Rolls Royce – Marine

Kongsborg

DNV-GL

## **Finland**

Tekes, the Finnish Funding Agency for Innovation,

University of Turku

Tampere University of Technology

## **Denmark**

Danish Maritime Authority

Technical University of Denmark (DTU)

## **United Kingdom**

UK Maritime Autonomous Systems Regulatory Working Group (UKMASRWG)

Lloyd's Register

## **European Union**

MUNIN (Maritime Unmanned Navigation through Intelligence in Networks)



“HRONN”

IMO Assembly resolution A.947, Human Element Vision, defines the human element as:

*“a complex multi-dimensional issue that affects maritime safety, security and marine environmental protection. It involves the entire spectrum of human activities performed by ships' crews, shore-based management, regulatory bodies, recognized organizations, .....”*.

The issues which have been identified include:

The degree of redundancy and robustness in technical, navigational and engineering systems;

The quality of the software and algorithms;

Cyber security and the reliability of the communications system;

The risks in mixed manned and unmanned traffic;

The situation awareness of the human controller is limited to data from remote sensors;

## ISSUES:

The reliability of the sensors and systems in all environments;

System failure in remote areas;

Security and environment issues and concerns;

Infrastructure requirements and costs;

Training for the shore-based remote control personnel;

Responsibility and Liability issues;

Regulatory constraints and the duty to render assistance;

## ISSUES:

Pilotage requirements;

The cost and interaction with tug services, mooring personnel and ports;

The cost of delays and having maintenance and repairs done while in port;

The cost of remote control and monitoring, including escort ships; and

The cost of insurance.