PROJECT NO: FP6-033015

OPTIPORT

The development of a new more efficient and safer portable traffic optimisation system for EU ports.

Co-operative Research (CRAFT)

Horizontal Research Activities Involving SMEs

Month 0-28

Final Activity Report

Start date of Project:	1st September 2006
Duration:	28 Months
Project Coordinator:	1 Marimatech AS

CONTENTS

PROJECT INFORMATION

PROJECT NO: FP6-033015

CONTRACT NO:

TITLE OF PROJECT: OPTIPORT - The development of a new more efficient and safer portable traffic optimisation system for EU ports

COORDINATOR: Marimatech AS

SME EXPLOITATION MANAGER: Marimatech AS

***SME CONTRACTORS*:**

Participant Role	Participant No	Participant Name	Participant Short Name	Country	Date Enter Project	Date Exit Project
CO	1	Marimatech AS	MT	DN	Month 1	Month 28
CR	2	~~Luciad~~	LC	BE	Month 1	Month 11
CR	3	Port Autonome de Nantes Saint Nazaire	SN	FR	Month 1	Month 18
CR	4	~~Gram&Jul~~	GJ	DN	Month 1	Month 3
CR	5	Thermoplasticos	TP	ES	Month 1	Month 28
CR	6	RCD	RCD	CZ	Month 1	Month 28
CR	7	NAVData	NV	FI	Month 1	Month 28
CR	8	Pera Innovation Ltd.	P	UK	Month 1	Month 28
CR	9	Teknologisk Institutt AS	TI	NO	Month 1	Month 28
CR	10	Navicon	NAV	DN	Month 20	Month 28

PUBLISHABLE EXECUTIVE SUMMARY

Problem:

Maritime industries in the EU had a turnover of €159 bn and employed 1,545,000 people in 1991. They added value of €70 bn (1% of GDP) and contributed €23 bn (33% of VA) to EU funds.

Today, the biggest problems faced by EU Industrial Ports are:

- Limited throughout because of limitation of under keel clearance (UKC) calculations
- Safety of the Ships & Sea Vessels in limited space environment
- Very Expensive Electronic Guidance Systems & Equipment

The Consortium:

The project partners, lead by the coordinator Marimatech (DK), are spread throughout seven member states. The project gains industrial support from RCD (CZ), Navdata (FI), Navicon (DK) and Thermoplasticos (ES). The end user Port St. Nazaire is based in France.

We brought together a truly trans-European consortium of SMEs from seven member states. They formed a supply chain comprising members of the Marine Equipment, Navigation Systems, Aluminium Extrusion, Plastic Extrusion and Motion Sensors SME communities that, together with 2 RTD performers, met the objectives of cooperative research.

The geographic locations of the companies, who make up the consortium, provided this project with an even spread across Europe. The project and associated benefits was only made possible by the financial support of the European Community.

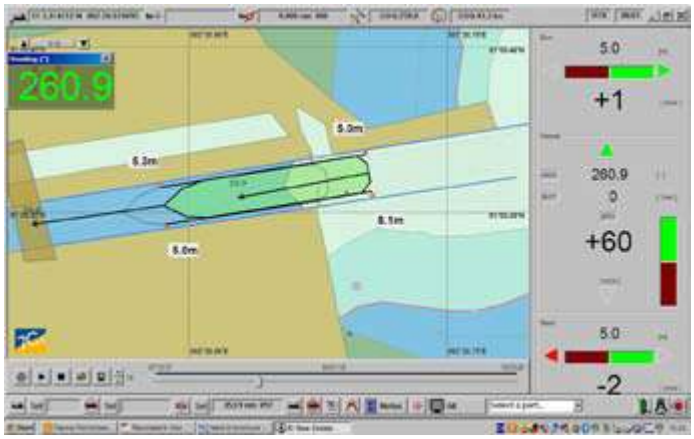
Objectives:

Optiport project was designed to overcome the problems outlined above and the project aimed to increase the competitiveness of European industrial ports by increasing port throughput by 10%. This can be achieved by improving the accuracy of calculation of under keel clearance (UKC) from 50 cm to 10 cm, enabling more ships to pass through the ports during a tide.

The project also aimed to increase the real time ship movement forecasting and position accuracy so that this would reduce accidents and groundings in narrow waters, which can improve safety and increase port throughput. It also aimed to introduce a new sensor that will provide very accurate real time ship movement forecasting in the case of GPS system blackout.

Results Achieved:

The consortium have now fully completed the project. Although there were some delays due to partner changes in the beginning of the project, the project has progressed extremely well with the consortium working well together. A prototype system was fully built by Month 24 and sea-trials have successfully completed by the end of the project.



The world-beating technology has been achieved by meeting the following targets:

- A portable system combining GPS receivers and motion sensors to show a vessel's position, speed and bearing more accurately than current commercial offerings
- Software to display Electronic Charts, combined with Automatic Identification System data and predicted UKC and Squat
- Building a world-class filtering system that is linked to motion sensors. This technology enables Optiport system to navigate safely and extremely accurately in GPS Blackout situations

Direct Application Areas:

The primary application for OPTIPORT is its use by Pilots bringing vessels into industrial ports. This especially applies to ports where the approaches are narrow and shallow, as these present the greatest risks of collision and grounding. The equipment allows vessels to enter port during a greater portion of the tide than was previously possible. It achieves this, by accurately showing the vessel's position, speed and bearing on an electronic chart of the waters around the vessel. When this is combined with the current state of the tide and other relevant environmental data the pilot can easily whether the vessel has a safe route into port. Including AIS (Automatic Identification of Ships) data about other ships in the vicinity, in the data displayed by OPTIPORT, improves safety by reducing the risk of collision. Radar provides some information about other vessels, but this can be misleading and has lead to 'Radar Assisted Collisions' when the information was misread by a ship's officer. AIS provides an accurate indication of the position, speed and bearing of every vessel within VHF radio range, even when their radar reflection is masked. For example when they are behind another vessel, or there is land in the way.

Other Application Areas:

The equipment will also be useful in third world ports, which do not have sophisticated radar and Vessel Traffic Services systems. Vessels equipped with OPTIPORT would be self-sufficient and they could safely enter these ports without the aid of local pilots.

OPTIPORT will also be useful for ship trials, hydrographic surveys and other situations where very accurate measurements of position, speed and bearing are required.

Patentable Ideas:

Two patentable ideas emerged during the project. These are:

- Research into methods for combining GPS and motion sensors in a compact low powered portable unit have produced patentable results.

- The research into RF Shielding and improved antennae have produced patentable results that could be applicable to other electronic devices which contain receivers and transmitters, especially where these are operating on different frequencies. The results may also be applicable to other equipment that contains a wireless device in close proximity to computing, or other electronic components.

Dissemination and Exploitation of the Results:

Dissemination of information was completed and has being very well received by the industry and public alike, the first event being the Sea Work Exhibition on June 2008 (Southampton, UK). It was here that a consortium member presented to an audience of approx. 200 professional, in a full programme of technical seminars with Optiport being one of them.

Publications in leading trade journals have been made by the coordinator and other consortium members.

Regarding the exploitation of the results, the SME partners constitute a realistic supply chain partnership. By entering the market with a highly innovative ECDIS system, offering significant performance and cost benefits over products currently on the market, we expect to be able to capture 10% of the Marine ECDIS market within 5 years of the end of the project. Initially it is expected that the consortium will have the capacity to meet demand for the OPTIPORT system and its components. When the demand for the system increases, it will be necessary to transfer the technology to a wider community of manufacturers to produce the antennae, shielding and to integrate the systems. This will be achieved by licensing the technology in Europe and globally and that will generate additional income through licensing and royalties. Direct benefits shared within the partnership will be:

- Sales of OPTIPORT systems to the primary and secondary markets (Marimatech)

- Sales of antennae and shielding to support the primary and secondary markets (RCD)

- Sales of software licences for processing and display of the data, to support the primary and secondary markets (Navicon)

- Sales of developed or customised motion sensor technology (Navdata)

- Generation of royalty revenue from the sale of manufacturing and sales licences worldwide (All SME partners)

A project specific website has been setup, which is currently located at http://optiport.pera.com. No technical details will be released until the Patent applications are submitted and published.

1.0 PROJECTIVE OBJECTIVES & MAJOR ACHIEVEMENTS DURING THE REPORTING PERIOD

1.1 Overview of General Project Objective

Scientific objectives

One of the key technical challenges in the Optiport project is to design a system with extremely high position accuracy in ports, less than 10 centimetres, and with a high rate of availability. Since the system is based on GPS receivers, there is a risk that the satellite signal is being blocked by buildings and other constructions. This will cause 'drop outs' in the reception of the positioning data. The missing position information has to be 'filled in' by motion sensors; most important information is the heading of the vessel. In summary scientific objectives are:

- Research on external influences on the movement of the ships
- Under Keel Clearance – Discover how to predict the under keel clearance and squat dynamically
- GPS Accuracy – Investigate methods for improving GPS accuracy and how to deal with GPS blackouts (by using Motion Sensor Technology).

Technological objectives

A portable system combining GPS receivers and motion sensors to show a vessel's position, speed and bearing more accurately than current commercial offerings;

Software to display Electronic Charts, combined with Automatic Identification System data and predicted UKC and squat.

Improve safety during port entry as well as navigation through narrow straits and waters, by new advances in real time ship movement forecasting enabling a 10% improvement in throughput at lower tides. The key areas are:

1. Accurately predict the vessels course for at least 5 minutes ahead in real time through the development of innovative predictive forecasting software and accurate sensor measurement of ship dynamics and external variables such as wind, tide, squat, water salinity and temperature, influencing the vessels movement. By using real time variables that

effect trajectory you can predict future trajectory and compensate/adjust in real time so that vessel keeps to its planned course.

2. Determine and provide automatic adjustment of position and speed to ship navigation system.

3. Increase under keel clearance (UKC) accuracy from 50 cm to 10 cm, enabling more ships to pass through the channel limited ports during tide, due to the increase in the port access window. This will be achieved by enhancing the state of the art on Real-Time Kinetic GPS calculations giving greater accuracy of position combined with accurate port maps to enable the relationship between the bottom of the ship and the bottom of the channel to be known to better than 10cm (4inches) in real-time.

