Connecting the future
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Visit our test-beds in Valencia and Stavanger
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Technology behind STM
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Meet Annika Korsbo, First Officer on board the M/S Baltic Bright, the first ship to be equipped with STM capability.
MOST GREAT INNOVATIONS start in the mind of one person. However, the idea of Sea Traffic Management began in the minds of two...

It was a cold and dark December night in the country of Sweden in 2011. Two men were facing the forces of nature on their way to a conference at the Swedish Civil Aviation Authority’s headquarters in Stockholm to discuss the topic of Air Traffic Management. Captain Fredrik Karlsson and Master Pilot Ulf Svedberg represented the Swedish Maritime Administration during the meeting and what they heard that day sparked an idea inside them. This marked the birth of the concept of adopting Air Traffic Management in the field of shipping, and the great benefits it could offer: such as a safer, more efficient and environmentally friendly maritime sector. An innovation that could make shipping a more efficient and competitive means of transport. A way to create a safer work environment for people at sea, where fewer lives are wasted and where the crucial and urgent issue of our climate is addressed, in terms of accidents (oil spills) affecting our seas, as well as lowering greenhouse gas emissions and reduced fuel consumption.

Both men kept their idea to themselves at first but could not resist telling people around them about the intriguing notion of instant information exchange and what that could mean for the maritime domain. Initially, they encountered resistance and scepticism. People would smile politely when they held presentations during conferences but gradually the idea gained momentum in the industry and resistance diminished as the number of advocates increased.
This is STM Timeline

From year to year - this is what has happened.

Stockholm 22
December 2011, the IDEA WAS BORN

MONALISA 2.0

RTZ became an APPROVED STANDARD (August 2015)

Meeting in Malmö to discuss the concept (March 2012)

2010  2011  2012  2013  2014

STM Validation Project VALIDATES THE CONCEPT onboard 300 ships, in 13 ports, 13 simulator centres and 5 shore centres

The development from the first GPS to STM in action:

1980s
Where am I?
= GPS

2000s
Where are you?
= AIS

2010s
Where am I going?
= ECDIS

2020s
And where are you going?
= STM
**First Shore Centre**

- Manned, Gothenburg Shore Centre (May 2017)

**First Ship Installed**

- SAT Stena Germanica (August 2017)

**First Ship Connected**

- Type approved, first ship connected M/S Baltic Bright (January 2018)

**First Port Call Synchronisation**

- Ramira to Rotterdam (May 2018)

**First Simulations**

- European Maritime Simulator Network, 10 centres and 20 ships involved (November 2017)

**First STM Service in Operation**

- Importing Pilot Route (September 2017)

**100 Ships Connected**

- (August 2018)

**First Shore Centre Outside the Project to be Connected**

- VTS Tallin (October 2018)

**First Simulations in European Maritime Simulator Network with STM Services, 10 Centres and 20 Ships Involved**

- (March 2018)

**13 Simulator Centres Connected to EMSN with the Capacity to Run 40 Ships**

- (June 2018)
The concept of Sea Traffic Management (STM) was developed within the MONALISA 2.0 project, which ran from 2013 to 2015. It included 39 partners from ten countries, co-funded by the European Union and was led by the Swedish Maritime Administration. On 19 August 2015 the International Electrotechnical Commission (IEC) approved the Route Exchange Format – RTZ. Having the format for route exchange approved by this global standardisation commission was a huge leap forward and an important milestone for the STM concept.

Support from international organisations increased over time. In March 2018 the Helsinki Commission (HELCOM) adopted a recommendation identifying e-Navigation through Sea Traffic Management as one of the prime tools for decreasing the risk of accidents in the Baltic Sea, marking another step forward for STM. The European Commission’s maritime pillar in the TEN-T (Trans European Transport Network) “Motorways of the Sea” has recognised STM as a success story and is a strong advocate for the implementation of STM in Europe.

The world’s probably largest e-navigation project yet seen is named the STM Validation Project. Within the project, between 2015 and 2019 the STM concept and services are being validated on 300 ships, in 13 ports, 13 simulator centres and 5 shore centres, making it probably the world’s largest civil e-navigation project yet seen. The project includes more than 70 partners and associated partners from countries all over the world and has a EUR 43 million budget, co-financed by the European Union. “STM Balt Safe”, “Real Time Ferries” and “STM Efficient Flow” are other examples of projects within the area of Sea Traffic Management. However, these projects are just the beginning: STM aims for global implementation by 2030 and, along the way, a series of projects and initiatives will commence on a regional and global levels.

