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1 Introduction

This report covers the implementation plan for the final phase of EFFORTS lasting from May 2008 until October 2009.

The following description of work as always is a work plan based on the assumptions of specified research results achieved within the project. Research, however, means to walk on unknown ground with a high potential of surprising findings which can force to modify the work plan in order to fulfil the overall terms of reference which are specified in benefits for the industry, the administration or the individual European citizen being involved in or effected by port operations.

It is a challenge and an opportunity that there has not been much research in port operations in the past because port processes only in recent times became so complex and sophisticated that common sense is no longer sufficient to maintain and strengthen European port competitiveness. It is the firm will of the EFFORTS consortium to take the lead in European port research and set the pace in innovations to improve port processes and operations.
2 Project Summary

Increasing globalization i.e. world-wide distribution of production and consumption results in continuous increase of trade and transport. In container transport e.g. the growth estimation for the next 5 years is about three times the GDP growth, i.e. about 9% p.a. The port sector handles more than 90% of the Union's trade with third countries and approximately 30% of intra-EU traffic, as well as over 200 million passengers every year. Even if competition between and within ports is increasing, there are areas common for almost all EU-ports where improvements are feasible on a pre-competitive level to benefit from technological opportunities in order to strengthen the ports’ position within the European intermodal environment.

Improved port efficiency will contribute to the integration of modes and services in a single system, on condition that there is interoperability and interconnections between systems. The market trend is towards capital concentration, specialisation and vertical integration. The provision of port services is gradually being transferred from the public to the private sector in order to increase efficiency and reduce public expenditure on port labour costs.

The FP-6 DG Research Integrated Project “Effective Operations in Ports (EFFORTS)” will improve both, the competitiveness of European port operations and the quality of the ports labour conditions and market, being a prominent one in coastal regions. Commencing 1st May 2006 and lasting for 42 months EFFORTS, research and development will focus on three scopes of application and one additional horizontal activity dealing with Education, Training and Human Resources Development:

- Navigation in Ports, i.e. to allow for safe and efficient port approach and berthing in the view of vessel sizes are growing faster than port infrastructure can currently follow. Based on high accurate digital chart data (Harbour ECDIS) operations of vessels and tugs will allow improved use of available manoeuvring space, continuous monitoring of operations and increased automation of processes.
- Ports and Environment, aiming at the development of new integrated approaches and systems for the management of environmental issues in ports. Based on solutions for a clean energy management, higher protection of water quality (either considering ballast waters or aluminium pollution), improvement of port air quality and decrease of noise annoyance, EFFORTS will cater for integrating ports operations with ports environment, with benefits for the all port communities actors (authorities, operators, industries), surrounding residential areas, fauna and flora.
- Port Organisation, where as a first step a system analysis will provide a comprehensive picture of related port processes and architectures in order to appropriately allocate project activities, elucidate interdependencies, provide a common understanding on European level and to allow identification of synergies and integration. Development of tools and methodologies for
improvement of port operations, infrastructure and systems will then follow also
including a risk assessment framework
• Education, Training and Human Resources Development, where the research
will focus an how best to invest in the development of our greatest resource,
our people.

It is the purpose of an “integrated project (IP)” to achieve a more significant
innovation impact than through individual small projects. This idea, however, became
spoiled by a too wide approach resulting in too many single activities each not having
a sufficient innovation impact. Therefore during the first 8 months the initial EFFORTS
work plan was put on touchstone to identify optimum feasibility for each work
package. Resources were focused on the most promising activities that have the most
significant impact on competitiveness of port services and its acceptance and support
by residents.
3 State of the Art

3.1 Scientific and Technological Objectives

The EFFORTS goals have been derived from a weakness analysis of current European port operations jointly with selected ports and terminals and translated into described project activities. Measurement of improvements from project results will be achieved by reversing this derivation process to conclude by a before-after comparison technology- and economy-wise.

In response to the defined weaknesses respectively ideas for improvement, the overall goals to be achieved are:

- Safe and efficient manoeuvring and berthing of vessels in consideration of decreasing manoeuvring space in fairways and ports by increase of ship sizes.
- Environmental-friendly ports and ships to allow co-existence of business processes and citizens, fauna and flora and further growth of the port industry without conflicts.
- Uniform risk assessment and risk reduction and management methodologies and tools.
- Increase of efficiency of port and service business processes (operations) and infrastructure of ports.
- Improvement of European port networks as interchange platforms and for mutual support.
- Assessment and inter-linkage of port-related training opportunities in Europe, new training opportunities to meet practice and social requirements and improve availability and quality of long distance and e-learning to address potential port and terminal employees including seafarers.

EFFORTS aims at achieving significant improvements in the management of ships in ports and related processes by developments and demonstrations within the following application areas:

**Navigation in Ports**
- Tug assistance
- Precise navigation and manoeuvring in ports
- Port ECDIS

**Ports and Environment**
- Clean energy management
- Water pollution related to ship reception
- Port air quality
- Noise annoyance of ports

Date: 30.09.2008
Port organisation and infrastructure

- Port processes
- Risk assessment framework

3.2 Achievements

The processes will be developed in order to reduce costs, increase flexibility in the utilization of the ports and its services, reduce environmental impacts and increase safety. EFFORTS will thereby improve the competitiveness of European ports within the transport chain in order to support the modal shift from road to sea but also to better balance the effectiveness between European ports and ports of other continents in the global transport chain, especially Asian ports. There will be tangible results such as new equipments and tools but also new methods and business processes.

3.3 State of the Art

Market globalization, along with its very powerful agents in its area of activity, its financial capacity, its wide business networks and its complicated logistical systems, has an enormous effect on raison d’être of maritime ports and determine the framework for successful technical and operational measures.

A wide range of port organization models and port management models exist that are based on two pillars:

Ownership:
The different forms are usually:
- Exclusively public (federal, regional, municipal or other public organisms)
- Mixed; basic public infrastructures with private auxiliary equipment
- Private

Management autonomy:
This is measured by the origin of financial resources, the autonomy to decide on investments and to set tariffs and the capacity to adapt to the changing market conditions.

Around 90% of European maritime traffic passes through ports where the decisions on financing infrastructures and on the tariffs for the services depend on or are influenced by public organisms dedicated to control or supervision.

However, budget restrictions in the public sector increase the importance of private capital to finance the infrastructure and equipment.

Apparently, the major key to the transformation of maritime transport of goods can be found in the irruption and generalization of the container. Two decisive trends arise from this:

- A new hierarchy in the ports, in which the ideas of hub and spoke generating feeder services are essential.
• A notable increase in the size of ships which forces the ports to increase their size.

**The strategies of the shipping operators:**

The large operators enter into two processes of vertical integration:

• They become door to door logistic operators
• They enter into the field of interior platforms (e.g. distribution centres).

Because some terminal operators are doing the same this market behaviour can create competition between terminal operators and their clients, the shipping lines.

The container terminal operators aim principally at increasing the scale of their activity. Through this process, they go from the "individual port" point of view to the "network of ports" point of view. However, it should be recognized that there is still quite a lot of capacity at local level to be exploited.

**The Response of the ports:**

From the point of view of European ports, this means they have to complete less and less as individual ports that attend to ships and more as links in a transport chain. **Therefore, the port chosen each time by an operator will be the one which minimizes the maritime, port and ground costs.**

This whole process leads to a large concentration of power in the demand side because of the integration of the ports in the logistic chain. It also finishes with the "loyalty" that a ship operator may have had to a certain port. There is no guarantee of this. The buying power of the large intermodal operators, reinforced by the strategic alliances between them, allows them to force the ports or groups of ports to compete amongst themselves. Currently the container terminal operators do not feel this competition because of the high demand in terminal capacity.

In short, if a port wants to attract or keep their clients, they have to position themselves efficiently within the intermodal chain(s) and offer distribution services, integrated in extensive transport and communication networks. Therefore, the success of a maritime port depends on the capacity of the port community to exploit fully the synergies with other transport nodes and with other agents in the logistic networks in which they take part.

**The ports are convinced that the best way to be competitive is to become more efficient and to offer value adding services.**
# 4 Participants List

In the second phase of EFFORTS the following 37 partners are involved.

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5 Relevance to the Objectives of the Sustainable Surface Transport Priority

EFFORTS is centrally relevant to the objectives of the Sustainable Surface Transport Priority.

Ports play a central role for the European Economy. According to Commissioner Borg\(^1\), over 90% of Europe’s trade with the rest of the world is shipped through its ports. This is also the case for almost half of intra-European trade. Sea ports also handle a total of 3.5 billion tonnes of cargo per year. Approximately 350,000 people in Europe work in over 1,000 ports or work in directly related services which together generate a value-added of about 20 billion Euros.

