



A message from the editors

This is the last bulletin from the Flagship project and we will use this opportunity to summarize some of the achievements that have been made over these four and a half years, both in terms of new products on or near the market and in terms of contributions to standards and legislative processes.

We would also like to use the opportunity to thank all our partners for an exceptionally good cooperation with many interesting new developments. More information about Flagship can be got from our web site at www.flagship.be or from the companies mentioned in the text below. The web site also contains the publicly available documents from Flagship. Additional contact details are available at the last page of this bulletin.

The first part of the bulletin (green headings) report from activities within IMO and EU that are related to policy or legislative issues. The second part (orange headings) report from international standards activities and the final part (blue heading) report on new products that have been developed as a result of the Flagship supported research activities.

IMO MEPC – Marine Environment Protection Committee

Flagship has contributed to IMO's work on improving international shipping's environmental footprint mainly through sub-project B1 – Energy Efficient Operations.

A new tool developed in this subproject allows onboard and onshore personnel to monitor on board energy production and consumption in great detail. The Energy Efficiency Monitoring Tool shows the current consumption and efficiency of operation on board, giving the crew a tool to develop awareness for energy efficient operation through direct feedback to their actions. The Flagship SP B1 results can be used for implementation of IMO proposed Ship Energy Efficiency Management Plan (SEEMP), with proof of savings and analysis of saving potentials. The tool is in the process of being commercialized by Germanischer Lloyd.

Both sub-project B1 and A1 (Technical Operational Strategy and Logistics) have also been looking at the concept of indexing energy efficiency in design and operation. In particular, deliverable B.1.1 details the effect of external factors on energy efficiency when assessed using the IMO methodology. A key conclusion from this work was that due to external influences, the initially proposed "EEOD" (Energy Efficiency Operational Index) was more suitable for benchmarking and internal management than for policy purposes. This result was communicated to IMO.

Some of the Flagship partners are also involved in the project Shipping KPI (www.shipping-kpi.com), which in part has made use of results from subprojects A1 and B1. Shipping KPI is a voluntary effort by the industry, headed by Intermanager, to develop indicators for the performance of shipping in a number of areas of public interest, among these also the environmental.

MARINTEK, being one of the Flagship partners in B1, has led the IMO project on determining Greenhouse Gas and other emissions from present day and future shipping and policies for reductions of these emissions. This resulted in the publication of the "Second IMO Greenhouse Gas Study" in 2009. Potentials and methods for present and future energy savings is a key issue in this work, and this has also been a main topic also within B1. Results and data produced in Flagship B.1 have been important inputs to this report.

IMO MSC – Maritime Safety Committee – Integrated Navigation Systems

The navigation (NAV) sub-committee of MSC created a new performance standard for integrated navigation system (INS) that was adopted by MSC in 2007. Flagship partners participated in the development of this standard, mainly through one of the predecessors to Flagship (DSS_DC). Sub-project B4 (Alarm filtering) continued the work by looking into the concept of an advanced Central Alert Management (CAM) module. Some results from this work were also contributed to the following work on an Integrated Bridge System (IBS) performance standard in IMO.

To get a more standardised way of handling alerts on the bridge, B4 has developed a technical concept for a CAM, based on the then draft IMO performance standards and experiences from the off-shore sector. This includes designing the actual technical solutions for the CAM as well as modifications in connected equipment. This has also led to various documents being tabled for the IMO correspondence groups for INS and IBS. B4 can now demonstrate the CAM concept as a functional prototype and show some of the practical results of using such a unit.

Subproject D1 (ICT infrastructure) have through this period also contributed to the development of an Ethernet based interfaces standard for INS and IBS systems. This standard was approved in April 2011 as IEC 61162-450 (see below).

IMO MSC – Maritime Safety Committee – e-Navigation Strategy

Flagship has also contributed to the IMO e-Navigation strategy. This has mainly taken part through the D1 sub-project (ICT infrastructure) and partly through D3 (Incentives and controls). Among the contributions is a study on future ship to shore communication requirements that may be triggered by the introduction of new e-Navigation services. This report has been published and has been made available to the joint ITU-IMO meeting in January 2008 as well as to COMSAR – the MSC Communication, Search and Rescue sub-committee.