4. As satellite signals are sometimes lost due to satellite movement (drop outs) or susceptible to malicious disablement due to jamming / blocking, the project will develop a new movement sensor or combination of existing types of sensor to provide increase accuracy of movement at slow speeds, to supplement GPS information in case of a GPS system failure during port entry or navigation.

1.2 Summary of Recommendations from Previous Reviews

Recommendations from the 1st Reporting Period were:

- Mapping software partner Luciad left the consortium in the beginning of the project due to poor understanding of the project concept and organisational reasons. The recommendation was to replace this partner with another mapping software partner.

We have identified and invited Navicon, the mapping and ECDIS systems experts in the consortium in the second reporting Period. Navicon integrated to the consortium very fast and delivered excellent results.

1.3 Summary of Project Objectives & Major Achievements for Reporting Period 2

The specific objectives for the project are summarised on the table below:

Deliverable No[1]	Deliverable title	Delivery Date[2]	% Complete
D1.1	Mathematical model of the external influences on the movement of ships.	Month 7	100% Complete
D1.2	Mathematical model of dynamic UKC and Squat.	Month 7	100% Complete
D1.3	A report describing a strategy for redesigning one, or more, of the antennae in OPTIPORT, or improving the shielding to maximise signal strength and minimise interference and electrical noise.	Month 7	100% Complete
D1.4	Report on the results of research into GPS accuracy.	Month 7	100% Complete
D2.1	Produce software specification for ECDIS software including a description of the interfaces between the mathematical models output from WP1 and the ECDIS kernel.	Month 12	100% Complete
D2.2	Developed ECDIS software.	Month 12	100% Complete
D2.3	Software test results report.	Month 12	100% Complete
D3.1	Design for improved antennae and shielding.	Month 16	100% Complete
D3.2	Improved antennae and shielding to maximise reception and minimise noise.	Month 16	100% Complete
D4.1	Microprocessor module	Month 16	100% Complete
D4.2	GPS module	Month 16	100% Complete
D4.3	WLAN Module	Month 16	100% Complete
D4.4	Motion Sensor	Month 16	100% Complete

[1] Deliverable numbers in order of delivery dates: D1 – Dn

[2] Month in which the deliverables will be available. Month 0 marking the start of the project, and all delivery dates being relative to this start date.

D4.5	Production of prototype casing	Month 16	100% Complete
D5.1	An assembled prototype OPTIPORT system	Month 21	100% Complete
D5.1.1	Report on the integrated OPTIPORT system	Month 21	100% Complete
D5.2	Report on the bench testing of the prototype OPTIPORT system	Month 21	100% Complete
D5.3	Report on sea trials	Month 21	100% Complete
D5.4	End user evaluation report	Month 21	100% Complete
D6.1	Report on potentially competitive patents and a plan for patent application(s) if required with exploitation agreements between the partners.	Month 24	100% Complete
D6.2	Support material for transfer of the knowledge to the partners through case studies and a generic design guide.	Month 24	100% Complete
D6.3	Two papers presented at conferences and major exhibitions and production of two publications in the form of editorials, technical papers and trade press.	Month 24	100% Complete
D6.4	Report on the standards, ethical and regulatory aspects of the exploitation of the results	Month 24	100% Complete
D6.5	Over 20 European ports and Pilot organisations contacted directly to promote the project results	Month 24	100% Complete
D6.6	Public Project Website	Month 3	100% Complete
D6.7	Publishable Project Summary Report	Month 28	100% Complete
D7.1	Dissemination and Use Plan (DUP)	Month 28	100% Complete
D7.2	Delivery of six month progress reports, mid term review report and final report. Submission of the cost statements at mid term and end of projects. Organise kick-off, mid term and final meetings.	Month 6,12, 28	100% Complete
D7.3	Provision of audit certificates and bank guarantees and amended consortium agreement (if applicable)	Month 28	100% Complete
D7.4	Report on gender, societal and ethical issues of exploitation	Month 28	100% Complete
D7.5	Consortium Agreement	Month 1, 12, 28	100% Complete

1.4 Issues during the Project Reporting Period

There were two main issues in during this period:

1. The consortium has asked for a budget change and updated the DOW document in confirmation with EC to reflect changes on some of the work packages. The coordinator Marimatech has been given more responsibility to do Motion Sensor technology tasks.

2. The consortium asked for a 4 month project extension from the commission.

Reasons for Extension Request were:

- Luciad and Gram & Juhl left the consortium in the beginning of the project. This was due to poor understanding of the project concept and organisational reasons. Luciad, the map software experts, also left the consortium in July 2006 as their organizational aims are changed in time. This led the consortium search for new project partners and created delays in the work packages

- Changes in the electronic device technologies led the research partners to use more efficient and faster electronic products. Re-design of the circuit boards and electronic device interfaces created delays for the design team

- The consortium agreed that, a more complex and specialised moulding needs to be created so that the Optiport device can cope with salty water, rain, and harsh conditions such as extreme cold and warm weather. The new moulding created slight delays in the project

- The software system was made more robust than the originally planned with Extended Kalman Filter for better accuracy in the device.

- The most suitable time for testing of the Optiport system is between November-December due to atmospheric conditions and tides. The consortium performed extra tests during these months.

Apart from the issues above, there are no other major issues to report in the second reporting period.

2.0 WORK PACKAGE PROGRESS REVIEW FOR FINAL PROJECT

2.1 Work Package Objectives

The specific work package objectives for the full duration of the project are summarised in the table below:

Planned: PL

Actual: AC

Work-package No.	Workpackage title	Lead Contractor Short Name	Person-months	Start Month	End Month	Deliverable No.
1	New Scientific Knowledge	MT	PL: 17.3 AC: 16.44	1	7	D1.1-D1.4
2	Software Development	NAV	PL: 27.90 AC: 27.89	7	12	D2.1-D2.3
3	Develop Antennae and Shielding to Minimise RFI	RCD	PL: 17.70 AC: 9.00	7	16	D3.1-3.2
4	Hardware Evaluation	TP	PL: 16.20 AC: 18.65	7	16	D4.1-D4.5
5	Technology Integration & Validation	SN	PL: 31.60 AC: 39.55	16	21	D5.1-D5.4
6	Innovation Related Activities	MT	PL: 13.90 AC: 13.28	10	28	D6.1-D6.5
7	Consortium Management	MT	PL: 3.8 AC: 4.95	1	28	D7.1-D7.4

2.2. Overview of Work Package Technical Progress

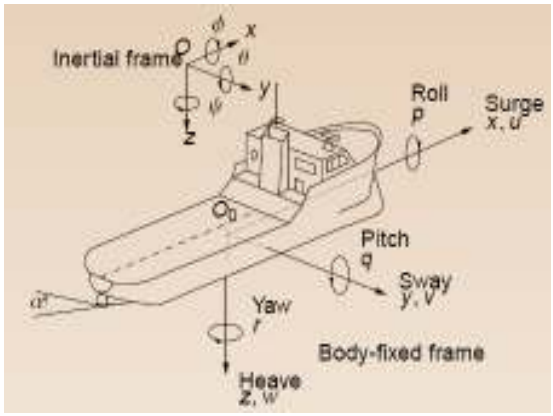
Work Package 1 – New Scientific Knowledge

Task 1.1 – Modelling of Vessel Movement Prediction

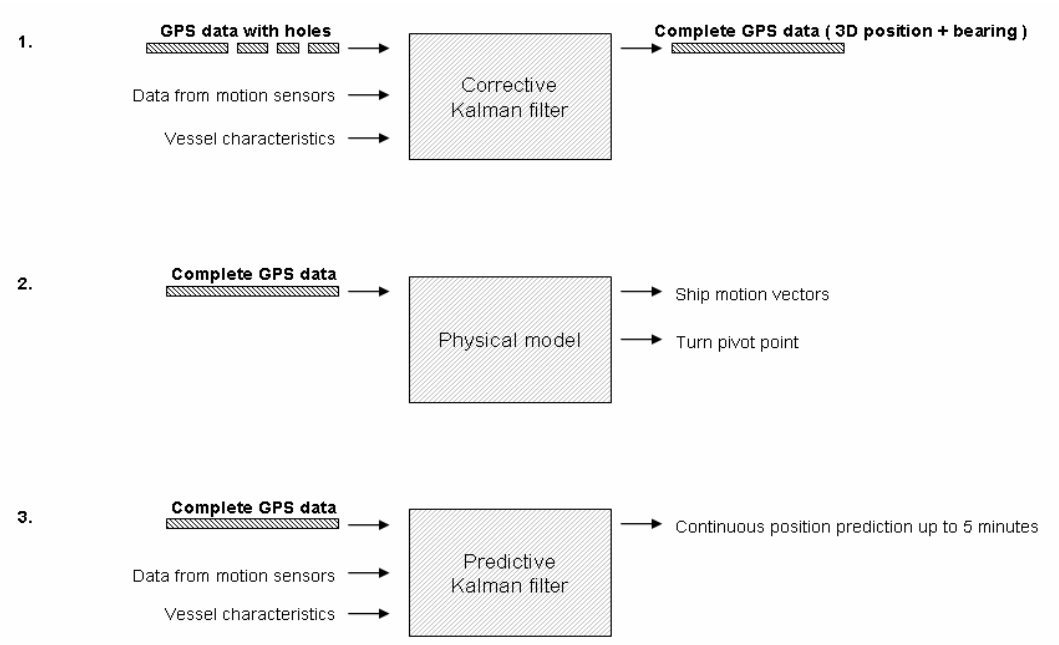
Objectives:

To develop an in-depth understanding of the prediction of vessel movement.

Progress:



Marimatech, RCD, NavData, Terpesa, Pera & TI took part in this task and have researched Mathematical model of the movements of the ships successfully and developed a Kalman Filter to be able to help us to correct and predict the heading of the ship. This task is completed successfully and it has been used in the other work packages & tasks as an effective tool. The design can be shown as below:



Deliverable Status (D1):

Deliverable is 100% complete.