An ever-growing partnership between academia, government bodies, the shipping industry and related sectors ensures that the work conducted will be enhanced and used to create a safer more efficient and environmentally friendly maritime sector. Be part of the journey!
STM – Sharing data and benefits

Ninety-per cent of the world’s trade is transported by sea. Every day, all year round, tens of thousands of ships navigate the oceans, sometimes with difficulty due to the lack of updated information, leading to risks of accidents, sub-optimal routes, waiting times in ports and an excessive ecological footprint. Data about positions, routes and times of arrival has always been somewhat confidential. As shipping now enters the digital age, the time is right for change.

Services

With common standards, STM offers possibilities for a new service market, such as an app store for the maritime domain. Various service providers can use the infrastructure to offer their services to ships, ports, cargo owners and other maritime actors. The interoperable services offered include:

- Route Optimisation
- Ship-to-ship route exchange
- Navigational warnings
- Enhanced monitoring
- Importing pilot routes
- Port call optimisation

Benefits

STM services allow personnel on-board, and onshore, to make decisions based on real-time information. This enables more just-in-time arrivals, appropriate steaming, reduced administrative burden and decreased risk-related human factors. STM also reduces the ecological footprint of shipping, thereby creating a safer, more efficient and environmentally friendly maritime sector.

Goals

The 2030 goals set for the fully-deployed STM are:

- Safety: 50% reduction in accidents.
- Efficiency: 30% reduction in waiting time for berthing and 10% reduction in voyage costs.
- Environment: 7% lower fuel consumption and 7% lower greenhouse gas emissions.

Infrastructure, standards and interoperability

Sea Traffic Management is creating a new paradigm for maritime information sharing, offering tomorrow’s digital infrastructure for shipping. Sea Traffic Management is the concept of information sharing in real time, through a secure infrastructure, with standards that create interoperability among various actors such as ships, manufacturers and port actors, allowing information holders to retain own their valuable data and choosing those with whom they wish to share it.
“STM is an example of the kind of collective effort that the IPCC is calling for.”

Thanks to STM, rescue units receive individual search patterns that are immediately visible.

Great times ahead, when all actors can collaborate here in Valencia port.

Digitalisation is transforming the maritime industry but there are cultural challenges to overcome.

How STM has affected their work. Meet three professionals from different fields.

Take a cruise to Stavanger, Norway and everyone will know you are on your way.
COLUMNS

It’s time to start making a difference

Digitalisation at sea will save time, lives – and the environment. The technology is here; the next step is implementation, worldwide and with everybody on board. STM’s time is now. Especially for the sake of Mother Earth.

THE ISSUE OF THE ENVIRONMENT is close to my heart, and it is more pressing now than ever.

In October 2018, the Intergovernmental Panel on Climate Change (IPCC) published its report, Global Warming of 1.5 °C. In the report, IPCC calls for collective efforts at all levels to limit global warming. Two of the focus areas it highlights are reduction of energy consumption in the transport sector and reduction of greenhouse gas emissions.

I have been involved in the development of Sea Traffic Management (STM) since its inception in 2012. STM is a collective effort, involving the private and public sectors. Thanks to this collaboration, international technical standards and standardised interfaces have been developed that – for the first time ever – allow vendor independent, interoperable exchange of maritime information ship-to-ship and ship-to-shore. STM facilitates new services, allowing more just-in-time arrivals, green steaming and optimal routes, leading to lower fuel consumption and reduced greenhouse gas emissions. STM also improves situational awareness, thereby reducing the risk of accidents that could have fatal consequences both for humans and nature.

I am passionate about seeing concrete results and the realisation of solutions. It is fantastic to see that STM services are already available, and more are in the pipeline. I am proud of my colleagues and our Sea Traffic Management partnership that are jointly creating this progress.