Indeed, in the European Commission’s White Paper “European Transport Policy for 2010: Time to Decide,”\(^2\) ports have a critical role within the Community’s transport policy for the future. Shifting traffic (mainly cargo) from road to sea has been adopted as a main policy goal, and specific actions are proposed to move forward toward that goal. As growth in European road transport has been recognized to create significant problems, such as congestion, pollution, noise, accidents, and others, these problems create significant ‘external’ costs, which are not reflected in the price of services rendered. The most recent estimate of the external costs of road congestion is 0.5% of Community GDP, something that will increase to 1% in 2010 (that is, €80 billion a year) if no action is taken. It is obvious that to achieve this strategic goal, one would need EU ports to operate effectively, otherwise this goal will fail.

The promotion of Short Sea Shipping\(^3\) and developments such as the Trans-European Networks\(^4\), the Motorways of the Sea (see Figure 1), and programmes such as Marco Polo\(^5\) and Marco Polo II\(^6\) are expected to further enhance the role of ports for the European economy.

At the same time, success in the European ports sector has been mixed, as epitomized by issues such as the increasing risk of bottlenecks and congestion, and as

\(^3\) COM (2004) 453 final, Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and The Committee of the Regions, on Short sea Shipping.
reflected by the industry’s concern and resistance over EU legislative proposals to liberalize the sector.

Regarding the risk of bottlenecks and congestion, recent trends may be disturbing, and call for decisive action to reverse the situation. For instance, even though short sea shipping grew considerably between 1990 and 2002 (36%), road transport grew even faster (41%). In fact, in 1985 road surpassed short sea shipping as the top transporter in intra-EU trades in ton-km, a position that it held at least until 2002 and will continue to hold if no serious action is taken. In 2002 the score was 1.376 billion ton-km for road versus 1.255 billion ton-km for short sea shipping. The trend was even more disturbing, as in 2002 the proportion of ton-km carried by sea dropped from 41.6% in 2000 to 40.8% in 2002, while in the same period for road this proportion increased from 43.2% to 44.7%.

As regards the environment, during the last years European ports have been consolidating a strong involvement in environmental protection and friendliness in ports. An example of such involvement is reflected in the ECOPORT LIFE project which achieved the result of defining a pioneer Environmental Management System Guide for ports. Also, the EU environmental regulation framework that relates to ports, directly or indirectly, is certainly impressive, including, among others, the Bathing Water Directive, the Dangerous Substances Directive, the Wild Birds Directive, the Health and Safety in the Workplace Directive, the Shellfish Directive, the Urban Waste Water Treatment Directive, the Habitats Directive, the Environmental Impact Assessment Directive, the Waste Reception Facilities Directive, the Water Framework Directive, the Strategic Environment Assessment Directive, the proposed Directive on criminal sanctions for ship-source pollution offences, and the Environmental Liability Directive.

8 Bathing Water Directive, 76/160/EEC.
9 Dangerous Substances Directive, 76/464/EEC.
10 Wild Birds Directive, 79/409/EEC.
11 Safety and Health of Workers at Work Directive 89/391/EEC.
12 Shellfish Hygiene Directive, 91/492/EEC.
13 Waste Water Treatment Directive, 91/271/EEC.
14 Habitats Directive, 92/43/EEC.
16 Waste Reception Facilities Directive, 2000/59/EC.
17 Water Framework Directive, 2000/60/EC.
18 Strategic Environment Assessment Directive, 2001/42/EC.
Yet, in spite of the above, much remains to be done. Progress is often slow, and environmental issues may often impede port development. The recent case of scrapping plans to build a huge container terminal at Dibden Bay in the UK on environmental grounds and after a public inquiry that lasted a year and had 15,000 pages of documentation, is an example.

All of the above make clear that there is an urgent need to synthesize in a realistic manner the overall issues facing ports and to provide for viable and integrated proposals and win-win solutions. In fact, the European port industry is at a critical point, to move ahead proactively and meet the serious challenges it faces, instead of retracting to inertia, complacency and fragmented action. However, this will not happen automatically, and it will definitely require the full energy and cooperation of all stakeholders involved.

The EFFORTS project intends to help significantly the European port industry toward this goal. It will do so by bringing together a consortium of ports, industrial partners and R&D organisations that have an excellent ability to identify problems and propose solutions to solve them.
6 Potential Impact

6.1 Strategic Impact

The guiding propositions for Call 3B as defined by the European Commission are:

• Surface transport has to face the challenge of supporting future economic development and subsequent traffic increase without degrading the quality of transport services and protecting the environment.

• Research and technology developments have an important role to play and are providing the European Transport System with innovative vehicle and vessel technology and new forms of transport organisation and infrastructure.

The Commission's "White Paper “European Transport Policy for 2010 – Time to decide” further states the following requirements:

• Shift the balance between transport modes
• Eliminate bottlenecks
• Gear transport policy to users
• Simplify the rules on how ports operate
• Bring all the players together in a one-stop-shop.

According to Call 3B research must target the development of transport technologies to achieve a sustainable modal shift from road to railways and waterborne routes including inland navigation and short sea shipping.

When policy established requirements for transport it was not yet evident that ports might become serious bottlenecks in global transport. Container growth rates are still about three times those of growth of world trade (currently about 3% p.a. resulting in growth of container transport of about 9% p.a.). The dramatic port congestion observed the first half of this year west coast United States, e.g. resulting in more than 100 container vessels at anchor off Los Angeles/Long Beach waiting for a berth, meanwhile has improved and did not result in the same dramatic effect in Europe. However, the increasing amount of cargo shipped from Asia and Europe shows already some congestion effects which result in shipping companies and terminal operators battling for additional terminals.

Space is a scarce resource in Europe especially in industrial areas which usually are heavily populated. Therefore increase of transport volumes must primarily become achieved by improvement of productivity of existing facilities.

EFFORTS in response to Call 3B, task 3.17, is aiming at increase of productivity in ports and at terminals as being crucial nodes within the whole transport chain. This will mainly be achieved by innovative technologies but organisation, social environment and policy provide the framework which cannot become ignored.
EFFORTS as any research project will not change the world but it is the firm will and the pride of the well-composed consortium to contribute to improvement of European ports in a convincing and perceivable way intending to write a success story in this field of research. Besides competence commitment is the other essential asset of the EFFORTS consortium.

The strategic EFFORTS terms of reference comprise:

- To primarily use technologies to improve business processes and productivity.
- To guide innovations by foreseeable acceptance of industry and administrations (no work for the shelf).
- To minimize potential conflicts between industrial requirements and environmental protection by intelligent solutions.
- To contribute to improved perception of value of port industry by citizens.

Even if nowadays container terminals are in the focus of considerations EFFORTS aims at the full range of ports: large, medium and small, with all types of vessels and cargo. There will not be a single set of solutions for every port, however, EFFORTS ensures relevance by addressing operational issues in context of technologies. A port will, therefore, be able to access technical solutions with applications to operational needs as well as defining potential modifications to later adapt to scratch).

### 6.2 Innovation-related Activities

This issue which is further described within the Outline Implementation Plan(s) in brief and on higher level of abstraction comprises:

- Scenario techniques to achieve both, results precisely adapted to current operational needs as well as defining potential modifications to later adapt to future needs (vital factor of development efficiency to not always commence from scratch).
- Exploitation of the potential of advanced technologies for dedicated port processes outside the range of current applications.
- Transfer and adaptation of solutions from other application areas.
- Extrapolation techniques to drive existing solutions further.
- Involvement of practice to assess research plans (“Delphi”-approach).
- Information to practice of advanced and future technologies and techniques in order to base their requirements on future state of the art.

### 6.3 Exploitation

Exploitation usually is the weak point of research projects because researchers are no marketing experts and this issue is commonly tackled at a too late stage of a project. EFFORTS includes exploitation activities from the very beginning, in fact it was one of the criteria to compose the consortium. To ensure successful exploitation:
- End-users and decision makers are represented within the consortium.
- Focal ports (see description chapter 6) will make results visible to a larger community.
- Demonstrations will prove the usability and effectiveness of results.

### 6.4 Dissemination

Dissemination is the pre-requisite for successful exploitation. To make potential users aware of EFFORTS achievements the common information channels from newsletters via internet to workshops and conferences will be established. However, the most important one is the concept of "focal ports", one in each European coastal region, six altogether (see chapter 6). The concrete port and terminal operations will provide the platform to convincingly disseminate EFFORTS ideas and results.