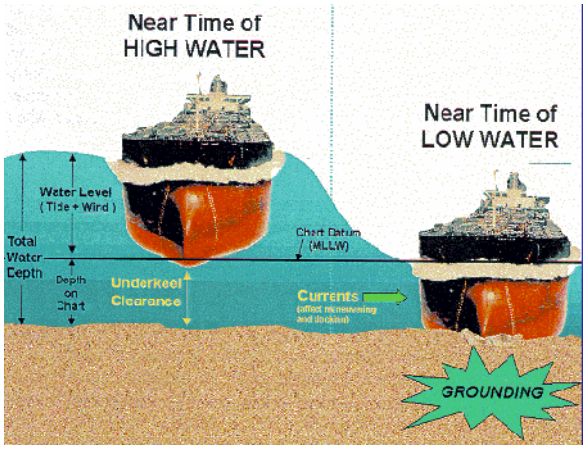
Task 1.2 – Modelling of Under Keel Clearance

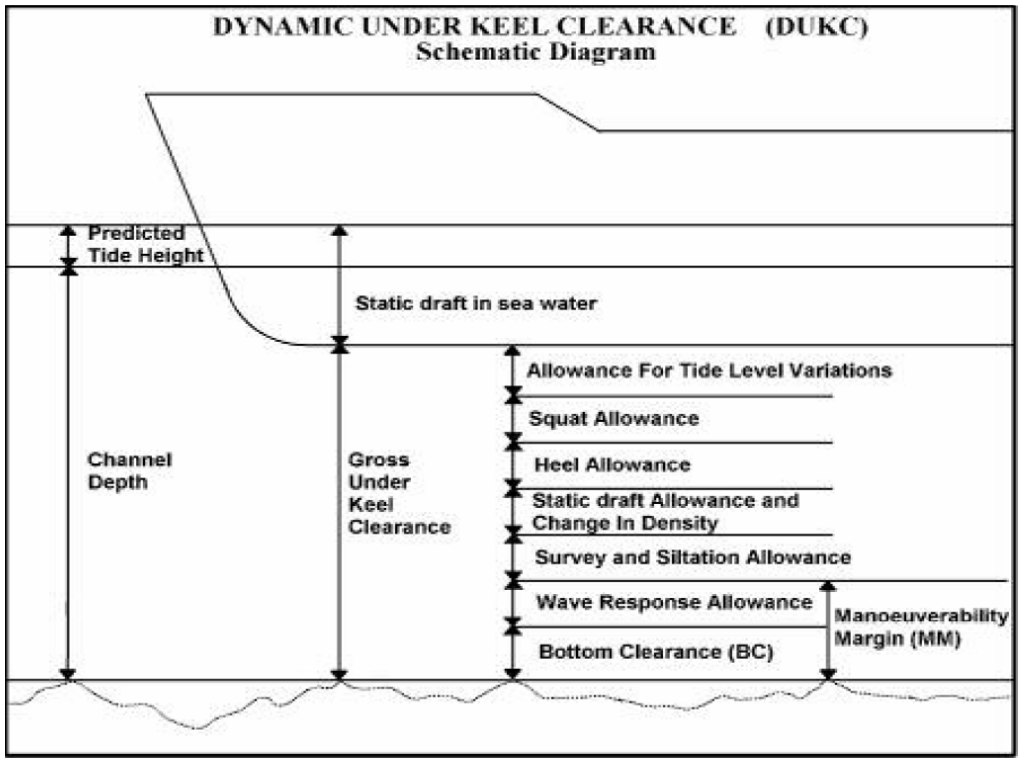
Objectives:

To develop an in-depth understanding of the calculation of under clearance including the calculation of squat.

Progress:

In this task, we have researched mathematical model of Dynamic UKC and Squat. We have looked at the traditional UKC and compared it to modern dynamic systems. Marimatech and Pera have also decided on the application interface and how we are going to model DUKC. The task has been completed successfully and the results were used in the other work packages and tasks. DUKC design can be seen as below:





Deliverable Status (D1.2):

Deliverable is 100% complete.

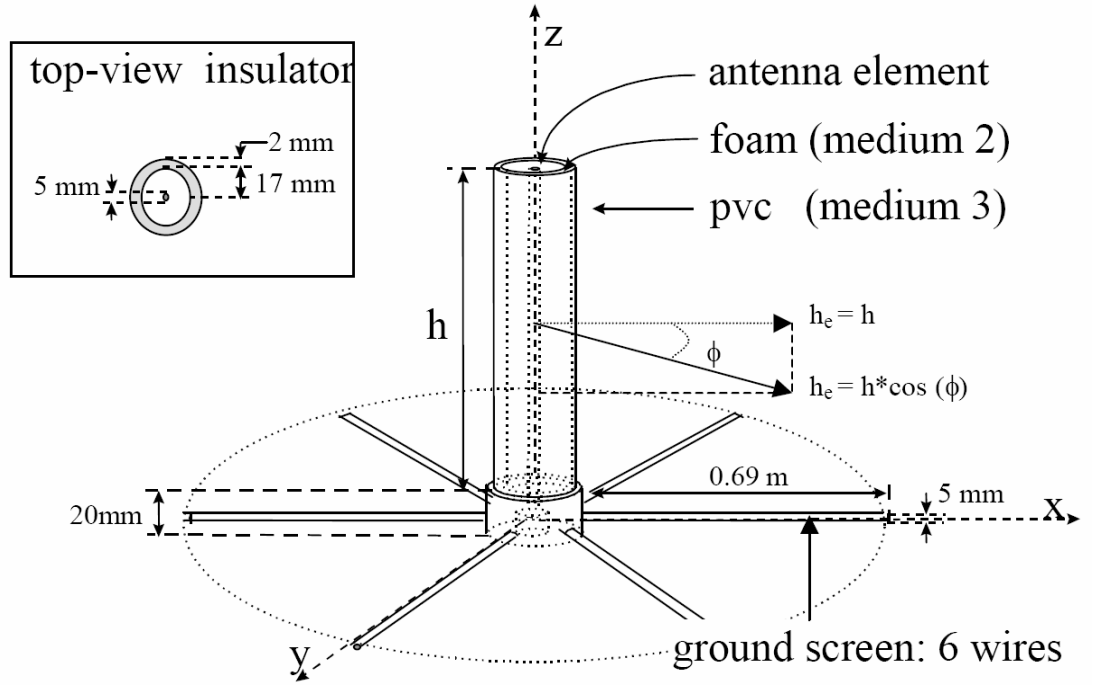
Task 1.3 – Investigation of methods for minimizing Radio Frequency Interference

Objectives:

To gain an understanding of how to minimise RFI between the components in a system containing a microprocessor together with GPS, wireless LAN and VHF radio receivers and transmitters

Progress:

From our research we have concluded that, miniaturisation of the VHF antenna is likely to significantly reduce the antenna efficiency and make the antenna radiation pattern more directive. Current antennas used are half wavelength dipole antennas which eliminate the need for a ground plane. A shorter quarter wavelength monopole with ground plane could be considered for this application. The task was completed successfully and the results were used in the other work packages and tasks. Marimatech, RCD & TI have conducted the research and decided on the antennae design method below:



Deliverable Status (D1.3):

Deliverable is 100% complete.

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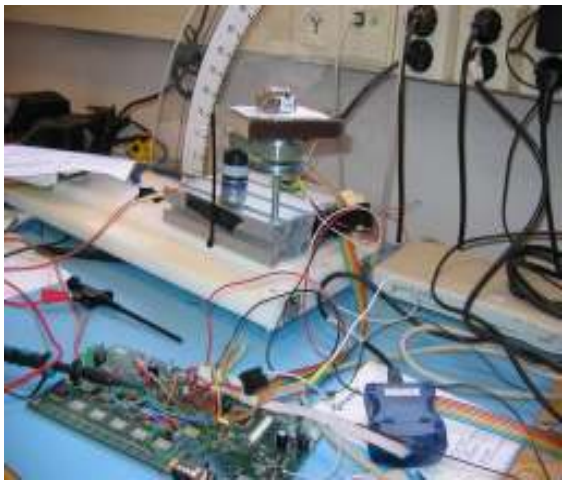
Task 1.4 – Investigate methods for improving GPS accuracy

Objectives:

To investigate alternative methods for improving GPS accuracy and to provide a fallback for periods of GPS drop-outs

Progress:



One of the key technical challenges in the OptiPort project is the design of an extremely accurate motion sensor unit that in combination with GPS receivers will be able determine a vessel's position with an accuracy better than 10 centimetre and with a high rate of availability. In order to achieve this target, investigations on methods & how to improve GPS accuracy and to provide a fallback solution for periods of GPS 'drop out' have been done. A motion sensor unit has been developed and tests have been carried out in laboratory and in the field, onboard a vessel. We have successfully managed to show that missing heading information less than 1 minute, caused by for instance GPS dropouts, can be filled in with required accuracy by integrating the gyro sensor, CRS03-02, to a microcontroller system, to perform the heading calculations and passing the heading information to a logging system. In order to even improve the accuracy it is recommended that analogue low pass filtering is done before the senor signal is read by the microcontroller, this in order to minimize the noise. An increase of the gyro signal sample rate from 10 times/second, used in the tests, to for instance 50-100 times/second, will improve the heading accuracy even more. The field test results from the test of the accelerometer, ADIS16201, did not show sufficient results. Both the pitch and especially the roll angle were too noisy. Longer filter times and/or mounting the sensor on a soft underlay to reduce the pick up of vibrations generated by the vessel might be a possible solution. Further investigations on this and to select a commercial supplier for the sensor system has been carried out during the work in task 4.3.

TI and Navdata also concluded that a motion sensor system can not replace the need for a RTK (Real-Time Kinetic) system. If centimetre position accuracy is desired an RTK system must be used.

Deliverable Status (D1.4):

Deliverable is 100% complete.