STM IS AN EXAMPLE of the kind of collective effort that IPCC is calling for. It involves the UN organisations IMO and IHO, IALA, member states, civil society and not least the private sector. Together we are taking concrete action to make a difference. Through real test-beds, we have shown that Sea Traffic Management contributes to sustainable shipping. The next step is to implement it, worldwide, voluntarily, through regulations, and through technical standardisation. And we need to support countries and regions by reinforcing their implementation of 1.5°C consistent climate responses through Sea Traffic Management. We all need to get on board. Now.

IN THIS first issue of the STM Magazine, you will find evidence and information about different aspects of Sea Traffic Management, its heritage, the services in operation and interviews with those involved. Fair winds and pleasant reading!

Magnus Sundström
Head of Research and Innovation, Swedish Maritime Administration

photo Andreas Skogh
STM in the largest port in Europe

Rotterdam’s port is the largest in Europe and is used by 30,000 ships per year. The Port of Rotterdam Authority’s digital application Pronto is a common platform for information sharing, aimed at optimising port docking. Pronto enables participating ships to cut waiting time in the port by an average of 20 per cent, which reduces greenhouse gas emissions from ships in port and on the approach to Rotterdam.

The application uses international standards, published in the Mariner’s Handbook, which were recently developed by an industry task force, with input from the STM community.

“Pronto is connected to the port community system, harbour master system, nautical services and terminals, amongst others. Since April 2018 Pronto has also been linked to STM, which means that captains with STM-enabled software on their ship can share their Estimated Time of Arrival (ETA) with Rotterdam, enabling even more accurate information. The ships update their information in real-time, which is the point. On average we receive the ETA seven times per STM-ship,” says Robbert Engels, Product Lead for Port Call Optimisation at Port of Rotterdam.

The challenge is to make it simple for all port actors to participate. Many people use planning software that has not been built to send and receive information, especially not in real-time. Hopefully 70 per cent of terminals will join the project.

“Pronto is a good example of how the Port Authority uses new digital solutions to increase the efficiency of processes in the port. Pronto also directly contributes to a reduction in CO₂ emissions”, says Robbert Engels.

Saved by STM

When a national rescue coordination centre receives distress information, a coordinator locates the relevant ships and rescue units and then takes the following actions:
- Calls each of them over the radio or by telephone
- Reads the coordinates of the point of accident and/or search area
- Recommends a search pattern, but not in detail since that takes too long
- Each unit then takes this information and manually enters it into their navigational equipment. The weather may complicate this procedure.

With the STM-alternative they could:
- Send all information instantly to the navigational displays of all ships and units involved, with search areas and individual search patterns immediately visible.

“The response time for all units will be reduced, human errors in plotting information will be minimized, and more complex search patterns will be easier to transfer from the Rescue Centre to the ship. STM will give us a useful tool and will help us save more lives”, says Jonas Malmstedt, SAR Mission Coordinator, Swedish Joint Rescue Coordination Centre.

65% of all marine accidents are due to human factors. With the technology available today, the number of such accidents could be drastically reduced.

NUMBERS

Maritime casualties (Source: EMSA Europe)

- 3,169 accidents and incidents
- 36 ships lost
- 38% navigational events
- 51 pollution events
- 982 persons injured
- 12% slipping and falling
- 59 fatalities

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A maritime future without telex?

Today Ships receive navigational warnings from authorities around the world using a solution called Navtex, which is basically telex at sea. Long paper lists need to be reviewed to identify relevant warnings.

A service that provides the navigational warnings relevant to the ship’s routes is operational in the entire Baltic Sea. The benefits are obvious: officers do not need to input information manually from paper to the electronic navigation system (ECDIS). A source of error is eliminated. Only the warnings relevant to route are displayed, warnings are not lost among others on a long list. The warning appears in real-time without delay.

Is STM a good alternative to Navtex?

Annika Korsbo, Chief officer on M/S Baltic Bright, uses the STM Navigational warning service in her work every day and finds it invaluable (read more on page 19).

In parallel with testing onboard, the STM-service has also been tested by hundreds of mariners in simulations. “It definitely is a great alternative,” says África Uyá, a Deck Officer who has participated in the tests. “Navtex is an extra apparatus used mainly for receiving Maritime Safety Information. Including this information directly in the ECDIS will make me more efficient and increase safety.”

During one of the simulations in EMSN, there was a navigational warning of an oil spill. Finnish test leader Mirva Salokorpi, at Novia, Turku was impressed: “I have never seen so many ships avoiding it with such precision.”

