The Sea Traffic Management Validation (STM) project will contribute to a safer, more efficient and environmentally friendly maritime sector by developing services based on information shared by maritime stakeholders which is updated in real time. The STM concept is a shared information environment with the underlying rationale that better overall decisions can be taken which will in turn result in increased efficiency and improved safety.

The STM led by the Swedish Maritime Administration, has a total budget of approximately US$50.5 million, of which 50% co-financed by the EU transport fund Connecting Europe Facility/Motorways of the Sea and covers the period 2015-2018. More than 50 partners from 13 countries are involved in the project.

The project will demonstrate the STM concept by using it in two large-scale test beds: one in the Nordic and one in the Mediterranean Seas. The test beds encompass around 300 vessels, 13 ports and five shore-based service centres. The impacts on safety and efficiency of additional information will also be tested through experiments conducted in the European Maritime Simulator Network. Co-ordinated simulations with all inter-connected simulators operating in the same area of the world will be used to measure the impact of the additional information on the behaviour of the watch and the navigational safety of the ship. The project comprises five activities each of which will facilitate the further development of the STM Concept.

PORTCDM

The first activity is Port Collaborative Decision Making (PortCDM). The impact of this in ports can be expressed in terms of Port Call Synchronization and Port Call Optimization. Port Call Synchronization is a feature that ensures that a ship does not arrive at a port before the port is ready in every way, including the resources necessary for a vessel’s call, like linesmen and pilots.

The ultimate goal is to arrive just-in-time and remove the need for anchoring. Port Call Optimization is a feature that aims to create common awareness in a port call, by making the plans transparent between key actors in a port call.

By sharing the plans, the key actors in a port call can not only achieve just-in-time arrivals, but also achieve just-in-time operations, leading to quicker integration with the hinterland transportation and improved resource utilization. The STM effects of these services on port efficiency are being measured as part of the project in participating port terminals, by analysing port visits with and without the STM information. The ports participating in STM serve container ships, passenger ships, cruise ships, tankers, Ro-Ro ships, fishing boats and dry bulk carriers. The information that will be used to assess efficiency improvements concerns availability and planned use of, for example, pilots and tugs. The two test beds are being used as a first step for service developers and
distributors in building PortCDM Services. In addition, stakeholder interviews are undertaken to identify the benefits for port stakeholders provided by the additional information services.

**VOYAGE MANAGEMENT SERVICES**

The second activity concerns the development of Voyage Management services. The activity will provide ships with better voyage planning capability and route optimization by enabling information about the route and the port of destination to be made available to the participating shipowners.

Speeding up or slowing down in times of berth availability or port congestion respectively, avoidance of hindrances where delays are caused en route to destination provide some examples. This part of the project also includes the provision of ship-to-ship route exchange. Making this information available is hoped to make navigation safer as ships will have better awareness of the expected behaviour of the other participating ships.

It is, however challenging, as appropriate training and integration with existing navigational information systems must be ensured, in order to avoid overrelance and ensure continuous compliance with the collision regulations. This part of the project will be validated within the two aforementioned test beds and by simulator experiments. The third activity of the project concerns Flow Management services. Such services will support onshore organizations and ships to optimize overall traffic flow through areas of dense traffic and areas with particular navigational challenges. The validation of the efficiency gains obtained by the Flow Management services will be based on extensive experiments undertaken through the European Maritime Simulator Network (EMSN), developed under Monalisa 2.0, a former EC funded project, and the test beds for Voyage Management. The simulator experiments will address specific scenarios and will involve several interlinked simulators “looking” at the same area. Simulation experiments for the English Channel and the approaches to Southampton and to the entrance to the Baltic are underway.

**SEASWIM**

The fourth activity System Wide Information Management (SeaSWIM) concerns the technical detail of information exchange. It is concerned with the development of the common digital infrastructure. This includes the Maritime Connectivity Platform (MCP), a communications framework that will enable the electronic information exchange. The MCP is being collaboratively developed by three projects, STM validation project and EfficienSea2 and South Korea’s SMART Navigation project. It will be shared among authorized maritime stakeholders.

**STM ANALYSIS**

The fifth activity of the STM is Analysis and Evaluation. This activity will collect and synthesize the information from the other activities in order to provide an integrated assessment on the effects STM implementation will have on efficiency and safety for ships and ports. This activity will further consider the compatibility of the STM concept, its tools and services with the applicable compulsory shipping laws. It will also identify any changes that may be needed in order for the STM concept to be adopted and used.