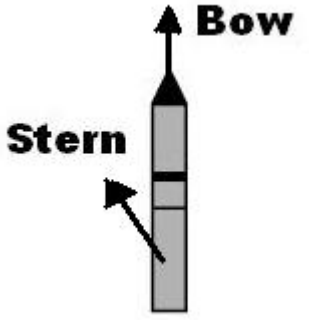
Work Package 2 – Software Development

Task 2.1 – Produce software specification for ECDIS software including a description of the interfaces between the mathematical models output from WP1 and the ECDIS kernel

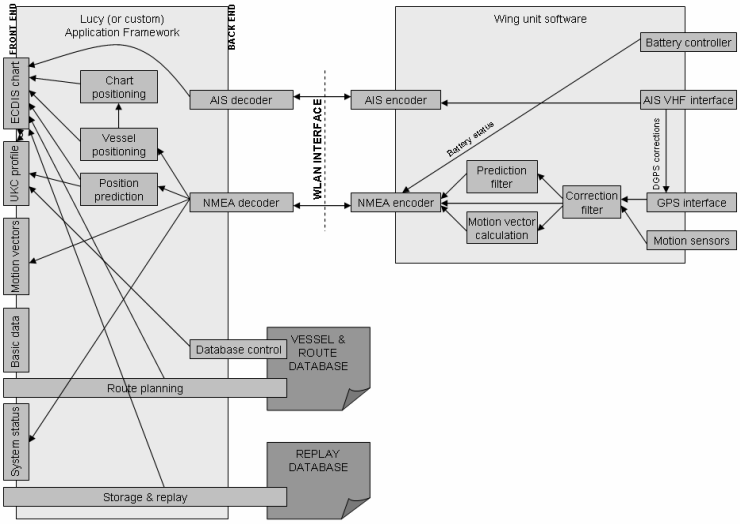
Objectives:

To specify improvements, which will provide the map display software component for the Optiport system which meets all of the project objectives

Progress:



Pera have designed the specifications for a modular software system with an easy-to-use graphical user interface (GUI), a communication system which is capable of communicating with the "Wing Unit". Navdata helped to draw out all possible user scenarios and the design is verified and agreed by Marimatech and other project partners including the end users. ECDIS Kernel and WP1 interface can be demonstrated as below:



Deliverable Status (D2.1):

Deliverable is 100% complete.

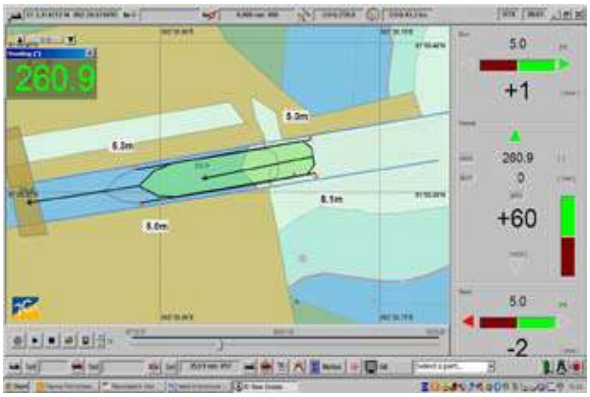
Task 2.2 – Develop ECDIS Software

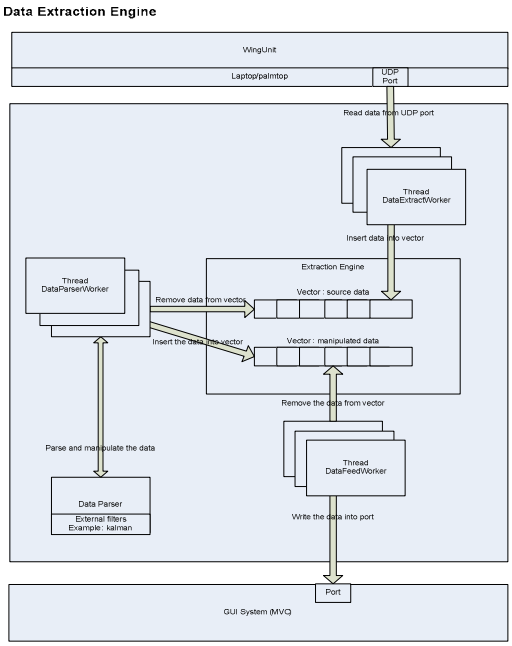
Objectives:

To develop a robust Optiport Software Kernel which will be embedded in the final Optiport prototype system.

Progress:

Software development has been completed by Pera, Marimatech and Navdata. We have followed a moduar software design and completed all software modules. We also built a wireless bridge (WiFi) between software and hardware (Wing Unit & Software). The wing unit is a hardware system installed on the vessel to feed source data to software system. The data will be written into a UDP port by wing unit for the software system to read. The data access layer was developed as an API for other components to interact with the database. This component is using the latest connecters to be able to gain speed when the system is working on real-time mode. Extraction engine was developed as a standalone application runs on a separate JVM. This application is used to spawn dispatcher threads to wait for the data to read from an UDP and data feed threads to pass data across the different components. The below diagram will describe how each classes interacts with each to extract and feed the data:





Deliverable Status (D2.2):

Deliverable Report is 100% complete.

Task 2.3 – Test ECDIS Software

Objectives:

To fully test the Optiport Kernel software produced in the previous task.

Progress:

Optiport Software is a modular design and every module has been tested after the completion of each module. We have created testing guidelines and we have tested each and every software module accordingly. We have used "The Equivalence Partitioning Technique" which is a test case selection technique in which the test designer examines the entire input space defined for the unit under test and seeks to find sets of input that are, or should be, processed identically. Included in the input space are legal situations that have both syntactic and semantic meaning to the program, and illegal situations that are either syntactically or semantically meaningless to it. These sets of input are equivalence classes. Similarly, in the Boundary Value techniques, the test designer first identified the range of expected inputs(e.g. equivalence classes), then tests the input values inside and outside that range. Pera, Marimatech and Navdata and Navicon has been involved in the actual testing.

During testing, we have identified issues on the following areas:

- Data Base connection pool – the problem was due to irregular inputs sent by the wing unit. The problem is identified and fixed.
- Mission type – An unknown error occurred when we tested the system according to pilot use (when choosing a new mission). This was due to connection problem between the database and the ECDIS system. We have identified the problem and fixed it.
- Several Graphical User Interface (GUI) based errors – These errors were identified during modular testing. All problems was due to Java Beans component definitions. We have fixed all identified errors.

Deliverable Status (D2.3):

Deliverable is 100% complete.

Work Package 3 – Develop Antennae and Shielding to minimize RFI

Task 3.1 – Experiment with Antennae and Shielding Designs to Minimize RFI

Objectives:

To produce an agreed design for the antennae and shielding which will significantly reduce RFI from present levels

Progress:

RCD have used the research techniques identified in WP and created the design for the improved antennae and shielding. Marimatech and Pera worked very closely with RCD to synchronise both Wing Unit design and Antennae design so that OPTIPORT product prototype could be designed without a technical glitch. RCD used their laboratories to experiment with 4 different types of shielding and tested the results to find the optimum design. They also designed the antenna's connector section. The consortium decided that the connector needed to be a flexible design so that the user could attach and disband the antennae easily. RCD developed two different connectors and tested them both to find the optimum connector easy to use and at the same time minimize the RFI. Like other hardware components, the consortium made sure all activities met the quality requirements of ISO 9001:2001 and the international standards required for particular module.

Deliverable Status (D3.1):

Deliverable is 100% complete.

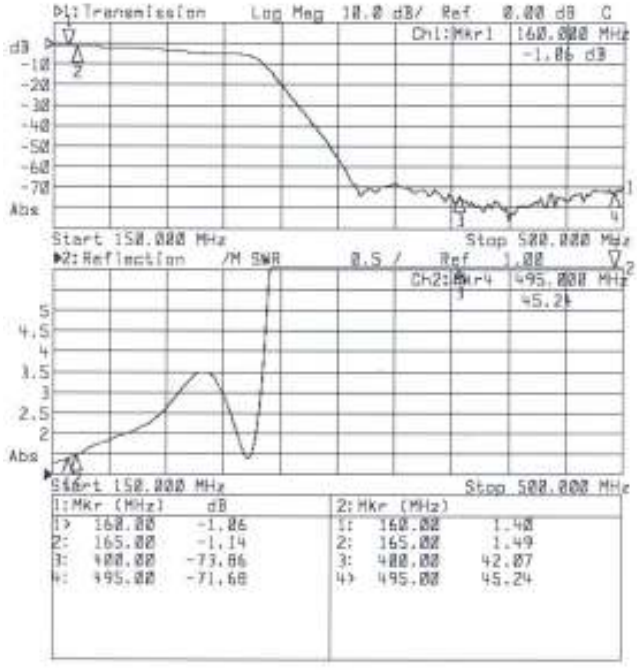
Task 3.2 – Production of prototype Antennae and Shielding

Objectives:

To produce a prototype Antennae and Shielding

Progress:

The antenna, antenna filter design and the diplexer module including the shielding, developed in work package 3 by the project partner "Radiokomunikace Spol" (RCD), were supplied and mounted on the CAT unit. The common antenna is designed to operate in UHF band 400 MHz to 495 MHz as a primary function. The antenna is also able to receive VHF/AIS signals 161.975 MHz and 162.025 MHz respectively. The RF power of UHF transmitter is designed to be 5W. The pictures are showing the finalised and prototyped antenna and the connector. Frequency sweep of the designed antennae can be shown as below:



Deliverable Status (D3.2):

Deliverable is 100% complete.

Work Package 4 – Hardware Evaluation

Task 4.1 – Evaluate GPS Modules

Objectives:

To select a GPS module for inclusion in the prototype OPTIPORT system

Progress:

In selection of GPS-receivers for OptiPort system there are especially three important features needed to be considered:

- High accuracy
- Low power consumption
- Small size

The co-ordinator company Marimatech in co-operation with the project partner Navdata has taken an active roll in this task. With theirs long experience and expertise within this field they have come up with two GPS-receivers which can be relevant for accurate position and heading determination of a vessel. The first one is a brand new GPS-receiver chip TRIUMPH G3T supplied by Javad the other one is the GPS-receiver BD950 supplied by Trimble. Both GPS receivers were thoroughly tested. We found out that the GPS-receiver supplied by Javad is the most suitable and therefore was selected for further testing and evaluation. The main reasons were the extreme accuracy of the GPS-receiver, the high level of availability since it can track all existing satellites, the low power consumption and small size.