### 6.5 Added Value from Carrying out the Work on European Level

The European ports in general are already innovative ports, a necessary assumption to meet current and future challenges. However, many issues need a consensus on a larger level. This is especially true for the maritime industry because not only European but global standards are required. To achieve consensus on European level is the first step and a sufficiently large critical mass to influence global standards. European policy-making is dependent on solid information of future technologies and process-relevancy in order to pave the way into the future of European ports in time not hampering progress.

Those innovations requiring high investment are only feasible on product level when a critical mass of clients exists, which is not feasible for a site, a region or even a member state, but all member states together will result in this critical mass.

### 6.6 Other National and International Research Activities

EFFORTS has performed a research and produced a list of relevant sources which is too long to become included here. In the field of navigation there is comprehensive material on national and international level available to base further research on. For the other sub-project areas there is not as much relevant material available and consortium partners are asked to further investigate available literature on national level and make it available to all.

It is one of the objectives of dissemination to early announce the EFFORTS work programme in order to attract other experts in the field to exchange ideas, opinions and results and make use of other relevant activities.

### 6.7 Contributions to Standards

European projects cannot produce standards on their own but EFFORTS will establish early links to all relevant standardization bodies in order to base further development
on existing standards and contribute to improvement of standards through contributions. Because standardization will take too much time to react on EFFORTS improvements within the duration of the project, “standards of facts” will be generated to motivate industry to invest in exploitation and production.
7 Outline Implementation Plan

7.1 EFFORTS S &T Approach

The overall objectives of EFFORTS are to achieve more effective, safe and environmental-friendly operations in European ports. EFFORTS defines effectiveness as operational efficiency and cost-effectiveness, both the governing factors of the ports competitiveness.

Technologies are forming the core of EFFORTS. To fully exploit project results the comprehensive operational environment of ports needs to be taken into account. Thus job satisfaction as well as identification of citizens with their port industry is development and implementation criterion within EFFORTS, too.

EU-research needs to be pre-competitive. EFFORTS activities have been defined through co-operation with specific ports to determine deficiencies or ideas for improvement. To achieve the applicability of results on European level the approach aims at modular, evolutionary and interoperable technologies also considering legacy systems. The approach also shall enable usability on each level of individual technological development of a port. Hub ports have requirements distinct from small feeder ports thus transferability methodologies (“from specific solution via generic tools and methods to specific requirements”) will be invented within the work package INTEGRATION (WP II).

Demonstration Ports will become determined, to serve as regional platforms to disseminate working plans and results, to organise work shops and conferences, to validate and cross-check applicability of results and finally to demonstrate achievements. Availability of results, potential to combine with other port-related activities like conferences and support of interested third parties will dictate the selection of the most appropriate ports. Primarily EFFORTS ports will become demonstration ports but other ports can also become a suitable site to demonstrate EFFORTS results.

To further ensure that EFFORTS is centred around ports and their requirements a High Level Group, has been established where representatives of the related administrations, the port industry, the port clients and other experts will continuously assess the work plans, the development and implementation procedures and the achievements. The High Level Group also shall ensure integration on user level and foster acceptance of research results. During the first stage of the project, practical reasons have prevented the HLG to work efficiently, therefore it appeared useful to redefine the purpose and the composition of the group.

Within EFFORTS there have been 3 technology areas defined organised within Sub-Projects in order to cluster related work packages and to minimise efforts. The sub-project objectives will be achieved by work packages, some of these further broken down to task level in order to clearly define terms of reference and measure achievements. The areas covered by sub-projects are

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• Navigation in ports and during approaches (3 work packages)
• Environmental requirements in ports and standards to meet these (4 work packages)
• Port and terminal organisation and infrastructure (2 work packages).

With the Work Packages a proven methodology will be followed, commencing from state of the art and existing technologies, then defining specifications to meet requirements, develop suitable solutions to be evaluated through demonstrations, the assessment results providing the input for further enhancements.

EFFORTS aims at added values by integration of specific project results. The benefits from integration of results shall be higher than just adding individual work package results. Individual improvements will not be perceived by practice in the same manner like the much higher efficiency improvements by integral application, thus encouraging other European ports to copy it. EFFORTS wants to be a lever at the end lifting much more weight than itself.

To achieve integration and to increase project economy the Horizontal Work Packages have been invented. Issues like “Education and Training”, “Dissemination” and “Implementation and Exploitation” are common for all “vertical” work packages. Tackling these by horizontal activities in a centralised way ensures a standardised approach, reduces required work capacity and fosters the transfer of results to a generic level (see “transferability” above).

The horizontal approach also fosters development of Recommendations for Standardisation where required.

Even EFFORTS being a technology project Training and Education plays a crucial role to ensure applicability and acceptance of project result and to stimulate an European port training and education platform as it is explained further down.

Also on the horizontal working level Validation (to ensure validity of scientific approach and development results) and Verification (testing of results under realistic operational conditions) will be dealt with as part of the Integration work package. The integration work package also controls all demonstration activities playing a vital role in order to elucidate EFFORTS achievements to larger audiences of users.

Through the inclusion of leading manufacturers and the end-users, the ports, and the size and composition of the consortium Exploitation of results can be initiated by the consortium itself also providing excellent opportunities for small and medium companies.

At the beginning the planned duration of the project was 36 months; after the verification phase the project duration has been extended over 6 months. Now, the project duration is 42 months. The first 8 months were declared as the verification phase in which the state of the art and the requirements of the ports were detailed leading to a refinement of the work package descriptions. The verification phase was concluded with a review by the Commission deciding which work packages will worth be conducted during the research & innovation phase and the validation & demonstration phase of the project. Some work packages were modified according
to the Commissions recommendations. Work packages which do not meet the Commissions requirements were rejected for funding.

The review at the end of the verification phase had severe impacts on the composition of the consortium and the budget allocation. Which project partners will perform the work in the research & innovation phase and their budget allocation was defined by the Commissions review recommendations. Project partners who can not precisely specify their competence for the project were excluded. Competences which were not covered by the consortium created at the beginning of the project have been added by inviting new partners.

The initial number 44 partners in the consortium, 10 of them ports, at a first glance an extraordinary large consortium finds its rationale in the wide spectrum of required competences. The number of partners for the research and innovation phase is 37.

### 7.2 Activities

The following diagram shows the EFFORTS project structure at the beginning of the Implementation Phase:
7.2.1 Horizontal Work Packages

The horizontal work packages serve to integrate the results from the vertical work packages to a holistic picture.

A project of the size of an IP requires stringent horizontal planning, monitoring and assessment to exploit project resources in an optimum way. The horizontal WPs also have an important service function to make the wide spectrum of knowledge aware and available to all WP-teams, to solve problems and clarify issues of common project interests centrally and organize internal and external support for problem solving.

It is the horizontal platform where the integration takes place and where results will be also put into context of relevant social and policy (EC) conditions and communities.

Leader D´Appolonia, Italy

This WP is split into two Sub-WPs, one dealing with the financial and administrative co-ordination (Leader D’Appolonia, Italy) whereas the other covers the scientific-technical co-ordination (Leader ISSUS/TUHH Germany supported by TL&A and ICES, France) including quality assurance covering the whole research and development process from specification of objectives via the work processes till the deliverables and its relevance to port operations.

Leader ISSUS/TUHH, Germany

Integration is a core issue of EFFORTS to allocate R&D work in most appropriate way to the large pattern of port operations and to exploit synergies between work packages. Project results wherever possible shall cause a lever effect i.e. the impacts from all achievements together shall exceed individual impacts. The formal platform for integration is provided by WP 3.1 determining all relevant port processes and its coherence which also allows mapping out critical relationships or dependencies between RTD issues, practical applications/requirements and normative/regulative ones. This "port process map“ further allows identifying the needs, the opportunities and the conditions to achieve a higher degree of interoperability and interconnectivity between operational processes based on technological innovations.
Leader Dublin Port Company, Ireland

The objective of this work package will be to ensure that we research how best to invest in the development of our greatest resource, our people.

The ultimate objective will be to develop a “skills and competency ports passport” for those who work in European Ports and to set a benchmark for integrated training and development programs to ensure greater operational cohesion, leading to better levels of business knowledge enhancing inter-change of staff and helping to establish a culture that will align business strategy with the human development strategy. This includes the development of a strategy to provide and exploit training facilities on European level in order to achieve both, a high level staff qualification and cost savings in training equipment such as simulators.

Leader ICES, France

This WP aggregates all activities related to dissemination, exploitation and protection of knowledge.

