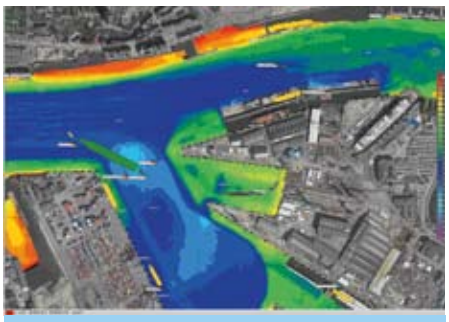
NEWSLETTER

35 Months after ... EFFORTS Teams Face the Public

Demonstration Events of EFFORTS Project Results ...



... on Navigation in Ports
14 to 15 September 2009
Hamburg, Germany

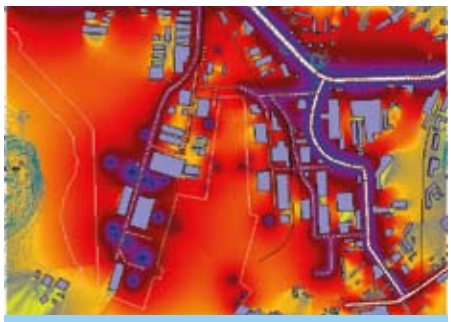
Greatly enhanced electronic navigational charts, state-of-the-art training equipment for tug masters and novel information displays for port pilots are some of EFFORTS' contributions to improved port efficiencies. The quest was not to invent something entirely new but to improve existing systems and to enhance their capabilities. The results have no equals.

During the Demonstration Event in Hamburg, industry experts and company representatives will have the opportunity to learn more about the above-mentioned results, discuss them with the researchers and witness the Port ECDIS and the PPU in action during life demonstrations in the port.

... on Water and Air Quality
22 to 23 September 2009
Le Havre, France

Questions about invasive foreign marine species, port water contamination through dissolved aluminium from galvanic protection and the reduction of air pollution in ports caused by bunkering operations have been investigated and answered by the EFFORTS team on Ports and Environment.

During the Demonstration Event in Le Havre experts from the laboratories and from the industrial partners will introduce and discuss their work and their findings and will present their new products.



... on Education and Training
7 to 8 October 2009
Dublin, Ireland

Sound and effective personnel development, education and training opportunities which address the operational level as well as the managerial and administrative one, have been developed by the EFFORTS team.

During the Demonstration Event in Dublin the European Port Skills Passport and the post-graduate course in Nautical Port Management and Technology will be introduced and explained.

... on Noise Abatement
7 to 8 October 2009
Dublin, Ireland

Ports have to engage actively in reducing noise disturbances in order not to loose public credibility. EFFORTS found solutions when sound engineers, port operators and sociologists worked together.

During the Demonstration Event in Dublin, the research done on noise disturbance reduction and lessons learnt for actual measure in ports will be presented.

INVITATION

Welcome to Hamburg, Le Havre and Dublin
Willkommen in Hamburg
Bienvenue au Havre
Céad Míle Fáilte go Baile Átha Clíath

Herewith, we very cordially invite all EFFORTS consortium members, collaborators, participants, sympathizers and all others interested in the EFFORTS activities to attend the Demonstration Events in Hamburg, Le Havre and Dublin.

After many months of thinking, conceptualising, repudiating, planning, investigating, testing, formulating, discussing, persuading, doubting and finally succeeding; after the roller coaster rides of enthusiasm and failure, of success and rejection, of quick advances and long plateaus of slow progress, of time pressure and missed deadlines, all EFFORTS Team Members are now eager to present their work and their successes to their fellow collaborators, to industry experts and users.

Please join us all for the Demonstration Events

Please spread the word to the industry, to the scientific community, to the wider public, to friends and to the press.

Let's get a great turnout!

EFFORTS NEWSLETTER

Safe and Efficient Navigation in Ports is Vital for Port Efficiency

An electronic navigational chart with port-specific chart objects and the ability to display bathymetric information in a 3-dimensional presentation at a very high resolution has resulted in a Port-ECDIS that will be of outmost benefit to port navigation, port pilotage, port engineering, dredging and terminal planning and construction.