Deliverable Status (D4.1):

Deliverable is 100% complete.

Task 4.2 – Evaluate Wireless Local Area Network (WLAN) Modules

Objectives:

To select a WLAN module for inclusion in the prototype OPTIPORT system.

Progress:

There are many Wi-Fi modules on the market today and in this task, we decided to have a look at the most suitable three Wi-Fi modules for evaluation. These modules are chosen because they are suitable for integration into a embedded system. We decided that the Wi-Fi module shall be compact, robust and have a serial interface, RS232 or TTL level, which allows an easy integration to a microprocessor application (plug and play). It also had to support the standard 802.11b. TI have tested different devices such as: Connect WiMe, WISMC01 and Matchport. The Wi-Me module offered good processor power, which can be used in the project for implementation of the run-time consuming Kalman-filter. The physical dimension of the module is well suitable. Since the project coordinator Marimatech is also well experienced with Digi products, which is an advantage for future development work and product administration, it was decided to select the Wi-Fi module Wi-Me supplied by Digi. The integration and test of the selected WiFi module are to be carried out in the work packages 4.3, 4.4 and 5.1.

Deliverable Status (D4.2):

Deliverable is 100% complete.

Task 4.3 – Evaluate Motion Sensors

Objectives:

To select a motion sensor / accelerometer for inclusion in the prototype Optiport system.

Progress:

Navdata, TI & Pera have compared 6 different motion sensors to find the most suitable sensor to be used in Optiport product. After multiple tests, we concluded that the calculation of heading, based on data generated by the gyro sensor CRS03-02, is accurate enough to fill in period of GPS dropouts. Several tests, onboard vessels, verify that the accuracy of the system can be kept even if the GPS data drops out for several seconds. The implementation of the gyro low-pass filter in combination with higher sample rate showed improved results regarding noise. The successful implementation, described in this work package, will be kept as it is and will be used for further integration to a final solution

The implemented calculation of roll and pitch angles, based on the 3-axis accelerometer 2420, showed very accurate results during static conditions. Due to the fact that the accelerometer was strong influenced by the dynamic movements of a vessel, accurate results could not been achieved during these movements. If the accelerometer was placed in roll and pitch centre of the vessel, the dynamic forces would be reduced and improvement in accuracy might have been achieved. Since the OptiPort system is a portable system and not permanent installed, the sensor installation at the vessel's roll and pitch centre is not a solution in praxis. The conclusion of this work was that dynamic roll and pitch measurements based on a single 3-axis accelerometer not can be used. To achieve sufficient accuracy a high precision inertial measurement unit (IMU), based on accelerometers and gyros in 3 dimensions, must be used. IMUs are supplied by several commercially manufactures like: Crossbows, iMAR etc. Since the price for a high precision IMU starts at several 10 000 Euros and many OptiPort system customers do not need this feature, a more reasonable solution is to make the OptiPort system's HW configurable for interfacing a standalone IMU.

Deliverable Status (D4.3):

Deliverable is 100% complete.

Task 4.4 – Evaluation of Microprocessor Modules

Objectives:

To select and/or customise a microprocessor for inclusion in the prototype OPTIPORT system.

Progress:

The microprocessor is used to calculate the heading, based on a gyro, roll and pitch angles based on accelerometer. It receives GPS data from the two GPS receivers for positioning and heading determination. It managed the battery capacity monitoring and also the wireless (Wi-Fi) communication to the OptiPort display unit. The control unit shall have available serial interfaces for connection of AIS and RTK receivers and digital I/Os for displaying status of battery etc. The control system shall be robust, low power consuming, future proof and cost-effective.

The requirements outlined by Marimatech and TI above were used as starting-point for selection of a control unit. In this work package we have selected the most appropriated processor, 8-bit RISC based microcontroller from ATMEL, ATmega2560. The main reasons for this selection were: Low power consumption, small size, future proof design and a cost effective solution. The AVRlib also offers open source code libraries, which decreases the development phase. The microcontroller SW can be written in C-language, which easily can be ported to other platforms. We have ensured by integration of the microcontroller in a full scale prototype that it can handle all the specified tasks. The controller SW has successfully been designed and implemented. Tests performed, in laboratory and on field (WP4.3) with the prototyped system underlines that the performance of the designed controller system gives a robust and sufficient controller unit solution for the OptiPort system.

Deliverable Status (D4.4):

Deliverable is 100% complete.

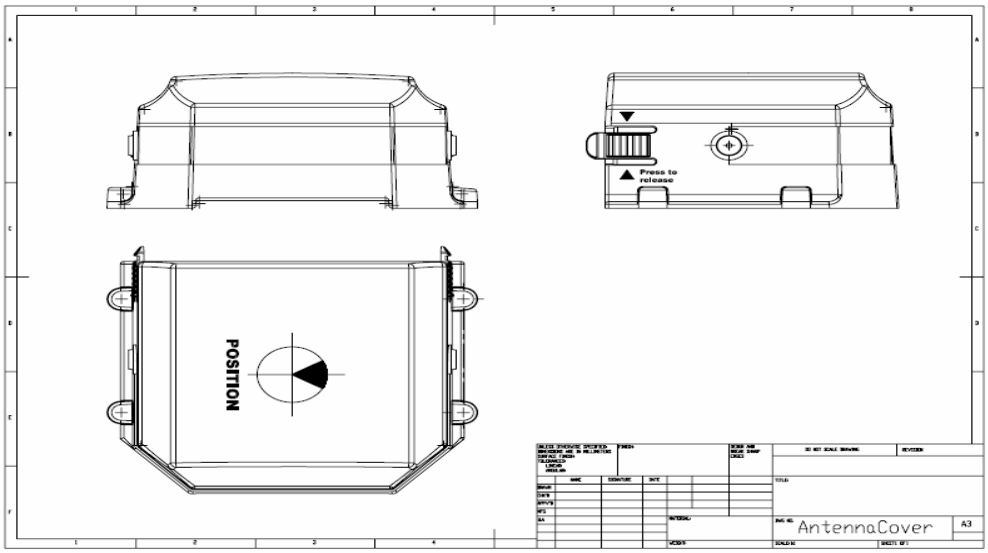
Task 4.5 – Production of Prototype Casing

Objectives:

To produce a prototype packaging which will house all Optiport components.

Progress:

The case design work carried out in the work package 4, by the coordinator company Marimatech and the Spanish partner Terpesa in close cooperation. Both casings for the CAT and the carrying case (used for transporting the complete optiport system) were designed and prototyped. The designs were done by using the CAD tool Solid Works.



Silicon moulds have been used and PU is used as the material. For serial manufacturing, polypropylene with steel moulds will be used.

Deliverable Status (D4.5):

Deliverable is 100% complete.

Work Package 5 – Technology Integration and Validation

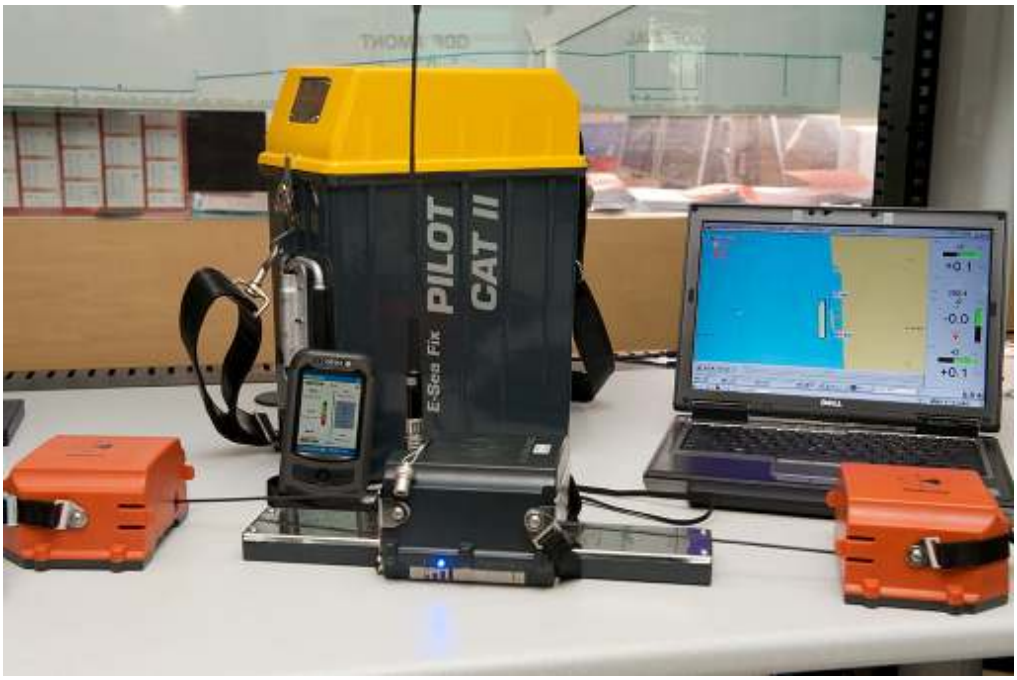
Task 5.1 & 5.1.1 – Integration to produce prototype OPTIPORT system

Objectives:

To produce a prototype Optiport System

Progress:

All the developed sub-components have been successfully integrated to a complete port pilot system. All partners have taken an active interest on this task. A complete redesign of the electronic control board, bug corrections and added functionality, were carried out by TI and Navdata. New schematics and layout have been produced. The new control board was assembled and all the components of the board were mounted. The new special designed antenna, diplexer module and the antenna connector were produced and assembled by RCD. The case designs for the electronic control board and for transportation of the system have been produced and assembled by Terpesa.



Task 5.1 can be concluded that all the required system components for a complete OptiPort system have been developed, integrated and prototyped.

Deliverable Status (D5.1 & 5.1.1):

Both deliverables are 100% complete.