Exploitation activities will aim to define guidelines for further research and business developments and for implementation. The EFFORTS Exploitation Plan will be built addressing in detail the market, and managerial aspects of exploitation.

This WP will also work to ensure protection (acquisition whenever possible) and management of knowledge. A knowledge data base will be settled and upgraded on the basis of the results acquired during the project.

Dissemination activities will work to promote and inform about the developed tools, software and research results in a responsive and proactive way, using a web portal, newsletters, DVD ROM, and conferences. The demonstration ports will be the locations of the workshops and will have an integrative role in their organisation.
7.2.2 Sub-Project 1: Navigation in Ports

Sub-Project Objectives
The Sub-Project “Navigation in Ports” aims at the improvement of safety and efficiency of navigation in ports considering decreasing manoeuvring space (vessel size in relation to fairways and basins) and increasing traffic. Safety is defined by risk of damage to vessels and infrastructure, efficiency is defined by turn around speed in ports.

This SP covers all navigational issues to be enhanced by techniques and technologies. Increase of vessel sizes and requirements for minimum dredging call for higher accuracy and reliability of navigation in fairways and ports not being met by equipment according to SOLAS Carriage Requirements.

Sub-Project Structure
In order to achieve the stated objectives and scopes, the Sub-Project is structured in three different Work-Packages:

WP1.1: Tug Assistance
WP1.2: Precise Navigation and Manoeuvring in Ports
WP1.3: Port ECDIS

The Subproject Navigation in Ports is lead by the Dublin Port Company (DPC).
WP 1.1 TUG ASSISTANCE

The result of the WP will be a top class tug simulator, which can be used by ports and tug operators to train pilots and tug masters in efficient and safe use of new tugs, for planning of tug use in ports and at terminals, and for decision-making concerning the introduction of new tug types and sizes. Experience so far indicates that training may be accelerated significantly. As an example, Svitzer A/S has stated that the training period for a new mate may be reduced by half by introducing extensive training in the tug simulator, thereby reducing the time needed onboard.

WP 1.1 partners are FORCE (leader), IST, APL, SW, L&R, HPA.

WP 1.2 PRECISE NAVIGATION AND MANOEUVRING in PORTS

Based on preparatory work, also within the DG Infosoc project IPPA, and as part of a tested set up on the river Elbe (approach to Hamburg), current portable pilot units (PPU) will be evaluated and selectively improved covering functionalities, weight, flexibility to become adapted to individual regional needs. The scope of potential input data will be investigated and validated including environmental and tidal information but also track polygons including time tags from a VTS as well as adaptation of the PPU solution for tug operations.

WP 1.2 partners are MARIMATECH (leader), ISSUS/TUHH, HPA, Tredit, PAH, ThPA, DPC, L&R, FORCE.

WP 1.3 PORT ECDIS

These days’ masters and pilots approaching a seaport usually use an Electronic Chart Display and Information System (ECDIS) based on IHO standards to obtain the required geographic, hydrographic and bathymetric information they need. The chart requirements for manoeuvring big ships in narrow fairways (harbour access channels) and harbours and for the seabed and port maintenance go far beyond the current...
ECDIS standard with respect to accuracy, topicality, chart objects and attributes ("object catalogue"), 3-D possibilities, designed reference model and call for a specific "harbour ECDIS".

On base of ECDIS technology (GIS) it will be possible to link, combine or overlay other information to improve the interoperability of harbour related tasks.

The utilisation of the port ECDIS can be grouped into two: for safe and efficient navigation and for the maintenance work of the port authorities. With the still increasing dimensions of vessels and the cumulating traffic the harbours increasingly operate at the border of their capacity. Under this circumstance can the safety of navigation and a proper traffic management and berth organisation only be guaranteed if accurate and up-to-date geographic and bathymetric data of high-resolution are available providing all necessary information, in some cases in real-time (e.g. for dredging purposes).

Almost all port processes from navigation to container stowage on the terminal have a geographical relevance. Automation of port processes, which means to replace human beings having an excellent orientation and heuristics ability, requires high accurate positioning features. Significant improvement of port productivity and at the same time reliability is only possible by a high potential GIS. The WP Port ECDIS therefore is a basic WP for any enhancement of port services and operations.

WP 1.3 partners are HPA (leader), ISSUS/TUHH, Caris.
**7.2.3 Sub-Project 2: Ports and Environment**

**Sub-Project Objectives**

SP2 aims at the formulation and development of a comprehensive framework for integration of ports and environment. SP2 will conceive pathways for improved management of environmental issues in European ports and for a global approach to deal with environmental protection in ports on a large level, that is, integrating different environmental and operational issues in ports.

During the last years European ports have been consolidating a strong involvement in environmental protection and friendliness (e.g. ECOPORT LIFE project). Also, the EU environmental regulation framework related to ports is certainly impressive. Yet, in spite of that, much remains to be done. SP2 aims at further improving the state of the art, so as to provide for viable and integrated solutions regarding the amelioration of port environment and the overall strengthening of port status within local communities.

It appeared clearly that the protection of environment is of their main priorities. Ports want to be aware and manage the environmental risks associated to their operations. Ports want to be proactive as far as environment is concerned, and for their day-to-day operations or in the event of serious toxic incidents, to be able to show their strong involvement to target an efficient and sustainable management. Even though Port Authorities are not decision makers in private companies’ policy, they often contribute to the Port facilities development, they facilitate the implementation on new Port activities and hence, they have a share in the whole environmental protection with the other Port actors as handling companies, ship owners, pilots and tug companies, etc.

Then, port competitiveness has to be optimised in a broader extent than in terms of cost-effectiveness and productivity. The improvement of port operations must be made in a sustainable way. Nowadays, development of ports mandatory requires to address environmental issues. In this context, research activities are of prime importance to permit the development of knowledge and technological innovation which will make it possible for ports to address such issues in the future which cannot be managed today taking into account existing procedures, techniques or technologies.

EFFORTS SP2 will develop new approaches and solutions for the management of environmental issues in ports, with direct impacts on energy management, air and water pollutions, and noise annoyance. Beneficiaries will be the ports communities actors (authorities, handling operators working in the ports), surrounding inhabitants, fauna and flora.

In order to achieve the stated objectives and scopes, the Sub-Project 2 is structured in four different Work-Packages:

- WP 2.1: Clean Energy Management
The Subproject Port and Environment is led by the Port of Le Havre (PAH).

During the concerned reporting period, main objective of work has been to start the SP2 work. After one year of work, requirements have been detailed for each of the research topic: consumption measurements have been realised in the port of Le Havre (WP2.1), active substances have been tested (WP2.2.1), chemical analyses on the water column and sediments, and ecotoxicological tests on mussels from the port of Le Havre have been realised, fuel from a barge has been analysed (WP2.3), noise annoyance has been measured in the port of Dublin. Interviews of end users (more than 20) have been realised to collect their needs. Design tasks are well advanced or nearly completed such as laboratory tests.

Next stage will now concern to finalize the design and confront the new innovative products to the real world, notably through on-site tests and demonstration. Obtained results will allow to conclude on the impacts of these innovations. Integration and evaluation activities will therefore be of prime importance, such as dissemination. This will allow to conclude on the real benefits which could be obtained through the implementation of these innovative products at a large scale.

**Sub-Project Structure**

In order to achieve the stated objectives and scopes, the Sub-Project is structured in four different Work-Packages:

- WP 2.1: Clean Energy Management
- WP 2.2: Water Quality
- WP 2.3: Port Air Quality
- WP 2.4: Noise Annoyance of Ports

The Subproject Port and Environment is lead by the Port of Le Havre (PAH).

More and more in Europe, Ports authorities focus their activities on infrastructure development, ship reception, regulation controls, promotion and land management. Ports are not “energy producers”, but as land planner have the possibility to integrate energy producers in their domain of management.
As a corollary mission, they are responsible for improving port activities meanwhile minimizing their impacts on inhabitants, fauna and flora. Such as other companies, Ports have also now to deal with the greenhouse effect. Energy has to be better used, to decrease the thermal balance of the planet. Besides, due to their locations, Ports have a high primary energy potential: on the waterfront, with the possibility to install windmills; in estuaries or on rivers, with the possibility to use current power; hosting activities (and/or closed to industrial or human activities) generating wastes. Moreover, according to EC Directive 2000/59, on port reception facilities for ship-generated waste and cargo residues, “Member States shall ensure the availability of ports reception facilities adequate to meet the needs of the ships normally using the port”.

Port activities are also high energy consumers. The global explosion of energy prices increases the associated stakes. And ports energy consumption could increase in the coming years if electricity is provided to ships at berth. Furthermore ports sometimes offer a service to other port actors by providing electricity thanks to their local network.