A greatly enhanced tug manoeuvring simulator newly developed algorithms displays tug movements in near lifelike presentations, regardless of the task the tug is presently performing, whether travelling, towing or pushing. For the first time the reciprocal interactions of the tug and the assisted vessel have been included in the simulation and give the tug master a realistic feeling of the forces involved in a particular towing task. A novel display of nautical information for the ship's command, the pilot and the involved tugs will assure that all parties will share the same information, because efficient team work requires identical information for all. In the past, the accurate positions of the assisting tugs could not always be determined with the required accuracy. The results of research and life trials have now alleviated this bottleneck, allowing comprehensive information to be displayed in a Portable Pilot Unit (PPU).

Ports have to manage their Environment in a Responsible Manner

Foreign invasive marine species that are carried in the ballast water of ocean vessels pose a great threat to our local marine environment. The addition of biocides together with the use of mechanical filters is up to now the only known effective measure to combat this threat. The question remains, what effect biocide-contaminated ballast water will have on indigenous marine species, once it is released from the vessel. Tests that will be explained and demonstrated have found biocides that have neglectable effects when applied correctly.

Aluminium anodes are extensively used to protect submerged steel structures in ports from corrosion that mainly occurs through galvanic currents. Anodes are used to divert the negative effects of the galvanic current away from the steel structure. In the process, the metal of the anode goes into solution with the water, hence the name sacrificial anodes. The question was whether the dissolved aluminium in the water has a toxic effect on the marine environment. It was found that the ions turn into a metal state very quickly and that the aluminium deposited in the sediment does not pose a toxic threat.

An explosive-proof system for the rapid oxidation of cancer-causing volatile organic compounds was developed. Volatile organic compounds are released into the atmosphere during the handling and transfer of hydrocarbon products, for instance fuel and bunker oils. In order to reduce air pollution in ports due to bunkering activities, the developed systems had to withstand the harsh working environment in ports.

Effective Ports Demand Innovative Approaches to Education, Training and Human Development

European citizens enjoy great private mobility; now they have to prepare for a great professional mobility, too. The European port sector has gone through tremendous changes in the last decades. Former world trade main ports have become secondary or minor ports, former coastal landing stages or wetland areas have become major container hubs. Inside the ports the changes have been as profound. Stevedores and lightermen have become chemical operators, supply chain assembly workers or highly skilled equipment operators without leaving their former work domain. Port people have been mobile in the past, but rather by chance than by design. In order to safeguard the skills and experiences of port personnel and to develop them further for the wider industries upstream and downstream from the port, EFFORTS is creating a European Port Skill and Competencies Passport. This passport documents the comprehensive training patterns the holders have completed and proves to other port employers and employers in other industries, both national and European, the skill levels and the professional competencies of the holder.

Seen on a national level, the ports and maritime industries in many countries contribute only a very small number of jobs to national employment. And inside these industries there are very important, specialised functions with a very small number of job holders. A post-graduate, post-experience academic course for these special functions in the ports that cannot be clustered in mainstream education is being developed. This course offers appropriate educational opportunities for experts engaged in Nautical Port Management and Technology. Because of the low numbers per site, the restricted time budget and the geographical dispersion of possible participants this course will be offered under the blended learning concept, with phases of personal attendance, e-learning and academic video conferences. In order to reduce the time and afford to design such a programme, several universities will contribute their already existing teaching offerings to the course. Through the European Credit Point System it is guaranteed that the course participants can study at their own pace and are awarded a degree by one of the participating academic partners.

Public Responsibility Forces Ports to Reduce their Noise Impact on the Citizens

Noise is inevitable in port operations, but has become a constant source of conflict with the residents close to the port. In order to contribute to good neighbourship, ports are actively trying to reduce noise disturbances. Novel ways of assessing the perception of noise disturbances emanating from ports have been identified and are being presently tested. Hitherto, investigations of noise disturbance have mainly focussed on sound pressure. The researchers found out that sound frequency, the repetition rate and the repetition frequency play also an important role in the question, whether and how sound is perceived as disturbing. Still not satisfied with the findings, sociologists were sent around to interview effected residents. They established that perceived disturbance varied not only in response to the parameters mentioned above, but also in response to individual subjective experience. Based on this realisation, researchers will now be able to devise noise protection measures for individual ports that will be more focussed and more cost effective.