In general, the report points to the need for a standardised service for exchange of information between the ship and public services. Satellite may be used, but the report shows that also terrestrial data carriers are good alternatives. Possibilities are the use of digital transmissions over already assigned VHF channels or use of new carriers based on, e.g., WiMax technology.

Flagship partners also participated in the discussion on a future information model for e-Navigation which also took requirements from the complimentary EU-initiative on e-Maritime. This work has also been supported by sub-project D1 and D3.

In 2008, Flagship did a study on seafarer's perception of new technology used onboard ships. The study was an attempt to explore current perceptions towards technology at sea and to evaluate the extent to which concerns raised in the literature are reflected in seafarer opinion. The focus in the study was upon ICT, reflecting both the aims of the FLAGSHIP project and a key direction in which the seafaring industry is heading. In the maritime domain, ICT refers primarily to systems that are designed to enhance the environmental and contextual perception of the seafarer. Examples would therefore include radar, satellite navigation and equipment to aid the remote management and monitoring of engine room equipment. By focusing on ICT, it was possible to look at an area both of significant development in the shipping world and one of comparability with other industries. A paper was published in the "Ergonomics" journal, presenting some of the results. The paper is fully based on the Flagship study, but focuses on the UK seafarers' responses. Briefly, from the conclusions of the article we would like to quote:

Where Lützhöft (2004) titles her thesis, 'The technology is great when it works', the results from the current study would suggest an equally appropriate title would be, 'The technology is great when we know how to use it'.

Interaction with technology requires adaptation and training on the part of the human operator, but also technology that is grounded in user-centred design principles. Evidence suggests an increase in standardisation would benefit the industry as a whole, but caution should be raised about innovation suffering as a consequence. The concept of an 'S-mode', currently in discussion at the International Maritime Organisation, would appear to be a constructive way forward.¹

The conclusion is interesting although perhaps not surprising. It certainly points to the need for more standardised operator interfaces, where possible, and more specific training where standards are not available. The work the paper is based on was performed in subproject D2 (Health, Safety and Human Impact).

IMO FAL – Facilitation Committee – Single Window

A correspondence group was established by IMO FAL (facilitation Committee) at its meeting in early 2009 to develop guidelines for a Single Window, led by Brazil. Flagship has contributed to this work through its involvement also in ISO TC8 activities. The draft report from the correspondence group will be sent to FAL in June 2011. The main interest for Flagship is the small and medium ports where different electronic clearance systems now are being developed. The lack of a good Single Window solution, or almost as bad, a plethora of different Single Window systems, will increase the work load for seafarers. This can become a significant problem for certain types of short sea shipping that visit many different ports on its voyages. This work is being performed in subproject D3. The work on ISO 28005-2 (see below) is also part of this initiative.

IMO and EU – Future support for regulation making

Sub-project B5 in Flagship (Support for rule compliance) has developed a system to find applicable rules and regulations on the basis of ship type, cargo, geographic location of ship and other parameters. At the heart of this system is a lexicon of terms that is used to classify the relevant rules and regulations so that they can be accurately retrieved. This lexicon is computerised and can also be used as a thesaurus, containing a number of synonyms to the basic classification terms.

This lexicon will be made available at the end of the project and may have significant value for future rule making in IMO and other organisations. By using a classification scheme based on this lexicon one can much easier verify that new developments do not conflict with other existing standards and also classify new rules for easy retrieval in electronic decision support systems. The lexicon will be developed further in coming research projects and may also be input to standards organisations as a candidate for international approval.

EU – e-Maritime and Flagship contributions

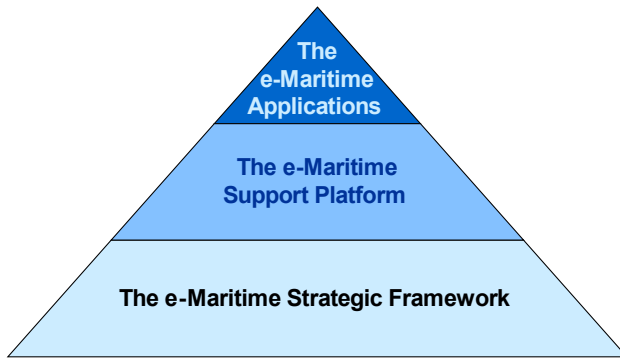
The work on the e-Maritime concept continues in DG TREN. e-Maritime may significantly change shipping in that it aims at improved cooperation between private and public parties and wants to rather use positive incentives instead of negative controls. E-Maritime was described as²:

- “e-Maritime” is working and doing business in the maritime sector with the support of Internet based applications (advanced electronic);
- the "EU e-Maritime initiative" will embody policies, strategies and capabilities facilitating the development of "e-Maritime" services
- in support of an efficient and sustainable waterborne transport system throughout Europe, fully integrated within the logistic chains.