Therefore, energy management is a specific issue of prime importance in ports.

In parallel, the concepts for energy production, transport and transformation are today moving. The classical concept of production and distribution leads to a low efficiency from the raw material to the end-user and to a high environmental impact. In order to improve the situation two ways of development are considered (and combined): distributing energy production and integrating Renewable Energy Sources (RES). Examples of utilisation of RES and clean energy can be identified in some large European ports (Rotterdam, Hamburg...), but these technologies are not so spread at EU level, mainly as a result of their specificity and lack of integration. More globally, a mix energy approach is missing.

Ports therefore need solutions to help them build and explain to the wide community of concerned actors their development policy and energy strategy, considering RES and energy recovery from waste for the development of a cost-effective, environmentally-friendly and “secured” integrated concept of distributed production of energy.

WP2.1 aims to analyse and propose solutions for management of energy issues in European ports at short, medium and long terms. It concerns the optimisation of planning and management of energy consumption and supply based on:

- The utilisation of clean and RES (solar, wind, sea...), as much as possible,
- Wastes energy recovery,
- In situ possibilities (weather, geographical, legal constraints).

Main deliverables of this WP are:

- A model of the port energy consumption and associated cost, function of time and situation (e.g. traffic),
- A mapping tool allowing to present the level of energy consumption and costs (obtained from the model) per type of port operation and geographical areas,
• A help to decision tool dedicated to simulate and validate virtually new energetic exploitation plans / scenarios in ports, according to their impact on environment, safety, security and efficiency.

WP2.1 partners are AREVA TA (leader), CORYSS TESS, TLA, VTT, CETMEF and ports of Le Havre and Dublin.
WP 2.2
WATER QUALITY

Leader University of Caen
France

WP2.2 addresses two issues of water quality in ports: “Ballast waters pollutions during ships reception” and “Aluminium pollution related to the protection of ports infrastructures/quay”.

Efficient and clean management of ballast waters is an important issue for ports. Ports are currently not assessing the impact from ballast water but need to ensure that discharge of ballast water from ships does not affect the port, river and coastal biosphere so they must be aware of the current status and impact of different harmful aquatic organisms in ballast water and eliminate or at least reduce negative consequences. In case of economic, health or ecologic disaster, the ports liability (and not only of ship owners) could be at stake. By de-ballasting in ports or close proximity, ships spread various unwanted living species which may proliferate, leading to local economic disasters and human health blows, even casualties (e.g. epidemic of *Vibrio cholerae* on South American coasts in 1991…). At EU level, significant results have already been obtained through the MARTOB program, but currently, there are only few treatments which complies with the IMO conditions (MEPC 55 10/2006) but each one imply major drawbacks (high energy consumption, high costs, low performance,…). Moreover, new legislation should be set up on water quality and notably controls of ballast waters. It is absolutely necessary to go further in management of ship’s wastes and to contribute to the development of an effective ballast water and sediment treatment.

In this context, this activity consists in:

- assess tested substances efficiency against selected bacteria, phyto- and zooplankton,
- determine the most viable active substance(s) for ballast water treatment considering onboard use requirements, environmental and economical aspects,
- design “easy-to-use-at-reasonable-cost” systems and processes to use the selected active substance(s) aboard ships (or ashore) and for demonstration and
- issue recommendations for treatment methods approval considering the forthcoming IMO criteria and to help port authorities regarding control activities and to prevent from ecological impacts through harmful aquatic organisms in ballast water.

This will contribute to help ports to ensure a better protection of environment (and lower risks) and improve ballast treatment techniques (efficiency, environmental risk, cost-effectiveness).
The research activity on “aluminium pollution related to the protection of ports (quay) infrastructures” aims to contribute to manage, combat and mitigate what could be (the WP will fix it) one of the main potential environmental hazards (aluminium pollution) related to port operations. Ports steel infrastructures are generally protected by sacrificial anodes usually in aluminium which dissolved in seawater. Aluminium is not recognized as a toxic substance, and acts as an indicating parameter that can be exceeded.... According to various researchers, the toxicity of aluminium for the brain cannot be denied. "There is a lack of information on the subject ... We do not have scientific bases proving the toxicity of this metal” (W.H.O secretary, 1997). Ports need to be given realistic information regarding the toxicity of aluminium, to know if aluminium can enter the food chain and if concentrations are dangerous or not for human health. This is of the utmost importance to ensure optimal prevention of accident on human health.

In this context, this activity will consist in:

- bring knowledge on pollution generated by the use of sacrificial anodes: quantity of pollutants, environmental impact (ecotoxicological tests), toxicity for human being and solution
- create a scientific database on toxicity of harbour sea water aluminium and develop a tool to help ports to choose optimal solutions for the protection of infrastructures.

Innovation is firstly to bring knowledge on a sensitive topic (considering its potential impacts) on which no scientific information is available, and secondly, to propose a tool to help port managers to make their choice for the protection of ports infrastructures, considering the efficiency, the safety, the risks on environment and the cost-effectiveness of existing solutions, but also their constraints in terms of installation, operation and maintenance. Environmental risk assessment, possible solutions and tools will help ports with respect to the environmental legislations. This will contribute to help ports to integrate the environmental aspect in their choice and strategy. This WP could imply legislative evolutions.

WP2.2 partners are University of Caen (leader), VTT, TLA, CETMEF, Ifremer, FIMR, ports of Le Havre and Dublin. The leader will get the help of Pr Lei-Chou (Université Libre de Bruxelles) for expertise and validation of scientific issues.

Leader Biowind
France

Quantifying/reducing the air pollution emanating from European port business is directly driven by national, European or world regulations applied to port air quality, within the scope of the European Directives on ambient air quality assessment and management, on the Volatile Organic Compounds (VOCs) control and the MARPOL convention’s Annex VI.

Combustion gas exhausts from ship machinery and straddle carriers, terminal traffic (VC, trucks), petroleum product transfer (storage and loading operations at
terminals), pilots and tugging operations, and auxiliary generators on vessels at berth
generate the main pollution release. The main pollutants are VOCs (contributing to
ground-level ozone harmful to health and to the environment), sulphur compounds,
NO \textsubscript{x} (Nitrogen Oxides, ozone precursor significantly contributing to smog) and
ultrafine particles (toxic air contaminants including diesel exhaust soot). Solutions
exist but generally imply cost or efficiency issues, and innovative solutions are still
required to allow to strongly reduce pollution at low cost.

WP 2.3 aims to improve the management of air quality in ports and the
environmental-friendliness of different port operations. Within this scope, an
innovative system based on photocatalysis will be developed for treatment of VOCs,
aspirated compounds generated by ports operations. Furthermore, the approach
will consider NO \textsubscript{x} and soot pollutant (bibliography, on site tests) to know if the
innovative solution could be globally exploited for treating the pollutants affecting air
quality in ports.

Photocatalysis attracted since 15 years a great and exponentially growing interest as
a clean technology for air treatment, ranked as one of the main high-potential
emerging technology. Major advantages of this technology are: high efficiency, low
costs for set up, low energy-consumption, few maintenance, numerous possibilities of
use, easy to adapt to new situations due to a high flexibility, easily transportable, and
financially acceptable.

The demonstration organised in the port of Dunkirk by equipping a barge delivering
fuel will state on the level of reduction of VOCs and sulphur pollutions. Principally due
to the fact that all the areas of the barge delivering fuel have to be considered as
ATEX (EXplosive ATmosphere) zone, the installation of the equipment implies strong
requirements on the equipment and an approval for installation. In this scope, a
dedicated process has been set up and is currently running, in consistency with the
initial planning. It is estimated that the installation will get the required permits by
month 32 (December 2008) to respect the planning in the DoW and allow sufficient
time for installation and test (for completion in month 35 i.e. March 2009).

Tests will also be performed on SO \textsubscript{x}, NO \textsubscript{x} and PM with exhaust gases from an inland
ship engine. They will not require any approval for installing and operating the
equipment (except conditions given by CFT). Global environmental benefits in
European harbours will be estimated from demonstration and tests results. In first
approach, such a technology should allow to reduce by 95% the VOC emissions and
by 80% the sulphur, NO \textsubscript{x} and soot pollutants.

WP2.3 proposes to give solutions and recommendations to ports managers, operators
and ships owners to improve port air quality and thus facilitate environmentally
efficient management of ports, in terms of noxiousness for human being and toxicity
for air. The innovative system based on photocatalysis will definitely be a way for the
port community / users to decrease impacts of their activity on air quality, with high
efficiency and at low cost. Detailed technical and operational recommendations
including cost-benefit considerations will be provided how this system could be applied
in any port. It will contribute to help ports to significantly decrease the impacts of port
operations on the human health (neighbourhood, port workers and users) and their
contribution to the regional air pollution (all the most sensitive when ports are near city areas).