Event Report on Demonstration of Port Process and Interoperability Solutions

By Phanthian Zuesongdham, ISSUS and Jan Prahm, TuTech Innovation GmbH, Hamburg

On 24 – 25 June 2009 the first demonstration event of the EFFORTS Project was held at the Port of Thessaloniki, Greece. This demonstration event focused on the port processes and the interoperability solutions by deployment of the EFFORTS approach. The results of EFFORTS in regard to port processes were presented to 34 participants from nine countries.

The welcome message was given by the moderator, Kevin O'Driscoll from Dublin Port Company and the host of this event, Dr. Christos Papadopoulos from Thessaloniki Port Authority S.A. Prof. Jens Froese, Leader of the Technical Coordination Team of EFFORTS, highlighted the main objectives of the project and its results as well as its significance to the maritime transport.

Aerial view of the Port of Thessaloniki

The EFFORTS port processes model

Ornulf Jan Rodseth, Director of e-Maritime Group at Marintek, provided the key goals and achievements of the work package 3.1 engaging port processes. These include the EFFORTS port process model, ICT methodology and toolbox to create interoperability solutions between stakeholders in ports by using process model tool (e.g. Enterprise Process Center) and specification model tool (e.g. Enterprise Architect). Furthermore, a summary of contributions to standards such as WiMAX, WiCAN was presented.

Phanthian Zuesongdham, Research Associate of ISSUS / TU Hamburg Harburg, introduced the significance of EFFORTS port process model and a detailed insight of the conceptual model of EFFORTS Methodology which is especially advantageous for small and medium sized ports. The process model can be used as a basis for documentation and analysis when standards such as ISO 9001, ISO 14000, ISO 28005-2 or ISPS code will be implemented in each port. It also plays important roles when developing Key Performance Indicators (KPIs), benchmarking or implementing the best practices. Further contribution is dedicated to a sub-framework of General European Interoperability Framework for e-Maritime "ARKTRANS ".

The process map can be accessed via http://pmp.efforts-project.org/. A login is obtainable by an e-mail request to Phanthian Zuesongdham (Zuesongdham@tu-harburg.de).

Two case studies

In order to demonstrate how the above mentioned methodology and tool can be applied, two case studies were selected as examples: Manifest Distribution in Port of Dublin and Berth Allocation Planning in Port of Thessaloniki.

The case study "Manifest Distribution" was presented by Sven Mathes from Nielsen+Partner in Hamburg/Germany. He revealed how an interoperability of the process of manifest distribution in the Port of Dublin among involved parties can be specified and created by exploiting this method.

The "Berth Allocation Planning" case was given by Christina Paschalidou, TREDIT S.A. She highlighted how the specification to develop new software can be created and how the new system can be interoperable with the existing one by exploiting the EFFORTS Methodology. In this example, a web-based tool for berthing monitoring and planning is programmed and interlinked to the existing terminal management system FRETIS (Intermodal Freight Terminal System) which is deployed by Thessaloniki Port Authority. This leads to a better planning capability and more efficient resource management of the port with limited berth areas.

Update on Port ECDIS and PPU

Before closing the event, two information sessions regarding Port ECDIS and Portable Pilot Unit (PPU) were provided.

Dieter Seefeldt, Hamburg Port Authority (HPA), showed how the Port ECDIS supports the port processes Navigation and Infrastructure and Resources respectively Water Area.