EMSN in a nutshell:

Number of countries that are connected: 7 (since 2016)
Total number of simulation days: 22
Number of participants: 500

Simulating a better world

How can you test STM-services involving dozens of ships in a small area? Until all ships are STM-enabled you really can’t. That is why we have developed the European Maritime Simulator Network (EMSN). By introducing a standard format used by different manufacturers and connecting 12 simulator centres across Europe, simulation exercises with up to 40 manned bridges connected in real time are now possible.

Hans-Christoph Burmeister at Fraunhofer in Hamburg manages the core of the network: “We note many user cases where EMSN has added great value. Search and Rescue training becomes more realistic when more nationalities are involved.”
Clearing the acceptance hurdle

Welcome to Spain’s largest container shipping port where digital information is exchanged across borders.

FOR VALENCIA, INTRODUCING Sea Traffic Management (STM) system has not been without its challenges.

Despite this, the effort has proved worthwhile “especially as the basis for a collaborative approach is now more accepted”, says Lucia Calabria of Valencia Port.

Valencia has a broad hinterland, as it’s not just Madrid’s natural port of choice but also the main channel for most import and export flows from the Iberian Peninsula – moreover, the Port Authority is also responsible for its sister facilities at Sagunto and Gandia, with the latter also included in the STM Validation project.

However, even given the port cluster’s functional complexity, it proved hard to convince the different parties that linking up their data could be in their best interests.

Lucia Calabria explains why: “Sharing operational information isn’t that usual, so at the beginning port operators were very reluctant to reveal anything to potential competitors or even to the port authorities.”

“Still, while getting people to agree was difficult in the beginning, many were really positive by the end of the process”, she says. “It became clear that increasing digital communication with nautical services and agents makes for a more efficient port call.”

Also, analysing the figures returned by the system added predictability to repeat operations and allowed us to marshal resources more effectively.

It also increases the ability of pilots pilots and tugs to plan ahead and the STM demonstrated its capacity for cutting down the (occasionally tedious) administrative burden: “The linesmen used to skip over schedules that had to be manually entered into the system, but now, they can easily send relevant information electronically,” says Lucia Calabria. “They say they can now get on with more important things.”

Finally, it seems that concerns about reduced competitiveness have generally been laid to rest: STM is being rolled out to cover the tugs in Gandia by the end of the year.

“The next project proposal will include all three ports”.

by Stevie Knight

STM Magazine #1
Into the great known
DIGITALISATION has the potential to transform the maritime industry. In the near future, optimised cooperation between ships and the shore side may lead to benefits in the form of increased efficiency and decreased environmental impact. But you also have to share information to achieve the full effect.

by Anders Bergmark

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Commercial shipping is a cornerstone of the global economy. Over 70 per cent of the world’s trade, calculated by value, is transported by sea and off-loaded at ports worldwide. In the report, Review of Maritime Transport 2018, the UN body UNCTAD states that turnover in the industry increased by four per cent last year, the highest growth in five years. Growth is predicted to remain at the same level this year.

But, maritime transport is also grappling with demands for increased efficiency and reduced greenhouse gas emissions. In April, the International Maritime Organisation adopted a strategy to reduce emissions by at least 50 per cent of the 2008 level by 2050.

This goal will be achieved through the introduction of alternative fuels and investments in new technology.

**AT THE SAME TIME** maritime transport, with its age-old traditions, is a conservative industry. Digitalisation has not yet progressed as far as in the aviation industry, for example. But maritime transport is now rapidly entering the digital era.

"There has been more change occurring in the maritime sector in the last five years, and likely to happen in the next twenty years, than has happened over any quarter century in the history of the industry. Whether it is digitalisation pushing forward new solutions or business models, or whether it is connectivity allowing data to be rapidly relayed to places it can be assessed and acted on more quickly, or whether it is changing trade patterns or geo-political challenges, or even the environmental threats that surround us. Change management will be key to a successful future", says Despina Panayiotou Theodosiou, Managing Director of the Tototheo Group.

The company is specialized in innovative, efficient, and functional solutions in the fields of satellite and radio communications.

"There is a growing acceptance of the technologies that surround the STM Concept. Whether it is the increased value of ECDIS, automated data sharing or the reliability of connections, there is a growing belief that the systems and solutions can give ship operators and owners a commercial benefit.", Despina Panayiotou Theodosiou says.