Currently, e-Maritime is envisaged as a three stage development process with approximate goals of completion at 2012 (Strategic framework), 2015 (Support platform) and 2018 (Applications).

¹ Allen, Paul(2009) 'Perceptions of technology at sea amongst British seafaring officers' ,Ergonomics, 52:10, 1206 — 1214.

² Presentation at Joint meeting Short Sea Shipping and Motorways of the Sea Focal Points and Shortsea Promotion Centres, Brussels, 8 July 2009, Dimitrios Theologitis, HoU - DG TREN Maritime Transport & Ports Policy; Maritime Security.



Such applications as automated reporting, single window systems, and optimized sea passages through, e.g., use of slot times in port have been suggested as parts of the e-Maritime applications. Another important aspect of e-Maritime is to improve the public image of shipping and providing better working conditions for crew. Thus, Flagship is directly at the core of the e-maritime initiative and Flagship results will play a significant role in e-Maritime.

Some concrete examples of Flagship results that have already been demonstrated and which are directly relevant to e-Maritime are:

- *A2 – KPIs for technical performance:* A system of indicators for main engines, auxiliaries and thrusters have been developed that allows monitoring of technical system performance both on the ship and shore. One can easily establish internal KPIs or even benchmarks between similar systems onboard different ships.
- *B1 – Energy efficiency and monitoring.* A new tool developed in this subproject allows onboard and onshore personnel to monitor energy production and consumption in great detail. The Energy Efficiency Monitoring Tool shows the current consumption and efficiency of operation on board, giving the crew a tool to develop awareness for energy efficient operation through direct feedback to their actions.
- *B5 – Support for rule compliance.* This tool will provide guidance as to what rules and legislation is applicable in specific geographic areas for specific ships with specific cargo. This will significantly help mariners as well as regulators as the tool in a longer term also can be used to check consistency and coverage of regulation.
- *C1 – Cooperative emergency management ship/shore.* Tools developed in this subproject provide support for information transfer and integrated operation between shipboard emergency management and other users on nearby ships or shore.
- *C2 – Prognosis, assessment and guidance DSS.* This subproject has developed a tool that is used on large cruise ship to provide guidance on remaining stability in case of hull damage and flooding. This is important for decision support relating to managing the stability of the ship as well as to when to evacuate large ships.

These are only some examples. Other activities in Flagship are more related to e-Navigation than e-Maritime (e.g., B3 – Nautical operation and B4 – Alarm filtering). Yet other activities deal with issues that are important also for the e-Maritime concept, but not through direct demonstrations (e.g., A1 - Technical operation strategy and D2 – HSE and human impact).

Central for the activities listed above is the need for communication between ship and shore. This issue is being analysed in subproject D1, ICT infrastructure. It has analysed the applicability of existing and emerging ship to shore communication facilities for various types of application, including aspects from distress alerts to crew infotainment. Conclusions indicates that existing communication technology satisfies most of the relevant requirements, but that there are some technical issues that need to be considered when determining what kind of communication equipment to fit to the ship. There are also interesting developments in shore based ship communication that can be of particular interest to crew infotainment and integrated ship to ship operations.

The work in IEC TC80/WG6 on a new international standard for Ethernet-based integrated bridge communication is now finished. Flagship has contributed significantly to this work through subproject D1. The standard will get the name “IEC 61162-450 – Maritime Navigation and Radiocommunication Equipment and Systems – Digital Interfaces – Multiple talkers and multiple listeners –Ethernet interconnection”. The first committee draft was published in March 2009 and the final standard was approved in April 2011. Almost two years of committee work preceded the first draft.