The Port ECDIS is needed by the ports to meet their requirements regarding navigational, manoeuvring, berthing, turning, docking, up-to-dateness, scale and accuracy aspects. The common ECDIS and the Inland ECDIS are not meeting the standards in the above mentioned aspects. As a GIS (Geographical Information System) the Port ECDIS can interact with VTMIS (Vessel Traffic Management and Information System), marine simulators, electronic chart systems, hydrographic survey- and dredging software, purpose bound navigation software that has been developed for dedicated navigational manoeuvres, e.g for PPUs (Portable Pilot Units).

continuation on page 4

For further development the inclusion of orthophoto, tidal information, current velocity and directions, AIS information, maintenance information e.g. dredging, gridded bathymetry and airborne laser scans have been named.

iPhone displaying the PPU functions

Last but not least the current state of the PPU was presented by Tommy Mikkelsen, Marimatech. In short the PPU is a software/ hardware tool to improve the situation awareness of the pilot / tug master / VTS including the visualisation of information exchange during docking and manoeuvring in fairways, locks and ports. The achieved advantages to existing systems are its low weight, easy-to-use and reliability in setting-up the system and during operation. As a computer for display merely an iPhone is required.

Even a Long Voyage Starts with a First Step – Process Modelling in Ports

Continuous improvements in operations and administration are a daily chore for port managers that strive for ongoing advances in effectiveness and efficiency. In order to achieve this, a deep understanding of the underlying port processes is needed.

In general, there are three main reasons for process modelling:

- Improve understanding of the subject
- Handle complexity of the problem domain
- Improve communication within the domain.

Improve understanding:

Is achieved by collecting, understanding and structuring information during an analysis phase. It must be kept in mind that modelling is always an iterative process that leads to continuous refinement of the subject modelled.

Handle complexity:

The number of stakeholders, the number of processes and the amount of interactions between them make the complexity of the process. Process modelling aims at partitioning the system into smaller, manageable units with distinct interfaces between them.

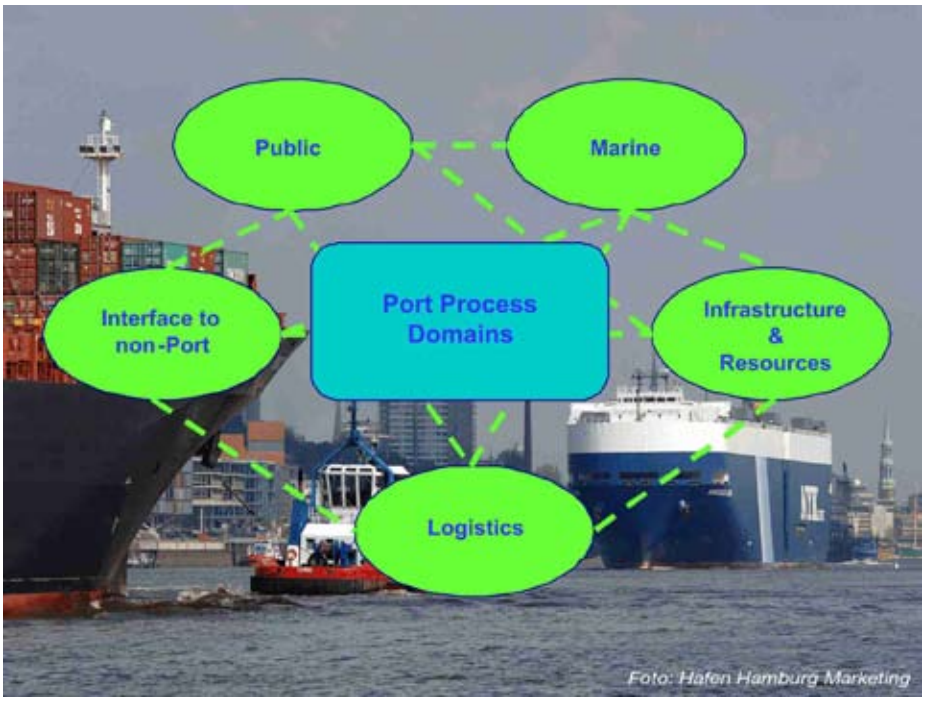
Improve communications:

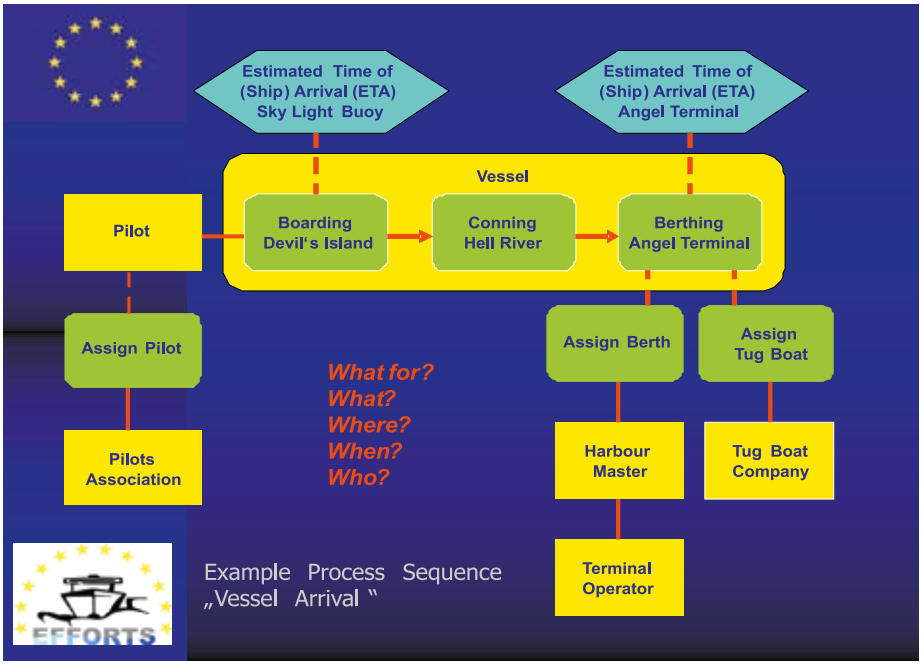
The challenge of large projects is to gain a common understanding of the problems elaborated. The process model serves as a "map" to locate different subprojects and work packages. Also, a definition of terms is part of the process model. A unified language will foster better communication among collaborators within a project.

Under the guidance of ISSUS/Maritime Logistics, the EFFORTS team developed a methodology for using process modelling in ports and also developed a guideline on how to apply the methodology; this guideline comprises the following aspects:

- Definition of the sequences of activities to be performed during process modelling
  - » **What will be done?**
- Definition of the role responsibilities within this procedure
  - » **Who does it?**
- Determination of deliverables and milestones
  - » **What are the results?**

The EFFORTS team used that approach to develop a port process map. Ports do not only have different organisational setups, they are very often industrial and commercial systems with many different





players. Therefore, business activities and the corresponding responsibilities tend to differ considerably. By concentrating on port processes as the main activities of ports, a description of the port organisation became universally applicable for every seaport. Each process in port operations is occurring once even though it is handled by many stakeholders. With this approach, a common understanding and framework in port operations was achieved. By applying the process map to real port organisations, the map identified five main domains, their meta-processes and process clusters, under which all possible port processes can be categorised or classified. These domains are marine, infrastructure, logistics, interfaces to port periphery and public.

A side effect of this work was that the process modelling methodology was used by the other EFFORTS teams to structure their work within this EFFORTS programme.

Seacharts, a former domain of mariners, have now caught the attention of port engineers, planners and scientists

Since ages, mariners have relied on graphical presentations to find their way around the seas and oceans. The forerunners of the first paper-based navigation charts appeared about 400 years ago. About twenty years ago navigation charts went digital and are now gradually replacing paper charts on board. Electronic navigation charts and navigational display systems were combined to create ECDIS, the Electronic Chart Display and Information System, that offers display and representation possibilities that have not been fathomed yet. The amount of symbols and data that can be displayed is only limited by the apprehension ability of the user; hitherto unrelated data sets can be combined to allow new insights and understanding; overlays with artificial features can focus the user's attention to the salient factors of the presentation, and many features more.