**ANDERS DALÉN**, a senior researcher at the RISE Viktoria institute has been part of developing concept and the infrastructure for STM. He explains the core components of the infrastructure: a common language and global identities. "Just imagine you enter a room wearing a blind-fold. You don't know who's in the room or even if they speak your language. With STM, you can start calling out names to find out who is there and start talking with them in a common language".

**A PRACTICAL TEST** of different services based on STM is now being carried out within the STM Validation Project. The project consists of over 70 partners from 13 countries and is co-financed by the European Union’s CEF programme. Around 300 commercial ships are participating. The services span all areas of the maritime industry. The planned route of the ship can be crosschecked against service providers prior to departure to gain information that may impact the route plan. During the journey, different service providers can
help optimise the route, in terms of the weather conditions, currents and minimising fuel consumption, for example. Data sharing enables avoidance of potentially dangerous situations caused by heavy traffic and a ship can be alerted when deviating from its route reducing the number of accidents.

**AS AN EXAMPLE**, an STM-equipped ship can choose to share its route plan with ships in the vicinity through AIS (Automatic identification system) that all larger ships that traffic internationally are fitted with. Other ships can then see the route on their STM compatible digital nautical chart in the navigation system (ECDIS) onboard. As the ship nears its destination, it can share information with the port to identify the earliest possible time that the port can receive it. The ship can adapt its speed to arrive just in time and save fuel, and the port can optimise the use of its resources.

One of the conditions for the services, and a fundamental idea underlying STM, is that different systems must be able to communicate with each other, that they are interoperable.

"It involves a machine being able to...

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**Interoperability in STM is built on voluntary agreements among the various participants, and not on obligatory rules.**

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STM Validation Project shows the benefits of STM

Some 300 ships, selected by the ECDIS manufacturers involved in the project, are having their existing navigation systems updated with STM capability. Around 180 of the 300 ships have been equipped with software from Wärtsilä and Transas. These two companies have been involved in the project from the very beginning, and they have since merged. In addition, several shore centres were STM-connected in European ports – partners of the project.

Dmitry Rostopshin was originally responsible for the shore-side of the project for Transas, but he is now the project manager for all the company’s activities of the company related to STM. “Initially, developing a data format was most important. This involved agreeing on a common approach to data sharing, for example, and how this would be implemented in the software. After that we started to develop the functionality in the navigation systems on board and ashore, which would then be used in the project,” he explains.

The idea behind the STM Validation Project is to give participants a chance to see the benefits of the STM functionality. According to Dmitry, digitalisation in shipping is slow due to a dilemma that the project hopefully can help resolve: the shipping companies are unwilling to make investments that perhaps may not yield any return for a few years, so the developers are not seeing the strong demand that would increase development tempo.

“But I believe that the benefits, such as efficiencies and increased safety, will be strong drivers in getting shipping companies to join up. Many people want the leading STM partners to push forward with creating an international standard in the maritime industry, and for us that would be a positive thing. But I believe in both voluntary participation and standardisation, and I don’t see any contradiction between the two.”

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photo Istockphoto
to send information to another machine that can use the information directly, without interpretation,” says Anders Dalén.

**INTEROPERABILITY** in STM is built on voluntary agreements among the various participants, and not on obligatory rules. The technological challenges are significant. All existing systems need a common language, common terminology and common standards to be able to confirm identities.

To support this development, the SeaSWIM infrastructure utilises de-facto industry standard protocols and adopts suitable standards for communication among different systems.

For example, one agreed standard developed by STM is RTZ, the Route Exchange Format, which makes it possible to exchange routes, irrespective of system provider.

But there are also cultural challenges. Since the birth of commercial maritime transport, ships have been seen as autonomous units, a perception that lives on today.

The Mare Liberum principle on the freedom of movement on the seas was established as early as the 17th century, and it continues to exist in UNCLOS, the United Nations Convention for the Law of the Sea.

There has been concern in some areas that information sharing might negatively impact a crew’s ability to take independent decisions. Which is why STM also has clear boundaries.

Ownership of the data is central for shipping companies and ports to want to join and information exchange is conducted among selected parties.