The standard is based on multicasting of Internet datagrams over a switched Ethernet and will provide a safe, efficient and low cost means for integration of bridge systems. It is only using standard Internet mechanisms and can be implemented on all types of equipment, from small single board computers to large multifunction workstations. It will be able to accommodate legacy systems, simple sensors as well as work stations. The protocol is based on the well known IEC 61162-1 (also known as NMEA 0183) telegrams, but will provide some new features that makes the standard more suitable for integrated ship and navigation systems. The standard will also be able to accommodate redundant network and has several other safety enhancing features.

With the emergence of new IMO performance standards for integrated navigation (2009), guidelines for integrated bridge systems and a performance standard for central alert management, the need for a more functional network standard has been acute. Thus, Flagship is providing critical input to the industry and the international standards organisations in this area. This work was mainly performed in subproject D1.

ISO TC 8 – International Standards Committee – Ship and marine technology

Flagship, through sub-projects D1 (ICT Infrastructure) and D3 (Incentives and Controls) has contributed to the development of the ISO 28005-2 standard on “Security management systems for the supply chain -- electronic port clearance (EPC) -- Part 2: Core data elements”. This standard defined data elements for exchange of XML messages between ship and shore for various operational purposes, including clearance for entry into port. This work has also been of importance to the activities in IMO FAL on Single Window systems. The ISO standard was approved in late 2011, after about three years of work. Flagship has supported the project management for the development of this standard as well as with input on information elements and definitions based on analysis of operational requirements from sub-projects A1 Technical operation strategy and logistics), D1 and D3.

At or near to market products from Flagship

FLAGSHIP-TCI (Sub-project A2) led by Marintek in Norway was concerned with creating Key Performance Indicators and Technical Condition Indices to enable fleet managers to compare the performance of their vessels with each other and with benchmarks. This has led to the development of a commercial product by DNV, called Top Monitoring, which monitors main engines. Commercial products monitoring auxiliary engines are expected to be launched later this year from two separate FLAGSHIP partners: Danaos and Wartsilla.

In the UK BMT led a sub project called **FLAGSHIP-HCA** (Sub-project A3) which addressed the process of surveys and dry-dock repairs. This resulted in the German partner, Germanischer Lloyd introducing a new commercial tool called “Hull Manager”. Germanischer Lloyd also led a project called **FLAGSHIP-EEM** (Sub-project B1) which focussed on energy savings during sailing which has resulted in a patent being secured to cover a new process of measuring and giving a direct insight in power consumption during operations and commercial products are planned for 2011.

The **FLAGSHIP-Bridge** project (B3) led by SAM Electronics in Germany has improved Integrated Bridge Systems with advanced functions for further integration of nautical information. By integrating NAVTEX messages, radar and AIS targets into a single coherent display it is possible to speed up hazard analysis, improve tracking accuracy and reduce the load on the Duty Officer. The NAVTEX (Notices to Mariners) integration is already available commercially from SAM, in NACOS 1100. AIS target merger will be available

in NACOS Platinum, coming out in 2011. The portable conning unit will also be available in 2011 as Tablet PC.

Alarm Filtering was addressed by the **FLAGSHIP-iCAS** sub project (B4) led by Kongsberg in Norway dealing with the problem of large cascades of alarms. A first commercial version came out in May 2009 and later versions are planned. Although this system is well beyond current minimum regulations, the market has responded extremely very positively and several orders are already being taken by Kongsberg.

Led by MJC2 a UK business, **FLAGSHIP-RTS** (B6) addressed real time container scheduling and matching imports and exports in order to save unnecessary truck trips. This resulted in large savings for China Shipping, the Port of Valencia and container terminals around. Several commercial solutions have since been made available including a free package called FAST, for small and medium sized UK logistics businesses.

Norway based Autronica led **FLAGSHIP-ISEMS** (C1) which dealt with safety condition monitoring, damage and prevention assessment, as well as ship to shore communication the learning from which is already out in the market as Automaster ISEMS – Integrated Safety and Emergency Management System – and have been installed on the largest cruise vessels in the world.

A sub-project called **FLAGSHIP-DSS** (C2) led by the University of Strathclyde in the UK dealt with the determination of an Index of Vulnerability. Its presentation to the crew in a recent 7-week demonstration led to an immediate improvement in practices which saw the Index fall by 45% in a single week - six orders from a wide variety of interest parties have already been received.

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