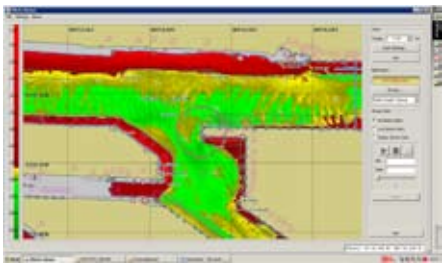
It is not surprising, that the capabilities of electronic navigation charts have finally caught the eyes of engineers, planners and scientists. And, this proves to be to the benefit of the mariners.

The Port ECDIS, which has been developed by the EFFORTS Project under the leadership of the Survey and Hydrographic Department of the Hamburg Port Authority has immediately been taken up by other EFFORTS teams to build a much more realistic and more accurate tug simulator and to develop a vessel berthing information system that can be displayed on a Portable Pilot Unit (PPU), probably more accurately to be called a vessel berthing information system.

But that is by no means all the new Port ECDIS can. Whereas the Sea ECDIS is 2-dimensional, showing depths areas as colour-coded surfaces, the new system is truly 3-dimensional and hence will be of great help to port engineers and waterway planners, to dredging contractors, to port pilots and to hydrographical, bathymetrical and environmental scientist, to name just a few.

As the full reach of data combinations between the Port ECDIS and other geographical information systems cannot be imagined yet, we can expect some exciting developments in this area in future.

Interested parties will have a chance for a first glimpse at the Port ECDIS and a discussion with the Port ECDIS' creators at the Demonstration Event in Hamburg.



A Vessel - Berthing Information System - the overall Picture for a Complex Task

To berth a large vessel is really a showcase of teamwork. The ship's command, the pilot(s) and the assisting tugs (as well as vessel traffic management personnel at times) have to collaborate closely to get the vessel on or off the berth safely, efficiently and with the least interruption to other marine traffic. Not only do they have to share the same objective but they also have to work according to the same mental operational model.

Tug close to container vessel

To be really efficient, all parties must have access to the same information at all times during the process. Until now this has not been entirely possible. The tug masters, in particular when pushing or pulling abreast of a large vessel, have no or little information about the position of the vessel relatively to the berth and about the approach or withdrawal speeds nor have they information about the position of the other tug(s). The pilots have to give them continuously detailed instructions for accurate manoeuvring. On the very large vessels the pilots themselves lack sufficient information, because of a very restricted visibility close to the bow and the stern.

A remedy would be an electronic display that shows in a dynamic representation the berthing vessel, the position of that vessel relative to berth or embankment and the assisting tugs. This information would than be made available to the ship's command, the pilot and the tug masters. This was exactly what the EFFORTS research team went about to develop, a large vessel berthing information system based on a Portable Pilot Unit (PPU).

Such a presentation requires continuously accurate reliable position data from the vessel and the tugs. This data will be obtained through the Global Navigation Satellite System (GNSS). One of the questions to be answered was whether tugs operating very close alongside large vessels will be able to receive the necessary GNSS signals at all times or if the large vessel will shadow the signals to be received by the tugs, making the obtained tug position too inaccurate for berthing purposes.

In the following, Tommy Mikkelsen of Marimatech reports on the trials done.

Shadow Effect for Tugs

By Tommy Mikkelsen, Marimatech, Denmark

1 Introduction

One of the technical challenges of the EFFORTS project is to have a reliable position of tugs. The technology used to achieve this goal is Global Navigation Satellite System (GNSS). As the GNSS relies on a clear view to the sky, respectively the satellites, the conditions are very special when operating close to large ships that block parts of the sky. This causes the so called "shadow effect". In order to find out how strong the shadow effect is under certain circumstances the two different sets of GPS systems of Marimatech were tested during a test sailing on the tug "Lesum" in Bremerhaven:

E-Sea Fix Pilot CAT III (CATIII) and

E-Sea Fix Pilot CAT I (CATI)

2 Test setup

The location of the antennas where far from ideal. The CATIII receivers were placed below two radar antennas and close to the communications mast. The CATI receivers were placed on the railing close to the wheel house.