**THOSE WHO HAVE** already seen the value of sharing information internally, and developed their own systems, have a lower threshold to sharing information with others. The Genoa-based cruise shipping company Costa is one such example.

“We see three significant challenges for the future of the maritime industry and these are safety, the environment and efficiency,”
says Franco Caraffi who is the IT Marine Systems Director.

“If there’s no safety there’s no business. No guest would go on a cruise if it were not safe. The same applies if we disregard the environment, and particularly the seas. We have to keep an eye on pollution and emissions. And by becoming more efficient, we can offer our guests better service for the same price.”

To respond to these challenges, the Costa Group has developed the Neptune system for its own fleet. Neptune builds upon the same information-sharing ideas as STM, but within the Group.

FRANCO CARAFFI believes that the existence of an information-sharing culture has paved the way for pain-free adaptation to the STM concept.

“I believe that STM services will continue to be developed. Data is the gasoline of our era and will be even more important in the future. STM allows sharing of information and services, and this creates value within all the areas affected by STM,” he says.

Taking a look into the future, the conditions should be in place for developers to use technology to identify solutions with the help of the platform, simply put, an Appstore for maritime domain.

“The premise for STM has always been that it should be developed in a commercial manner. Our hope is that the industry will now take over, and discussions with different companies are in progress,” says Anders Dalén.

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“The World of STM

Canada: Evaluating STM for route recommendations in the Arctic.
Rotterdam: Better synchronisation of port calls for STM-enabled ships.
Malaysia: Planning to implement STM in national VTS and in one major port.
Korea: Planning to test STM services and connection to the simulator network.
India: Including STM requirements in upcoming VTS procurement.
Singapore: Using STM-developed standards in traffic management projects.
Australia: Evaluating STM to improve protection of the Great Barrier Reef.

We see three significant challenges to the future of the maritime industry and these are safety, the environment and efficiency.”

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”This can simplify and harmonize data exchange”

MIKE COLLIER, Manager, Research and Projects at Carnival Corporation, responsible for leading and directing HESS-related research projects across the global organisation.
"The adoption of technology to achieve efficiency and safety improvements, providing clear, concise and focused information to ships´ officers is an important challenge for the future. Another challenge is posed by cyber security and systems with ever-greater data requirements, while maintaining appropriate levels of confidentiality. STM can simplify and harmonise data exchange, providing opportunities to automate a significant administrative burden that today distracts people from their core roles. As more ports extend into land, the SingleWindow systems can be developed to seamlessly interact onboard and ashore, providing authorities with the data they need to protect borders and allowing them to focus on risk. Carnival Corporation has long been involved in STM projects; we have integrated our fleet operations centre solution, Neptune with STM to provide ship specific data. The future benefits to the organisation will include improved retention as Officers are less overwhelmed with administration."
"We aim to become an accredited trans-shipment hub"

"The port of Limassol in Cyprus is one of many ports around the world aiming to become an accredited trans-shipment hub. This means that large shipments from other Mediterranean and Black Sea countries could be consolidated and sent to Cyprus, from where they could be efficiently distributed to various nearby ports in Egypt, Israel and other countries in the Middle East, using smaller vessels and Short Sea Shipping operations. We will build on the Port Collaborative Decision Making aspects of STM, which Cyprus University of Technology is already working on. It’s an optimisation process for coordination between port actors and synchronisation with ships and the previous and next ports. This is achieved by exchanging real-time standardised data with technical and operational simplicity, and it results in enhanced situational awareness which yields maximum predictability of arrival and departure times."

DR SOTOS VOSKARIDES, Assistant Professor at Cyprus University of Technology, and the STM Validation project coordinator for Cyprus.
"Navigational warnings are invaluable"

ANNIKA KORSBO, First officer onboard M/S Baltic Bright, the first STM-enabled ship.

“As with all new technology, there were technical problems in the beginning. After some problem-solving and development of the system, it was really great to finally see other STM-enabled ships for the first time. Today I meet more and more of such ships and in my systems I can see their intended route plan, which can make navigation easier. A few weeks ago, I got a real benefit from the integrated navigational warnings in the digital nautical chart. A little notice popping up in the chart saying that there is an incident in the area we intend to pass through, is just invaluable.