WP2.3 partners are Biowind (leader), ULP, TLA, VTT, CFT and the port of Le Havre.
In order to reduce the amount of unhappy even irritated residents living near port areas, the key issue is to minimize the annoyance of port noise. Many annoying sound sources can give results below the regulatory values but still disturb the nearby residents.

As a result of the project new annoyance metrics for sources distinctive to ports will be developed using psychoacoustic descriptors and listening tests.

The most significant problem related to environmental noise evaluation is managing the uncertainties due to weather. A prediction model will be developed taking into account the weather conditions.

Apart from creating sound attenuation maps the ports will obtain annoyance maps which will enable ports to reduce the annoyance of the port to nearby residential areas at varying weather conditions and reduce the amount of complaints.

The results of the project will enable development of cost-efficient innovative technical measures to minimise the emissions. The noise control measures will be specifically targeted to the most annoying sources of noise in order to minimize their annoyance and impact on the environments.

WP2.4 partners are VTT (leader), FMI, and **ports of Turku and Dublin**.
7.2.4 Sub-Project 3: Port Organisation

Sub-Project Objectives
Ports are extremely heterogeneous systems composed from a wide variety of industries directly dealing with ship operations, others providing support services and also some using the function of ports as transport nodes to manufacture their goods within the port area. Additionally we have community administrations and governmental and regional administrational services such as customs, immigration and health services. Thus ports are truly complex systems requiring the involvement of quite distinct special experts but expertise in certain domains is not sufficient to manage communication and co-operation across border-specific disciplines.

A way must be found to integrate all these experts and to create a common platform of understanding and to allocate project activities in a holistic and consistent way. Matching this challenging objective shall not become restricted to the project itself but must serve the ports as a useful tool to manage their development beyond the project.

The work package "Port Processes" (WP 3.1) will provide the architecture(s) and process descriptions to make the complex port structure transparent and in a next step to provide software tool(s) to support specified operations.

It is only logically to base the approach of WP 3.2 "Risk Management Framework" on the process "map" of WP 3.1 and hence develop an approach and tools for ports to not only increase safety and security of operations but also elucidate this to the non-experts.

Sub-Project Structure
In order to achieve the stated objectives and scopes, the Sub-Project is structured in two different Work-Packages:

WP 3.1: Port Processes
WP 3.2: Risk Management Framework

The Subproject Port Organisation is lead by the Port of Gijon (PAG).
The efficiency of port operations depends heavily on the quality and timeliness of the information exchanged. A further increase of efficiency can only be accomplished by means of optimised automated processes supported by complex IT solutions. In this context interoperability between processes and interconnectivity between ICT systems plays an important role.

Requirements on interoperability between partners increase tremendously, making interoperability solutions between partners more and more intricate, costly and error-prone. On the other hand, state of the art procedures for specification, implementation and testing of such solutions are still based on a data-centred view on interoperability than on a process view.

WP 3.1 aims at providing the methodology and necessary tools to create interoperability solutions between stakeholders in ports. Application of a structured procedure for specification, implementation and testing makes development of interoperability solutions calculable thus minimising project costs and risks.

One of the main objectives of this WP includes capturing and visualising all important relevant port and terminal processes with related stakeholders. A set of standard business cases will be defined as templates for the implementation of interoperability solution. ICT requirements and standards are also concerned that all analysis are in their conformity.

The procedures and tools developed within this work package facilitate rapid implementation of interoperability solutions with high quality between partners within ports. The use of a Service Oriented Architecture allows the application of this methodology within arbitrary system architectures.

Whereas the main focus of this work package lies on the implementation of interoperability solutions, the process-centred approach is also suitable for interoperability projects on an organisational level.

WP 3.1 partners are Marintek (leader), NundP, ISSUS/TUHH, DPC, PAG, Tredit, ThPA, ISDEFE.
This WP aims at

- Including all the stakeholders in the risk assessment framework, not only the port entities but also the port users and customers e.g. transportation companies, logistic operators, etc.
- Integrating the port protection plans with local regional, national and European plans.
- Having a flexible protection plan able to include all the dynamic changes of the port operations and regulations.
- Developing an integrated methodology covering safety so as to deliver a tool/methodology to meet the needs of ports now and in the future.

In order to achieve the objectives the following activities, in accordance with Formal Safety Assessment (FSA) procedures are developed:

**Hazard Identification** (task 3.2.1) including the definition / categorisation of the hazards / risks, map of the generic hazards, related to the generic port processes and actors, consequence analysis.

**Risk Assessment** (task 3.2.2) including the definition of a comprehensive matrix of exposures and indexes, the specification of the hazard risk scenarios which requires very detailed process knowledge only available at the operational site, a model to qualify (nature of potential danger/risk) and quantify (according to common risk calculations) risks, an umbrella model to determine comprehensive risks from individual process risks and tools for threat identification and vulnerability analysis, as far as the security items are concerned:

**Risk Management** (task 3.2.3) including a catalogue of suggested control options/ hazard control strategies, the application of the software tool Risk Monitoring Tool (RMT) and the evaluation of the residual risk. **Recommendations for integration and implementation** (task 3.2.4) including the platform of software tools translating the umbrella model for the development of risk scenarios and a case study suggested by the port operators.

**The main results** are a proven risk assessment for ports allowing standardisation, a proven control options to mitigate the hazards (best practices).

WP 3.2 partners are DAPP (leader), ISSUS/TUHH, IST, JRC, ISDEFE, APL, DPC, PAG.
7.3 Plans

7.3.1 Plan for using and disseminating knowledge

The objective of this section is to define the dissemination of the results of the EFFORTS project.

Dissemination is available for and to be used by especially the Sub Project leaders, Work Package leaders (horizontal and vertical), WP partners, the SP leaders, the HLG chairman, the Technical Coordination Team and Coordinator on one hand and by the market and the stakeholders on the other. An efficient and effective internal communication will lead to an efficient and effective dissemination of the EFFORTS objectives and results to the external world. Co-ordination on dissemination is consequently required; this section is for this purpose only a supporting tool. Due to the large number and diversity of partners and countries taking part in this project, a pragmatic and an effective dissemination process is required.

7.3.1.1 Planned activities overview table

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21 Press release (press/radio/TV), Media briefing, Conference, Exhibition, Publication, Project web-site, Posters, Flyers, Direct e-mailing, Film/video
22 General public, Higher education, Research, Industry (Sector x)

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Newsletters

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CD ROM

- Ready October 2009, collection of material throughout the project

Conference

- Fall 2009

Demonstrator sessions

- To be detailed in the demonstration plan (WPII activity)

Workshops

- For the SPs workshops should be organised at a time when there is a presentable result. It is planned to organise 6 workshops in total, that means two per SP.

At the Caris conference Mr Seefeldt of the Hamburg Port Authority (HPA), WP Leader 1.3. Port ECDIS will present the current results of the WP 1.3.

At the IAPH D’Appolonia will make a general presentation of the EFFORTS project. As this conference will take place closely towards the end of the project the dissemination of important results is expected, nevertheless such dissemination depends on the progress of the project on which the WP IV has no influence.

7.3.1.2 Dissemination organisation

Due to the big diversity in the thematic areas of EFFORTS, the large number of participants and countries, the organisation of the dissemination is to follow the following lines:

- The leader of dissemination activity, the TCT and Coordinator will propose to the Work Package leaders and Sub Project leaders on a yearly basis a set of dissemination activities; in this scope, a meeting will be held each 6 months to define disseminations issues.
• Work Package leaders and Sub Project leaders are responsible for identifying the dissemination needs on their speciality in the project and for addressing the TCT and Coordinator about required actions on these topics. They are also requested to contribute to and assess the dissemination activities;
• TuTech, the leader of dissemination activity will co-ordinate, monitor the progress and execute and assist in the execution of these actions, and will revise the dissemination action plan on a yearly basis for 2008, 2009 and 2010.

7.3.1.3 Target groups

The following target groups for dissemination have been identified:

1. Policy makers
Besides the policy making authorities the influence of the international interest groups or branch organisations has also to be considered. The group of policy makers can be divided into:
- International authorities (e.g. EC…);
- National and regional authorities (e.g. port and maritime authorities in different countries);
- Local authorities;
- Organisations / Interest groups (e.g. EMHC, EMPA, ESPO, FEPORT).