From the GPS the number of satellites "visible" and the HDOP value was logged. HDOP (Horizontal Dilution Of Precision) tells how accurate the position is. The lower the HDOP value the more precise is the position. A HDOP value below three is considered ok and at least 3-4 satellites are needed to get a position fix.

3 Test cases

Two different test situations were analysed:

Case 1:

In this case the tug got close to a small container vessel and sailed below the cranes. The shadow introduced was not very big as the container vessel was quite small

Case 2

In this case the tug first approached the MV "Tamesis" to drop off the pilot and followed as stern tug into the harbour, including turning the ship, assisting it through the locks and to the berth. During the tug operation some bad weather with massive rain and wind occurred.

4 Conclusion

The test data analysed is the number of satellites the GPS can see and a HDOP value.

In case 1 the number of satellites never dropped below 8, and at least 8 satellites were always visible. (CAT I). The HDOP values usually stayed below 1 (MKI), for a few seconds it was 1,25 to 1,5. This is very good, and the position in this case were very stable and accurate. Only GPS satellites were used, not GLONOSS and GALILEO. The PPU is capable of using these two systems too, but for the tests this ability was turned off.

In case 2, during the pilot drop off, the number of satellites is over 8 at all times and the HDOP is usually below 3, occasionally, especially in bad weather, only 3 satellites were visible and HDOP increased to over 3, but always stayed below 6. The difference to case 1 is explainable by the fact that the MV "Tamesis" is a much larger vessel than the small container of case 1. A bigger

continuation from page 6

Tugs assisting berthing LNG-tanker

ship tends to disturb the GPS systems more. However the results are still very good. During the bad weather, it seems that the systems run into some trouble, as can be seen by the number of satellites which some times dropped down to 3 with the MKIII system. It seems that in this case the CAT I survives better where never less than 6 satellites were seen.

There could be two reasons for the difference:

1 – The CAT I system was better shielded from the rain, as it was placed lower.

2 – The sensitivity of the CAT I is much higher than the CAT III. This also means that the accuracy of the CAT I is lower, as it receives more noise.

The tests prove that the GPS systems perform very well, even when operating on a tug close to an assisted ship. Warnings have to be given to the user if the system is deteriorating and augmentations of the GNSS should be considered for the future. It is important to consider whether position accuracy or reliability is more important. Going for high accuracy might lower the reliability!

For the daily use the GNSS antenna shall be mounted into the main mast as high as possible with an undisturbed view of the satellites.

Multi-path effects should be investigated in a next step.

Advance Notice of EFFORTS events:

In September 2009 the following research results will be presented to the port and maritime experts:

Port ECDIS, Tug Assistance, Precise Navigation and Manoeuvering in Ports
14-15 September 2009 Hamburg, Germany

Water Quality, Port Air Quality
22-23 September 2009 Le Havre, France

Education, Training and Human Development, Noise Annoyance of Ports
7-8 October 2009 Dublin, Ireland

The detailed programme with definite times and places and registration details will be published in the next newsletter and on the website of the project:

www.efforts-project.org

EFFORTS Final Conference
28 October 2009 Hamburg, Germany
For detailed programme and registration please go to:

www.seaport-innovation.org

Contact:

Administrative Coordinator
Dr. Valerio Recagno
D`Appolonia S.p.A
Via San Nazaro 19
I-16145 Genova,
Tel.: +39 010 3628148
Fax: +39 010 3621078
www.dappolonia.it

Leader Technical Coordination Team (TCT)
Prof. Jens Froese
University of Technology Hamburg
Maritime Logistics/ISSUS
Schwarzenbergstrasse 95c
D-21073 Hamburg
Tel.: +49 40 42878-6133
Fax: +49 40 42878-6135
www.maritime-logistics.de

Further members of TCT:
ICES International Consulting Environment Services, France
TL&A TL&Associates

Editing Team:
Dr. Svenja Töter, TUHH/ISSUS
Helga Wagner, HPTI
Jan Prahm, TuTech Innovation GmbH

Layout:
TuTech Innovation GmbH
Harburger Schlossstrasse 6-12
21079 Hamburg, Germany

Project is part-financed by the European Union