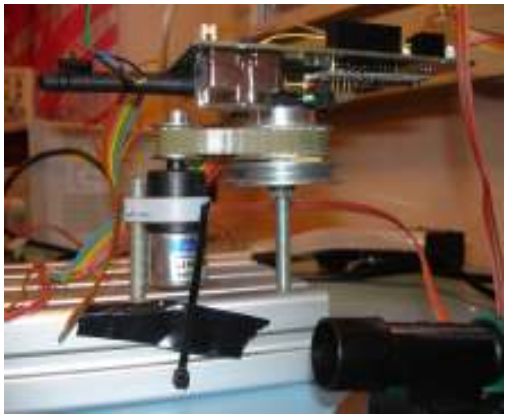
Task 5.2 – Bench testing of the prototype system

Objectives:

To demonstrate that the prototype OPTIPORT system functions as per design.

Progress:

The bench testing in the laboratory of the OptiPort system has successfully been completed by TI, RCD, Marimatech and Pera. No defects or errors have been found during the tests. The measured voltages and the ripple were well in specified ranges. The gyro rate filter as well as the lithium charger circuitry were working as expect. The functional tests of the system did also perform according to specified working criteria. After the bench testing of the prototyped system was finalised, Marimatech has started the preproduction trails. Lab tests and the heat chamber tests can be seen below:



Deliverable Status (D5.2):

Deliverable is 100% complete.

Task 5.3 – Pre-Production Trials

Objectives:

To carry out pre-production trials

Progress:

The prototyped system has been subject for several trials under real conditions. The results from the trails showed on excellent performance. There is still a room for further improvements which might increase the accuracy even further. Another issue that also is relevant is to implement the Kalman filter onboard the CAT unit. This will have the advantage that the data flow to the Kalmann filter will be consistent even if the wireless link (WiFi), to the bridge computer, drops out.

Ferry: Maren Mols was used in the pre-production trials

A comparison to a relevant competitors showed that the performance of the developed OptiPort system is absolutely in the top region. As an example in this report the high end system from Navicom Dynamics was compared. It shows that the OptiPort system has much better performance in heading, ROT (Rate Of Turn) and Position accuracy.

The conclusion is that the developed system, even without the proposed improvements, performed very well and was meeting the required level of accuracy.
Pera, Marimatech, Port St. Nazaire and TI were involved in the sea-trials.

Deliverable Status (D5.3):

Deliverable is 100% complete.

Task 5.4 – End User Evaluation

Objectives:

To collate all information from the pre-production trials and establish the overall performance of the OPTIPORT system to enable a successful commercial version to be produced.

Progress:

Port St. Nazaire is the end user in Optiport project and End User Evaluation took place in Port St. Nazaire, France in November 2008. They have actively joined in the sea-trials in their Port and tested the system first hand. Port St.Nazaire were very involved in the project from the start to end and has been very influential during the project. The consortium decided to present the evaluation report as a questionnaire form to identify the strong and weak points.

Port St Nazaire said that the results were simply astonishing. The end user mentioned that OPTIPORT system exceeded their expectations and they were very happy with the overall product. They commented on some potential improvements and Marimatech will work on those improvements when they start serial production.

Deliverable Status (D5.4):

Deliverable is 100% complete.

Work Package 6 Innovation Related Activities

Task 6.1 – Protection of IPR

Objectives:

To ensure that all project results are formulated and compiled into a protectable form and all necessary patents are made.

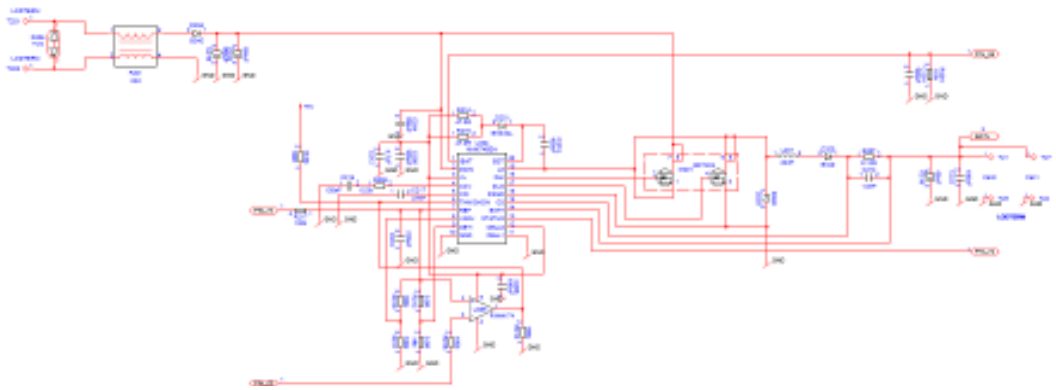
Progress:

All current and pending patents are identified by Pera. Possible Patentable technologies are identified by the project consortium. A patent agent has been identified and interviewed to ascertain their suitability to progress IPR protection. A secondary meeting will take place between Marimatech and the agents to discuss if the potential patentable ideas can be protected.

Two patentable ideas emerged during the project. These are:

- Research into methods for combining GPS and motion sensors in a compact low powered portable unit have produced patentable results.

- The research into RF Shielding and improved antennae have produced patentable results that could be applicable to other electronic devices which contain receivers and transmitters, especially where these are operating on different frequencies. The results may also be applicable to other equipment that contains a wireless device in close proximity to computing, or other electronic components.



Deliverable Status (D6.1):

Deliverable is 100% complete.

Task 6.2 – Absorption of results by proposer

Objectives:

To transfer specific knowledge from the RTD performers to the SME participants to enable them to rapidly apply and embed the technology onto specific products.

Progress:

All the internal reports with hardware evaluation and software codes are distributed to the consortium partners. TI & Pera have also developed a generic design guide to be distributed to industrial partners. In this way, the knowledge will be transferred from researchers to Industrial partners.

Deliverable Status (D6.2):

Deliverable is 100% complete.

Task 6.3 – Dissemination of Knowledge

Objectives:

To broadcast the benefits of the developed technology and knowledge beyond the consortium to potential industrial user communities.

Progress:

Dissemination of information was completed and has been very well received by the industry and public alike, the first event being the Sea Work Exhibition on June 2008 (Southampton, UK). It was here that a consortium member presented to an audience of approx. 200 professional, in a full programme of technical seminars with Optiport being one of them.

Publications in leading trade journals have been made by the coordinator and other consortium members.

Events Attended:

Seawork International, Southampton, UK – June 2008

Seawork International is the biggest and fastest growing business to business event for the commercial marine and workboat sectors in Europe, attracting more than 6000 high calibre visitors from 40 countries across the globe. It is a one-stop forum where buyers, sellers, innovators and legislators come together for three days. Optiport

partners attended to this event and disseminated and distributed Optiport (E-Sea Fix) catalogue which talked about the end-product at the end of the project.

Talara, Port of Talara, Chile – July 2008

Marimatech visited Port of Talara to talk about Optiport project, project results so far and the expectations on the end-product.

American Pilot Associations Biennial Convention 2008, Hawaii

The American Pilots' Association is the national trade association of professional maritime pilots. Its membership is made up of approximately 60 groups of state-licensed pilots, representing virtually all the state pilots in the country, as well as the three groups of United States-registered pilots operating in the Great Lakes. APA members pilot over 95 percent of all ocean-going vessels moving in United States waters. Optiport project was introduced to the Pilots and Associate members.

Deliverable Status (D6.3):

Deliverable is 100% complete.

Task 6.4 – Socio-economic Aspects

Objectives:

To assess the socio-economic impact of the generated knowledge and technology

Progress:

The system specification outlines the European and International standards that the Optiport product should comply with. All product modules are designed in compliance with EU and Internatioanl regulations and standards.

Deliverable Status (D6.4):

Deliverable 6.4 is 100% complete.

Task 6.5 – Directly Promote Project Results to over 20 European ports and Pilot Organisations

Objectives:

To create spin-offs from the participant organisations and promote the broad application of the results by organisations outside of the consortium.

Progress:

The project coordinator Marimatech has established links with Pilot Organisations. They have promoted Optiport product to more than 100 pilots and organisations in the annual United States Pilot Association International Conference event.

Deliverable Status (D6.5):

Deliverable 6.5 is 100% complete.

Task 6.6 – Public Website

Objectives:

To create a public project website

Progress:

A public website is created at the URL below:
http://optiport.pera.com

The website helps the project partners to share files easily and more effectively. At the end of the project, the website will be also used as a dissemination of knowledge tool.

Deliverable Status (D6.6):

Deliverable is 100% complete.

Work Package 7 – Consortium Management

Task 7.1 – Dissemination and Use Plan

Objectives:

To ensure that the knowledge management process are conceived and implemented in a coherent manner.

Progress:

A dissemination and use plan has been created in the beginning of the project and updated frequently. The plan can be seen at the Annex of this document.

Deliverable Status (D7.1):

Deliverable is 100% complete.

Task 7.2 – Co-ordination of technical activities at a consortium level

Objectives:

To ensure that all aspects of the EC requirements for communication and reporting are met. The co-ordinator will be the sole point of contact between the EC and the partners.

Progress:

We have been in touch with the EC and our monitoring officer at all times. We have prepared and submitted all the required forms, reports and paper-work.

Deliverable Status (D7.2):

Deliverable is 100% complete.

Task 7.3 – Co-ordination of legal aspects

Objectives:

To co-ordinate the overall legal, contractual, financial and administrative management of the consortium

Progress:

A fully signed consortium agreement was maintained throughout the project. All new consortium members acceded to this agreement and the EC contract. Financial management was also performed successfully using a set of spreadsheet tools provided by Pera.

Deliverable Status (D7.3):

Deliverable is 100% complete.

Task 7.4 – Report on Gender, Societal and Ethical Issues

Objectives:

To co-ordinate gender equality, ethical, science and society aspects of the project.

Progress:

The ethical relevance of the project is not applicable, as the research does not involve any testing on animals, humans, plants or any other living species. The project is non-gender specific, the end product is marketed at society as a whole and not specifically at any one section. Social and economic issues are taken into consideration in the research activities of this project and partners are informed about and are aware of the social aspects with regard to scientific and technological progress. The benefits of research in support of socioeconomic policy challenges would be enhanced by the integration of socio-economic research.

A questionnaire will be distributed to each project partner to facilitate the monitoring of the integration of the socio-economic dimensions in FP6 and to finally support the

assessment of the research that will guide the future policy formulations and decisions.