2. Potential users of services
This target group is the most important stakeholder for dissemination of EFFORTS activities and results, because this group represents the future beneficiaries of EFFORTS in Europe. The group includes all stakeholders that use resulting products of EFFORTS in any possible way and can be subdivided into:
- Pilots, Captains;
- Ship builder and maritime equipment providers;
- Port authorities;
- Terminal operators;
- Logistical and industrial (located in ports) players;
- Shipping agents
- ...

3. System suppliers / Developers
The target group system suppliers/developers covers the commercial companies, which are providing hardware, software and related services (in Europe or worldwide). The importance of this target group is not restricted to the development of systems and applications based on the results of EFFORTS but is also important for the application of the EFFORTS standards and architecture results in their systems and applications. This group consists of:
• Providers/developers of information and communication systems, handling systems, infrastructure (quay), ship builders;
• System operators (e.g. companies, which are operating and maintaining installations);
• ..... 

4. **Wide public**
This target group follows a broad definition. The communication/distribution focuses mainly on organisations/institutions, which have a multiplying effect for the dissemination of the EFFORTS results, like:
• Universities (transport faculties) and Transport Institutions including teaching personnel and students;
• Training facilities;
• Logistical players;
• Etc.

7.3.1.4 **Dissemination actions**
The dissemination itself is performed through dissemination actions, which are auxiliary means for carrying the information to the defined target groups in the most efficient way. The following actions are taken into consideration for supporting the dissemination of the EFFORTS results:

**Online Portal**
The online portal is up and running.

• TuTech is responsible for the elaboration and maintenance of the Internet site.
• Information updates should be provided to TuTech on its request by the TCT, the SP leaders, the HLG chairman and the Coordinator,
• On their request, EFFORTS partners can propose update to the Internet site after validation by the dissemination activity leader or SP leaders.
• All partners should link their companies Internet site to the EFFORTS Internet site.
Project Information material

Project Leaflet

The project leaflet is a small brochure in which EFFORTS is presented in a brief and well-structured way. The advantage is that the cost of printing a leaflet is rather low in comparison with newsletters or brochures. Leaflets can be distributed by mailing or by handing them out at demonstrations, fairs and exhibitions.

- TuTech is responsible for the elaboration of the leaflet.
- Information required has to be provided to TuTech on its request by the TCT, by the SP leaders, the HLG chairman and the Coordinator.

Newsletters

A full and informative 2-4 pages newsletter detailing each six months of the project will be distributed by e-mail to the freight logistics database maintained by EURIFT (TuTech) and target groups, especially ports.

CD-ROM

A CD ROM will be compiled with public deliverables and results. It will be handed out at workshops and conferences and posted.

- TuTech is responsible for the elaboration and distribution of the CD Rom.
- Required information has to be provided to TuTech on its request by the TCT, by the SP leaders, the HLG chairman and the Coordinator;
- In this scope, information required by the TCT will be provided on its request by WP leaders and partners.

Workshops

The intention is that the sub-projects (SP) hold workshops on their specific topics as an informative event on the current state of the research. It is also envisaged to hold a global EFFORTS workshop (integrating the three SPs) if the project progress allows it. The intention is to get feedback from the persons, organisations and companies that are interested or affected by the results of the research. So such a workshop should be held at a good date during the work, where either the planned activities are presented or at an early stage of the work. In the latter case this enables the SP to fine tune their research work with the help of the feedback from the participants of the workshop.

A second workshop should be held than after some progress has been made but it is still possible to include suggestions from the stakeholders.
Planned: 6
Max 2 per year
Number of participants: 20
Duration: One day

Typically, a workshop will be organised in such a way that after the presentation of the relevant information and results a structured discussion about it gives feedback to the SP members.

- TuTech is responsible for the organisation of the workshops, in collaboration with the TCT, the SP leaders, the HLG chairman and the Coordinator
- TuTech will take care that the workshops are organised and will for that purpose contact the SP leaders in order to coordinate the necessary steps.
- On request of the SP and WP leaders specific workshops can be organised.
- The SP leaders, WP leaders and partners will have to contribute to the content of the workshops

**Demonstrator sessions**

Demonstrator sessions are information sessions organised on a specific topic in the research field of EFFORTS focussing on one or more target groups. Demonstrators do have the goal to inform and create awareness to an audience as big as possible about the results of the EFFORTS research activities either on a policy level, on user level or towards system suppliers and developers so the intention lies not so much on the feedback from the participants but a greater number of participants than in the workshops is intended.

So a demonstrator session should be held when sound research results can be demonstrated.

At the end of the project, a final live show will be envisaged to show EFFORTS best of breed results.

**Presentations and Papers**

Presentations and papers will be made at workshops, conferences and trade shows across Europe.
• Partners are encouraged to disseminate the (intermediate) results of the project during conferences by presenting the project in a conference and/or the submission of a paper for a conference.

EFFORTS consortium will produce at least two conference papers per year and will present the project at two international conferences per year.

Scientific articles

Academic partners will work to submit scientific papers to international and national peer reviewed journals.

Press articles

Of equal or greater importance, partners will write and submit for publication articles to trade papers and magazines across the EU.

TuTech will compile a list of trade papers and magazines across the EU:

Every partner is free to write an article for a newspaper or magazine, before publication it must have been audited by the TCT, the SP leaders, the HLG chairman and the Coordinator.

Special events or external meetings

A partner is encouraged to represent EFFORTS during special events or external meetings and to disseminate during these meetings the EFFORTS (intermediate) research/results. A partner representing EFFORTS during a formal event or formal external meetings, either on a national basis or international basis, has to handle documents produced in EFFORTS or research results of EFFORTS with special care.

Representing EFFORTS in special events or external meetings needs to be communicated in advance with the TCT, the SP leaders, the HLG chairman and the Coordinator. The use of confidential or draft EFFORTS documents and intermediate EFFORTS research results during these missions require agreement of the TCT, the SP leaders, the HLG chairman and the Coordinator.

7.3.2 Gender Action Plan

EFFORTS will follow an action plan to promote gender equality within the framework of the project. The plan will be implemented from the beginning of the project and monitored by the project board. Summarizing, the plan will cover the following actions:

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The thematic area of the proposed project is not associated with gender issues.

- Actions to ensure that more women are brought into the project, particularly as subproject and work package leaders and as members of the Board and management committees;
- Linking with networks of women scientists in the maritime field;
- Linking with schools and universities, to trigger the interest of women in the project, particularly during the implementation of the training parts.
- Organising a workshop to raise awareness about the need to increase gender equality in the maritime field.
- Actions to ensure that System Requirements in the various subprojects take the gender dimension into account, to guarantee to biases are introduced which disadvantage women operators.
- Complementarily, action to guarantee that the testing and evaluation procedure ensures that System Requirements are met in what refers to gender neutrality.

### 7.3.3 Gender Issues

EFFORTS will comply with the policy of equality between women and men enshrined as one of the European Union’s objectives in the Treaty of Amsterdam, 1997, Articles 2 and 3.

It will also comply with the aims of the Community Framework Strategy on Gender Equality (2001-2005) and the Communication “Women and Science: mobilising women to enrich European Research”, which was adopted by the Commission in 1999.

The impact of gender issues will be specifically considered in the project in WP III. The promotion of the role of women and of gender equality in RTD which is one of the central aspects within the European Research Area, will thus be taken into account. The main objectives with a view to promoting gender equality will focus on:

Promotion of opportunities of women employees in the particular field of maritime operations. The objective is to achieve an increase in the percentage participation of women in EFFORTS with respect to previous projects of the E.C.

Increase of women employees being placed at key positions in EFFORTS as subproject /task leaders.

All work packages in EFFORTS are gender-neutral in terms of suitability for employment.

The thematic area of the proposed project is not associated with gender issues.

### 7.3.4 Raising public participation and awareness

A great number of factors influence the development and adoption of Pan-European solutions to accommodate competitive and sustainable port industry, fulfilling the
defined objectives. A systematic approach has been established depicting project objectives, goals and time schedule. The work packages have been grouped in different Sub Projects, bringing together the necessary resources and expertise to undertake the defined project activities. Stakeholders must be brought together to participate to the process.

There’s a vast number and variety of port stakeholders like e.g. authorities, industry, operators. Most of them are funnelling their interest in local, regional, national and international organisations. An underlying factor is the public / private organisation differences. The different actors are not always governed by the same agenda and conflicting interests may occur from time to time. Business interests may in some situations hamper open cooperation as competition is overshadowing an objective scrutiny of all elements in the situation.