The implementation of the STM concept is planned to be gradual and be fully applied in 2030. However the ambition of the STM concept is to demonstrate its value to maritime stakeholders in terms of efficiencies and financial benefits so that they voluntarily implement it as part of improving the services they provide to calling ships.

**COMPLIANCE**

The University of Southampton (UoS) contributes to the project within the Analysis and Evaluation activity. The team includes members of the Institute of Maritime Law, including myself, Professor Filippo Lorenzon, Dr Meixian Song, Dr Sophie Stalla-Bourdillon, Mr Spiros Papadas and Professor Ajit Shenoi from the Faculty of Engineering and the Environment. The work undertaken concerns three specific activities: The first is the detailed assessment of the compliance of the STM concept with all the applicable shipping laws and regulations. For example, the ship to ship route exchange is considered within the Safety of Life at Sea (SOLAS) Convention, the Collision Regulations and the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW). The compliance of the STM concept with the existing regulatory framework is essential and complements the bridge simulation experiments on the behavioural changes of navigators and the effects on navigational safety. This part of the work is relevant and applicable to all types of ships and trade.
SUSTAINABILITY
The second aspect of the UoS work involves the development of the legal tools for a supportive and sustainable business model. This is a complicated and contentious issue because, while optimization of the transport chain efficiency may be overall beneficial, it is not a contractual consideration.

Instead, in contracts for the use of the ship, optimization of the earning capacity of the ship is the objective. For example, optimising the voyage requires taking into account the en route traffic conditions and the port’s readiness, and in some cases may mean slowing down or speeding up the ship in order to arrive just in time. However the current arrangements in charterparties only provide for specified laycan days, or days contractually agreed for the loading to start, with a risk for cancellation if the ship is late, and the market conditions enable cheaper alternatives.

LAYTIME
Furthermore arrival of the ship at the agreed destination starts laytime, or the contractually agreed period for cargo operations, irrespective of whether the cargo operations can in fact start or not. If the delays exceed the agreed laytime damages in the form of demurrage are payable to the shipowner and in many cases also to the seller of the goods under a contract of sale. Thus it normally pays for the ship to go fast, arrive early, exceed laytime and get demurrage in addition to freight, even if this reflects in increased overall bunker consumption and atmospheric emissions in the proximity of the port. This is unaffected by the fact that the ship knew of the expected delays.

CONTRACTUAL PENALTIES IN PORTS
Similarly, penalties for breach of the ship performance clauses, in terms of the average speed attained, may also restrict behavioural adjustments to congested port or traffic conditions. The implementation of the STM concept requires the development of functional contractual clauses, which will rebalance the risks and distribute the benefits of increased efficiency. The UoS team plans to collaborate with the international shipping association BIMCO in order to develop supportive, to the STM concept charterparty clauses, compatible with the widely used BIMCO forms. The ambition of the STM project for global implementation necessitates the development of appropriate clauses generally available, which may be adopted, subject to the prevailing market conditions, in appropriate trades and routes. This part of the activity is more relevant, of course to tramp trading ships and ports. The third aspect of the UoS activity concerns the legal framework and precautions surrounding the information infrastructure.

Responsibility for cybersecurity and data ownership remains with the generator of the information, but can also be provided to partners who have secure access to the information they all need to be assessed under international laws applicable to information.

This work is applicable to all ports and ships and, in addition to all service providers who develop services based on the availability of STM information.

ABOUT THE AUTHOR
Michael (Mikis) Tsimplis, BSc Physics, PhD Physical Oceanography, LLM Maritime Law is a professor of Oceanography and Maritime Law at the University of Southampton. His research is both in law and oceanography and he is also involved with interdisciplinary maritime research. He is currently the Deputy Director of the Southampton Marine and Maritime Institute. He has published extensively and has been involved to various projects, the most recent concerning maritime autonomy, atmospheric pollution for ships and the impacts of marine extremes.

ABOUT THE ORGANIZATION
The University of Southampton is a leading University in marine and maritime research. The marine and maritime expertise of the university which extends from ship science, maritime law, oceanography and maritime archaeology is integrated under the Southampton Marine and Maritime Institute which works across the traditional disciplinary divides to better address some of today’s global marine and maritime challenges.

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