I believe in STM. Information is essential for being able to make the right decisions about choice of route, correct speed and thereby bunker optimisation. We rely on information from ports, pilots, prevailing winter and ice conditions and more, and this can be inadequate from certain places today. And to also be able to share routes between ships and on-land organisations seems self-evident. Imagine how this could simplify matters during a Search and Rescue operation. Each and every boat would receive a recommended route from the rescue leader that they should follow for the best fine-combed searching of an area.”
We travelled to **STAVANGER** in Norway to find out how STM has made port calls of large passenger ships more efficient and safer.
Just in time
ENTERING THE  Norwegian port of Stavanger is truly magical. The spectacular mountains that plunge all the way down to the fjord are in perfect harmony with the city that greets you from the bridge of the ship.

But we are not here to talk about the beautiful scenery of Norway. Since 2016 the port has been testing the use of STM when large ships call in port. Under the leadership of Trond Andersen, Manager of the Maritime Department of Port of Stavanger, the port has been developing STM with a “Living lab” (see below). The Norwegian Coastal Administration (NCA) is a leading actor in innovating the way information is automated, shared and used. The National SingleWindow reporting system is a solution that simplifies ship reporting for all port calls in Norway. Through the introduction of Sea Traffic Management and its Port Collaborative Decision Making-enabler, NCA helps the operational aspects of shipping.

“This is a new way of working for us. Previously, whoever owned the terminal would make the decisions and set priorities. If there were delays or anything like that, then it wasn’t always certain that everybody would receive the information,” explains Trond Andersen.
A delay actually impacts a lot of people. The pilot who is scheduled to go on-board, Vessel Traffic Services (VTS) that receive all the information; and everybody else involved in receiving the ship and unloading it when it is docked in port.

"Then you had to phone everybody up, even the lorry crane that was meant to come so that everybody could disembark."

Now no phone calls are needed, and there is no risk of people missing information.

"We now share all the estimates and information in a shared platform that everybody can access. You get everything in real-time. Everybody can see when the ship is approaching. When the pilot boards, you can see that. You can monitor the entire docking procedure on the screen and know when it's time for your part in the process. In the past, people could stand and wait for hours because they hadn’t been informed about a delay."

It is difficult not to miss just how satisfied Trond is with STM and the new functions.

"We really like this platform. I see it as a new standard and a universal tool in the future. The standards and the experienced colleagues from Viktoria Swedish ICT and Valenciaport Foundation have saved us time and effort when setting up the Stavanger solutions. I believe STM will grow fast; as more and more ports gain STM capabilities, more ships will demand compliant software.

The port of Stavanger receives ships from other parts of Norway and also from Sweden, Germany, the UK and US, well more or less from all over really. An on-time arrival is key as many people come here on holiday to enjoy Norway's incredible mountains in more places than just the port of Stavanger.

"It's essential that the service works and that everybody is here on time. Many people have buses or some other form of transport waiting for them. It's also important to observe departure times too. So if we can make the port call more efficient by ensuring that everybody is prepared then we can make up time during any delay, and also prevent delays from occurring."

Thorough groundwork lies behind this now relatively well-functioning setup. When it started in 2016, all the stakeholders met in the port and discussed the points that had to be included.

"We mapped out how a port call process looked in detail. This became a very long time-line against which everybody had to note down what they did and who they communicated with. That gave us a map that looks like a map of the London Underground," explains Trond. We have continued to meet on a regular basis to solve issues and discuss further improvements and functions. This is what we call a "Living Lab."

Once everybody knew who had which information and how it needed to be shared, everything was implemented in the shared portal that everybody now tracks. Some people use a computer, others use a tablet and others check via a mobile phone.

Were there any initial obstacles? "At first people were afraid that they would be sharing confidential business information with each other, but that isn't what STM is about. We all agree that there is nothing secret about times and other information regarding the docking."

**In brief**

**Port of Stavanger:**
- Owned by the municipalities of Stavanger, Sola, Randaberg and Rennesøy (and Finnøy from 2020).
- 22 Employees.
- 65 000 Port calls in total (including national traffic)
- 10 000 International port calls
- 245 Cruise ship calls (2019)
- 500 000 Cruise guests (2019)
- 160 000 Cruise crew (2019)
- Northern Europe's largest oil and gas cluster
- Over 4800 metres of quays
- 300 000 m² land area
The VTS Horten Norway sees a ship approaching Oslo. They request that the ship to share its route. The ship gives the VTS access to the route monitored in their navigation system ECDIS. The VTS operator checks that the route is compatible with the traffic situation and either provides approval or alters the route to suit the situation or the orders of the pilot. When receiving the route, the VTS can make sure that the route chosen is safe at an early stage, and, if not, adjust it accordingly even before the ship enters the VTS area.