Deliverable Status (D7.4):

Deliverable is 100% complete.

Task 7.5 – Consortium Agreement

Objectives:

To co-ordinate and update the Consortium Agreement

Progress:

A fully signed consortium agreement was maintained throughout the project. All new consortium members acceded to this agreement and the EC contract. Financial management was also performed successfully using a set of spreadsheet tools provided by Pera.

Deliverable Status (D7.5):

Deliverable is 100% complete.

2.3 Deviation From the Plan and Corrective Actions

There are some deviations from the initial project plan as below:

- Gram&Juhl, the motion sensor technology partners left the consortium in the beginning of the project due to organisational problems. The Coordinator, Marimatech have proven expertise in Motion Sensor technology and most of Gram&Juhl's work and budget has been transferred to Marimatech.

- Full prototype testing and sea-trials had to be delayed. The project was extended an additional 4 months (total of 28 months) to be able to complete the sea-trials and dissemination activities.

2.4 Work Package Deliverables Update

Del. No.	Deliverable Name	WP No	Lead Participant	Estimated Persons Days	Nature	Delivery Date	Completed
1.1	Mathematical model of the external influences on the movements of ships	1	Pera	61	R,O	7	100 %
1.2	Mathematical model of dynamic UKC and Squat	1	Pera	67	R,O	7	100 %
1.3	Improving the shielding to maximise signal strength and minimise interference	1	Pera	63	R	7	100 %
1.4	Report on the results of research into GPS accuracy	1	Nav	103	R	7	100 %
2.1	Produce Software Specifications for ECDIS Software	2	Pera	49	R	12	100 %
2.2	Develop ECDIS Software	2	Pera	110	0	12	100 %
2.3	Software Test Results	2	Pera	177	R	12	100 %
3.1	Experiment with Antennae and Shielding Designs to Minimise RFI	3	RCD	70	P	16	100 %
3.2	Microprocessor module	3	RCD	77	P	16	100 %
4.1	Evaluate GPS module	4	NAV	68	P		100 %
4.2	Evaluate Wireless Local Area (WLAN) module	4	TI	34	P	16	100 %
4.3	Evaluate Motion Sensors	4	TI	84	P	16	100 %
4.4	Evoluation of Microprocessor Modules	4	TI	36	P	16	100 %
4.5	Make a prototype of unit packaging	4	TP	92	R	21	100 %
5.1	Integration to produce prototype OPTIPORT system	5	TI	169	R	21	100 %
5.2	Report on the bench testing of the prototype OPTIPORT system	5	TI	147	R	21	100 %
5.3	Report on sea trials	5	SN	99	R	21	100 %
5.4	End user evaluation report	5	SN	110	R	21	100 %
6.1	Report on potentially competitive patents and a plan for patent app.	6	MT	17	R	28	100 %
6.2	Support material for transfer of the knowledge	6	MT	97	R	28	100 %

6.3	Two papers presented at conferences	6	TP	42	R	21	100 %
6.4	Report on standards, ethical and regulatory aspects of the exploitation of the results	6	Pera	17	R	21	100 %
6.5	Over 20 European ports and Pilot organisations contacted directly for promotion	6	TI	96	R	28	100 %
6.6	Public Project Website	6	Pera	15	R	3	100 %
6.7	Publishable Project Summary Report	6	MT	20	R	28	100 %
7.1	Dissemination and Use Plan (DUP)	7	MT	17	R	28	100 %
7.2	Delivery of Month 6, 12, 28 reports	7	MT	31	R	6,12,28	100 %
7.3	Provision of Audit Certificates and Bank Guarantees	7	MT	10	R	28	100 %
7.4	Report on genderm societal and ethical issues of exploitation	7	MT	10	R	28	100 %
7.5	Consortium Agreement	7	MT	10	R	1,12,28	100 %

2.5 Workpackage Milestones Update

All the planned work from the previous reporting period has been fully completed.

3.0 - CONSORTIUM MANAGEMENT

3.1 Consortium Status Overview

Some changes have been made to the consortium as shown below. We have had a slow but good start to the project with very constructive technical and commercial discussions at the meetings, as described in the minutes, and regular communication has taken place between the Partners. The Partners worked extremely well together, communicating and meeting regularly. In addition to the formal meetings a large number of working party meetings have occurred to discuss the technical aspects of the project.

Partner changes during the project

Partners left the consortium

- Gram & Juhl (Month 3)
- Luciad (Month 11)

New Partners joined the consortium

- Navicon (Month 20)

List of Participants

- Marimatech AS
- Termoplastics Peral, S.A.
- RCD Radiokomunikace Spol S.R.O
- Navdata OY
- Navicon AS
- Port Autonome de Nantes Saint Nazaire
- Pera Innovation Ltd.
- Teknologisk Institutt AS

3.2 Project Timetable & Status

3.2.1 Work Programme (As Updated)

TASK	Task Leader	MONTHS																										
		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
New Scientific **Knowledge**																												
1.1 Modelling of Vessel Movement Prediction	P																											
1.2 Modelling of Under Keel Clearance	P																											
1.3 Methods for minimizing Radio Frequency Interference	P																											
1.4 Methods for improving GPS accuracy	NAV																											
Software Development																												
2.1 Evaluate ECDIS Kernel Software	NAV																											
2.2 Specify improvements to ECDIS	P																											
2.3 Develop ECDIS Software	NAV																											
2.4 Test ECDIS Software	NAV																											
Develop Antennae																												
3.1 Investigation and selection of shielding designs	RCD																											
3.2 Production of prototype shielding	RCD																											

TASK	Task Leader	MONTHS																											
		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
Hardware Evaluation																													
4.1 Evaluate GPS Modules	TI																												
4.2 Evaluate WLAN Modules	TI																												
4.3 Evaluate Motion Sensors	MT																												
4.4 Evaluate Microprocessor modules	TI																												
4.5 Produce prototype of unit packaging	WI																												
Technology Integration and Validation																													
5.1 Integration to produce prototype OPTIPORT system	TI																												
5.2 Bench testing of prototype system	TI																												
5.3 Pre-production trials	SN																												
5.4 End user evaluation	SN																												
Innovation-Related Activities																													
6.1 Protection of IPR	MT																												
6.2 Absorption of results by proposers	MT																												
6.3 Dissemination of knowledge	P																												
6.4 Socio-economic aspects	MT																												
6.5 Promotion of exploitation	MT																												

TASK	Task Leader	MONTHS																										
		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Consortium Management																												
7.1 Co-ordination of knowledge	MT																											
7.2 Co-ordination of the technical activities at a consortium level	MT																											
7.3 Co-ordination of the overall legal, contractual, financial and administrative aspects	MT																											
7.4 Co-ordination of the gender equality, ethical and science and society aspects	MT																											

3.2.3 Clarification of Changes to Work Programme

The latest DOW (version 8) was updated and accepted by the project officer. The changes included the 4 month extension, an updated gantt chart and Marimatech's budget is updated (all ShipMotion's budget and work has been transferred to Marimatech).

3.3 Meetings & Communication

There was 21 project review & technical meetings since the start of the project.

Project Review Meetings

	Date	Type of meeting		Location
1	20.09.2006	Kick-off Meeting	Management Meeting	Marimatech, Denmark
2	18.12.2006	Technical / Management	Working Party Meeting	Pera, UK
3	11.01.2007	Technical	Working Party Meeting	Marimatech, Denmark
4	18.01.2007	Technical / Management	Working Party Meeting	Luciad, Belgium
5	07.02.2007	Technical / Training	Technical Meeting	Luciad, Belgium
6	19.04.2007	Technical Meeting	Working Party Meeting	Pera, UK
7	05.07.2007	Technical Meeting	Working Party Meeting	Pera, UK
8	10.08.2007	Technical Meeting	Working Party Meeting	Marimatech, Denmark
9	14.09.2007	Technical / Management	Management Meeting	Luciad, Belgium
10	24/25.09.2007	Month 12 Meeting	Management Meeting	Oxford, UK
11	12.12.2007	Month 15 Meeting	Management Meeting	Marimatech, Denmark
12	20.02.2008	Technical Meeting	Working Party Meeting	RCD, Czech
13	28.02.2008	Technical / Management	Working Party Meeting	Marimatech, Denmark
14	13.03.2008	Month 18 Meeting	Management Meeting	Pera, UK
15	06.05.2008	Technical Meeting	Working Party Meeting	Terpesa, Spain
16	18. 06.2008	Month 21 Meeting	Management Meeting	Marimatech, Denmark
17	04.08. 2008	Technical Meeting	Working Party Meeting	RCD, Czech
18	30.09.2008	Month 24 Meeting	Management Meeting	Marimatech, Denmark
19	24.11.2008	Technical Meeting	Working Party Meeting	Port St. Nazaire, France
20	8.12.2008	Technical Meeting	Working Party Meeting	St. Nazaire, France
21	21.01.2009	Final Project Meeting	Management Meeting	Marimatech, Denmark

All meetings have been characterised by good attendances and open discussion, thus exploring broad views on the direction and content of the technical work. Partners have also carried out technical presentations at these meetings and have brought technical knowledge to the project consortium. This clearly illustrates the positive commitment of the partners.

Between the main management meetings, there were number of working party meetings. These were especially useful to discuss specific workpackages and technical outputs.

3.4 Dissemination Activities

Management of Knowledge and IPR

The partnership has developed an Exploitation Strategy for the management of knowledge, intellectual property and of it's inter-relation with the various innovation-related activities planned. The main innovations in the project have been protected by means of patents and other methods, and by the second post project year it is expected that the technology will be sold or licensed, to other manufacturers across the European Union – to satisfy the demand stipulated by the Commissions policies. When the innovations were protected, the new scientific knowledge created by the project was actively disseminated amongst academic communities and validated. Hence, the full range of scientific, technological and product/process/system specific dissemination activities was enabled without compromising the protection of the foreground IPR.

Disseminations of the Knowledge

The main contribution to scientific knowledge lie in the developments associated with Advance Kalman Filtering & Under Keel Clearance (UKC). Further, through demonstration of the developed system in real-world applications, we will enhance the knowledge base of issues associated with the take-up and acceptance of ICT within the marine sector.