A ship is heading for the port of Valencia. The bridge officer shares the route and the port officer receives a live updated planned time of arrival. This starts a process in the port management system, generating a recommended time of arrival when the port is ready to receive the ship. The Port Control Traffic Co-ordinator sends the recommended time of arrival back to ship, which can then adjust speed and arrive just in time.

It’s cold and icy, a ship is heading for the north Baltic Sea. After checking the Service Registry, the officer on watch finds the winter navigation service and sends her intended route to Ice Breaker Management. In return, she receives directional routes through the ice directly in the ECDIS on board. She can now navigate safely to Vasa, Finland, in caravan supported by icebreakers.
Interoperability – the STM way

Step by step, get to the top with STM.

Step 1: What do we share?

International standards ensure that everybody shares the same data in the same format. STM has helped in developing standards for route information (RTZ/S-421) and port call time stamps (PCMF/S-211).

Step 2: How do we share it?

The same data format can be sent in (oh so) many electronic ways. STM defines how the message should be sent and the detailed interface to other systems.

Step 3: With whom do we share?

The information owner always decides with whom to share the data. All actors are registered so finding the right receiver is easy, and STM authentication verifies the identities.

Step 4: STM protects your data

All data is sent over encrypted unique channels for each interaction. The secure infrastructure is known as SeaSWIM.

The "what" is like a common language when writing letters. The "how" is the envelope size. The “who” is like the yellow pages with authentication. STM security sends the letters as registered mail.

But wait, how do I get any use or value from all this? The Service Registry can be compared to an App Store for the maritime domain. Here, different service providers list their applications/services, and ships can check what services are available for them to use.
STM SERVICES

At your service

Some of the services developed so far, thanks to STM.

Baltic Navigational warnings

With the Baltic Navigational Warning Service, navigational warnings are sent directly to the on-board electronic chart (ECDIS), machine-to-machine. The service allows warnings to be sent only to those affected and deleted when no longer relevant.

BENEFITS: Avoiding human errors, reduced workload

Importing Pilot Routes

Before leaving a port, a ship has to plan the route berth-to-berth. By importing the correct pilot routes at both ends into the original plan, misunderstandings are eliminated and no re-planning is needed at a later stage.

BENEFITS: Common situational awareness, reduced workload

Route Optimisation

The STM concept provides the means to have the ship’s route optimised by different service providers with different focus areas, such as the weather, ocean currents, fuel consumption, no-go areas regarding draft or of a sensitive nature, conflicts with other ships’ routes etc.

BENEFITS: Bunker reduction, reduction of emissions
Enhanced Monitoring

With Enhanced Monitoring, a ship can share its route with a shore centre and receive alerts if it deviates from its route, thereby considerably reducing the risk of grounding.

**BENEFITS:** Fewer groundings, fewer collisions

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**SAR – Search and Rescue**

Introducing STM in SAR services will greatly improve Maritime Rescue Co-ordination Centres’ (MRCC) overview and possibility to control SAR units in search operations. The MRCC will be able to send areas and routes to SAR units, which will be directly visible in the onboard electronic charts.

**BENEFITS:** Increased safety, better accuracy in SAR operations, reduced risk of misunderstandings

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**Ship-to-ship route exchange**

Ship-to-ship route exchange allows ships to share their intentions with other ships in the vicinity, giving all actors involved a better overview of the traffic situation.

**BENEFITS:** Increased common situational awareness

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**Port Call Synchronisation and Optimisation**

With Port Call Synchronisation and Optimisation, ships and ports exchange time stamps for arrivals and departures, enabling all parties to perform actions just-in-time and create more efficient port calls with reduced waiting time outside ports and green steaming between ports.

**BENEFITS:** Shorter turn-around time

Bunker and emission reduction

Optimised use of resources
Making STM happen:

Partners:


stmvalidation.eu