Dissemination of information was completed and has been very well received by the industry and public alike, the first event being the Sea Work Exhibition on June 2008 (Southampton, UK). It was here that a consortium member presented to an audience of approx. 200 professional, in a full programme of technical seminars with Optiport being one of them.

Publications in leading trade journals have been made by the coordinator and other consortium members.

The consortium has already created a publishable project summary report which is suitable for dissemination to the public at large, and that highlights the achievements that have been derived from the development work contained within the project.

The consortium have been provided with a portal website to allow secure document sharing between members and provide a place to maintain discussions on themes and topics of interest to the project. http://optiport.pera.com.

There will be several international conferences and seminars held to promote marine & navigation products and they are being reviewed by the consortium.

It is expected at this stage that any information disseminated on the OPTIPORT project will be general, in order to protect the IPR, but would be able to stimulate the market, and receive feedback.

Events Attended:

Seawork International, Southampton, UK – June 2008

Seawork International is the biggest and fastest growing business to business event for the commercial marine and workboat sectors in Europe, attracting more than 6000 high calibre visitors from 40 countries across the globe. It is a one-stop forum where buyers, sellers, innovators and legislators come together for three days. Optiport partners attended to this event and disseminated and distributed Optiport (E-Sea Fix) catalogue which talked about the end-product at the end of the project.

Talara, Port of Talara, Chile – July 2008

Marimatech visited Port of Talara to talk about Optiport project, project results so far and the expectations on the end-product.

American Pilot Associations Biennial Convention 2008, Hawaii

The American Pilots' Association is the national trade association of professional maritime pilots. Its membership is made up of approximately 60 groups of state-licensed pilots, representing virtually all the state pilots in the country, as well as the three groups of United States-registered pilots operating in the Great Lakes. APA members pilot over 95 percent of all ocean-going vessels moving in United States waters. Optiport project was introduced to the Pilots and Associate members.

4.0 - OTHER ISSUES

4.1 Conclusions

The project has progressed extremely well, which highlighted a number of developed novel technologies which were recognised to be a patentable function of the project results. This will open up new market opportunities, for the consortium, and provide tangible social benefits across Europe.

The consortia unanimously agree that all project objectives have been met and that the economic objectives are now attainable.

The consortium have seen publications on the developments undertaken within the project and have seen exposure in numerous European magazines and articles, not only within the marine industry, but beyond, which includes a UK publication called Insperation, which highlights innovative products and applications, thereby enabling the consortium to reach a broader audience.

The consortium have succeeded delivering all deliverables and achieving all the expected results and producing a world-beating product. The consortium has remained a highly motivated partnership with only minor changes to the work programme, budgets and personnel. This reflects the team work and co-operation within the consortium.

Throughout the project, there was a significant number of meetings held, demonstrating the commitment of the consortium. The main project meetings held every 3 months were mainly fully attended, once again demonstrating the partner's commitments.

Finally, the consortium are grateful to the EC for part-funding this FP6 project, where all participants have appreciated the usefulness of this instrument. Some of the partners have been involved in Craft projects prior to this project, and has showed that participating with the researchers to develop and innovate; greater project results is highly beneficial to them.

We would also like to express and thank Iphigenia Pottaki for the guidance and assistance during the last 28 months, and to Antonio Cherenti, the legal officer, who has also passed on much guidance.

APPENDIX 1

Plan for Dissemination and Use

PROJECT NO: FP6-033015

OPTIPORT

The development of a new more efficient and safer portable traffic optimisation system for EU ports.

Co-operative Research (CRAFT)

Horizontal Research Activities Involving SMEs

Dissemination & Use Plan
Deliverable 7.1

Start date of Project:	1st September 2006
Duration:	28 Months
Project Coordinator:	1 Marimatech AS

PART 1: OVERVIEW

1.1 Executive Summary

The objective of this project is to develop a new, more efficient and safer, portable traffic optimisation system for EU ports. Currently a technical description of the system is being drafted from which an outline patent is planned to be filed.

1.2 Exploitable Results

Exploitable Knowledge	**Exploitable Product(s) or Measure(s)**	**Sector(s) of Application**	**Patents or Other IPR protection**	**Owner and Other Partners Involved**
A. Under Keel Clearance (UKC)	Improving the accuracy of the calculation of UKC from 50cm to 10cm	1. Marine Industry	Consortium is currently considering to patent this technology	**All SMEs in the consortium**
B. Positioning Accuracy	Improvements on Ship Positioning Accuracy	1. Marine Industry	Consortium is currently considering to patent this technology	**All SMEs in the consortium**

A. Under Keel Clearance - Dynamic Under Keel Clearance (DUKC) integrates real time measurement of tides and waves with modelled vessel motions to maximise port efficiency and safety. By monitoring individual vessel characteristics and sea conditions, vessel drafts and tidal windows for harbour transits can be maximised. In order to achieve this, the DUKC system determines the Net Under Keel Clearance and manoeuvrability requirements for vessels undergoing transits through shallow water. The factors considered by the system in performing the real time analysis are

vessel motion, tidal rise and fall, including meteorological effect vessel squat and heel. Fixed allowances for siltation, survey and draft tolerances are also catered for. Vessel drafts and sailing windows are maximised by the system, subject to internationally accepted guidelines regarding minimum Bottom Clearance (BC) and Manoeuvrability Margin (MM) requirements. This is done by performing rigorous modelling to determine the maximum safe draft for vessels and by accurately predicting windows of opportunity for safe sailing.

B. Positioning Accuracy - One of the key technical challenges in the Optiport project is the design of an extremely accurate motion sensor unit that in combination with GPS receivers will be able determine a vessel's position with an accuracy better than 10 centimetre and with a high rate of availability. On the market today there are no systems that are cost effective that are fulfilling those requirements. A system that can achieve this goal will enable an increased throughput of the EU ports and reduce the accidents and groundings in narrow water. In order to achieve this target, investigations on methods how to improve GPS accuracy and to provide a fallback solution for periods of GPS 'drop out' have been done. A motion sensor unit has been developed and tests have been carried out in laboratory and on the field, onboard a vessel.

1.3 Approach to Dissemination and Use

The consortium is already and will continue throughout the project and beyond to disseminate the non-confidential information that is unaffected by IPR in order to stimulate the market with with the technology and to bring awareness to potential end-users.

To date the consortium has:

- Created a project website for purposes of market stimulation, user awareness and via passwords to a secure project administration and information technology transfer (http://optiport.pera.com/ - Optiport Portal).
- Formed an exploitation committee to plan dissemination and decide upon the exploitation routes and incorporate them into the Dissemination and Use Plan.

- Discussed the most commercially attractive applications for the technology and developed an outline for the exploitation plan.

1.4 Market Overview

Maritime industries in the EU had a turnover of €159 bn and employed 1,545,000 people in 1997. They added value of €70 bn (1% of GDP) and contributed €23 bn (33% of VA) to EU funds.

The project will increase the competitiveness of European industrial ports by increasing port throughput by 10%. It will achieve this by improving the accuracy of calculation of under keel clearance (UKC) from 50 cm to 10 cm, enabling more ships to pass through the ports during a tide.

The project will also increase real time ship movement forecasting and position accuracy, this will reduce accidents and groundings in narrow waters, which will improve safety and increase port throughput. It will introduce a new sensor that will provide very accurate real time ship movement forecasting in the case of GPS system blackout.

The market for OPTIPORT could be very large in this growing and increasingly competitive industry. Our provisional analysis of the target market size indicates that within Rotterdam port, there are potentially 1,000 users for 300 OPTIPORT systems. A provisional estimation of demand is 15,000 European systems and 20,000 in North America. At a target selling price of €25,000 this gives a market value of €375m in Europe and €500m in North America.

Optiport project will create international export opportunities for those involved in the manufacture of this new ship navigation technology; help to protect the sector they serve from globalisation effects; and increase their competitiveness through the following OPTIPORT key product features:

- Increased port throughput;
- Improved ship safety during port entry;
- Low cost.

1.5 Strategy for approaching the market

The coordinator, Marimatech, have a direct route-to-market. They will be able to take the product technology to market after the development has been successfully completed and validated. For the duration of the development, the SME proposers will maintain communication and validation activities with end-users in order to ensure conformance requirements are met. The SME proposers will detail plans during the second year of the project to maintain technological & commercial collaboration between one-another to secure a robust supply chain to fully facilitate exploitation of the technology, and enable market penetration, post project.

PART 2: DESCRIPTION OF DISSEMINATION PLAN

The consortium will play an active role in technology transfer and dissemination, promoting the technology development through networks, best practice demonstration and pilot end-users to direct further development of the technology and applications.

There are several international conferences and seminars held to promote marine & navigation products and they are being reviewed by the consortium.

It is expected at this stage that any information disseminated on the OPTIPORT project will be general, in order to protect the IPR, but would be able to stimulate the market, and receive feedback.

PART 3: DESCRIPTION OF THE USE PLAN

3.1 Market Analysis

A portable system combining GPS receivers and motion sensors to show a vessel's position, speed and bearing more accurately than current commercial offerings: Software to display Electronic Charts, combined with Automatic Identification System data and predicted UKC and squat.

The project will create international export opportunities for those involved; help to protect the sector they serve from globalisation effects; and increase their competitiveness.

We have brought together a truly trans-European consortium of SMEs from six member states. They form a supply chain comprising members of the Marine Equipment, Navigation Systems, Aluminium Extrusion, Plastic Extrusion and Motion Sensors SME communities that, together with 2 RTD performers, meet the objectives of cooperative research.

3.2 Market Application Sector

The following market sectors have been identified as offering good potential for the OPTIPORT technology:

- EU ports – a new more efficient and safer, portable traffic optimisation system for EU ports
- Shipping Industry – an ECDIS system with better information system and more accurate positioning

3.3 Approach, timing and estimated effort for use of results

The time frame for a marketable product is expected to be three months to six months post project. It is anticipated that the market push will be led by Marimatech with strong support from the consortium. Details of the plan will be defined in the forthcoming exploitation meetings between the partners.