It is a challenge to approach all the different stakeholders as their level of knowledge of the overall situation differs depending on their role in the port process. The harbourmaster, a pilot, a tug master, an environmental manager... are all linked together by elements in a global process. This fact must be taken into account.

It is thus a challenge for the EFFORTS project to approach the user- and stakeholder communities to investigate their needs, discuss and propose adequate solutions.

To accommodate this challenge the EFFORTS partners benefit from the existing networks established in previous EC and national projects. This ensures that previous contacts are developed further and magnified by new contacts in course. The process of dissemination is conducted to accommodate the requirements of the different stakeholders by preparing general information as well as dedicated information for individual groups of interest. All relations with the public are based on a “Win–Win” approach aiming at promotion of a positive atmosphere to create successful and beneficial solutions for the port industry.
8 Description of Project Management

EFFORTS is an ambitious project involving various complementary partners, having their own competencies and know-how, which have to be managed in the most coherent way to reach the project objectives. In this scope, a specific management structure and related procedures are created in order to ensure:

- The overall management of the project (in terms of resources, schedules and activities)
- The integration of activities, sub-projects and work packages
- The collaboration between partners and with EU commission representatives
- The quality of the results
- Their widest dissemination

A transparent management structure with short decision and contact lines is essential for the success of a complex project such as EFFORTS.

8.1 Management and Decision-Making Structure

The management structure consists of:

- The Project Coordinator
- The Technical Coordination Team
- Sub-Project and Work Package leaders
- The High Level Group (Support Group)
- The Management Board
8.1.1 Project Coordinator

The EFFORTS Project Coordinator (PC) is Valerio Recagno from D’APPOLONIA. The PC together with his team is well experienced in the management of large projects including EC projects. They are familiar with the rules to be applied and the structure of related entities. They also know a high percentage of the consortium what fosters efficient communication and co-operation. The PC is in charge of:

- Project administration (partners participations etc.)
- Financial administration (cost monitoring, accounting, consolidation of yearly management report, etc.)
- Legal and contractual issues: the PC will notably manage the Consortium Agreement and Technical Annex (in administrative terms), in collaboration with TCT (for technical and scientific aspects)
- Management Board meetings organisation
- Quality definition (quality assurance handbook) and administration (planning, tracing, storage)
- Information management (documents, deliverables, workshops presentations etc.)
• Communication with EC on these aspects

8.1.2 Technical Coordination Team

The comprehensiveness and complexity of EFFORTS and its ambitious objectives requires high efforts for technical co-ordination at project, SP and WP levels by continuously monitoring and validating work progress and providing or organizing support to project partners.

In this scope, a Technical Coordination Team (TCT) is created with the main purpose to integrate the project and to organize the overall EFFORTS development in the most coherent way. The TCT will insist on deliveries according to agreed WP content (notably on their form). The TCT is in charge of ensuring the overall quality of work performed during EFFORTS and the integration between SP. The TCT will act as the necessary link in-between SP. To fulfil these objectives, the TCT will work in strong and constant relations with the Support Group, SP and WP leaders.

The role of the TCT will evolve during EFFORTS development:

• For a first step, so-called “verification phase” (month 1 – month 8), the TCT had the main purpose to provide to European Commission, in collaboration with SP and WP leaders (and after review and recommendations of the Support Group), a list of research projects / WPs, presented under a comprehensive and common form, answering to pre-identified effective needs from the port community world and considered as real innovations (compared to the existing State of the art)

• For a second step, so-called “realisation phase” (month 9 – month 42), the TCT will have the main purpose to ensure a more classic role of coordination in research project, with a strong care to guarantee integration of developments and results

An important role of the TCT concerns the elaboration of Technical Annex, in collaboration with SP and WP leaders and PC, notably the final version which will be elaborated in between the two verification and realisation phases (during month 8), based on the definite choices of the European Commission.

Objectives

- Detailed research and development road map
- Efficient and effective development
- High quality and usability of development results
- Added value of individual achievements by integration

Activities

- To assess technical developments
- To update the Description of Work (with main version at month 8)
- To ensure the overall integration of project developments and products
- To prepare the programme of activities, and propose changes to the project, SP or WP if necessary
- To ensure management of troubleshooting (at technical level), solve technical issues or technical conflicts between parties, at the end of the escalation process
- To review the project progress in reference to objectives and
schedule (work program, time planning, achievements etc.)
• To organise the preparation and consolidate technical progress reports (activity reports) to be submitted to the EC
• To determine project deliverables and the allocation of funding among partners
• To manage co-operation between SP and partners at project level
• To manage relationship to relevant external entities (project officer, ....) regarding scientific and technical issues
• To support the PC in all management issues with scientific relevancy
• To propose exclusion of defaulting partners, and implement the competitive selection procedure for new contractors
• To decide on terms and conditions of access rights to (pre-existing) knowledge (in close collaboration with the Management Board).
• To manage ethical aspects, mostly concerning partners that will be co-operating directly, as well as the gender equal opportunity and issues

Members
The Technical Coordination Team will be composed of the Scientific Coordinator, i.e. Mr Jens Froese from ISSUS, of Mr Jean-Louis Deyris from ICES and Mr Yann Trémeac from TLA.

Mr .J. Froese as Scientific Coordinator is responsible for the realisation of the different coordination activities. Mrs J-L Deyris and Y. Trémeac will assist him in the realisation of coordination tasks, and complement TCT know-how by bringing specific competencies (socio economy, ...). Work might notably be shared between TCT members on a geographical basis (e.g. for ports needs collection).

Organisation
The TCT will organise different meetings with SP leaders. First meetings will allow to review and approve the detailed schedule of each SP implementation. Subsequent meetings will allow to control SP progress and ensure integration of its WP. Between these meetings, interim contacts (e.g. conference calls) will take place on a monthly basis. The TCT will set the agenda of the meetings and conference calls.

The TCT will also be present at the Management Board meetings.
8.1.3 High Level Group (HLG)

8.1.3.1 Purpose of the High Level Group

The purpose of the High Level Group (former named Support group) is to validate the main scientific or technical results of EFFORTS and to deliver some relevant guidance to the TCT and to act as an expertise team for the project and for the European Commission.

During the verification phase, the work wasn't enough advanced to need to review it through a HLG.

Now the HLG has to be redefined, taking into account the real difficulties to involve leading actors which are very busy and reluctant to spend time on matters with unclear issues.

From the verification phase experience, it appears that the HLG should concentrate in helping the TCT to focus on the more promising issues stemming from their own experience or to put into light some points which should be improved.

During the realisation phase, the HLG will review project achievements, giving proper expertise at the important milestones of the different main sub-projects (detailed specifications, architecture design, unitary tests in laboratory, demonstration results, final evaluation and exploitation). The HLG further will support in dissemination of project results.

Following the recommendation by the commission the project established a cooperation with the EHMC. Capt. Lems, harbour master of the Port of Rotterdam, will support the research and development in EFFORTS.

8.1.3.2 Composition of the HLG

The HLG is chaired by Mr. Geoffroy Caude, general manager of CETMEF (French Technical Institute for Maritime and Waterways Studies), partner of the EFFORTS project. It is composed of four European permanent experts or professionals g in several fields (navigation, terminal operation, environment...):

- Geoffroy CAUDE, manager of CETMEF
- Captain Yang BIN, chairman of COSCO Europe
- Pierre-Henri THUEUX, intermodal logistic manager CMA-CGM
- Joerg POLLMANN, Harbour master, Port of Hamburg or
- Captain Jaap LEMS, harbour master port of Rotterdam

Possibly other experts could be involved: for instance a permanent expert from American ports (AAPA) and some more punctual experts for particular topics which could raise discussion.

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8.1.3.3 Meetings of HLG
For the realization phase, the HLG will meet on a basis of one or two meetings a year depending upon the pace of achievement of the project with main objective to examine each sub-project production at different relevant steps.

The first meeting of the HLG should be held in the 2nd week of November 2008 (with SP leaders and TCT).

HLG meetings will be called, organised and managed by CETMEF, which will also take care of preparing the minutes of meetings accordingly with the project quality standards.

8.1.4 SP and WP leaders
To ensure the project is well-managed at SP-level, each SP is assigned a SP leader (SPL). Based on EC evaluation comments, ports have been designed so as to ensure SP leadership. She / He is responsible to ensure the successful completion of its SP (in time, in resources and objectives achievements). SPLs will assist the TCT in scientific and technical coordination and PC in the monitoring of the work progress. Each SPL will be in charge of providing a detailed work plan for the SP he is responsible for. A kick-off meeting is to be scheduled before the launching of each SP. SPL will organise internal SP meetings with WP leaders and participants at least two per year. An ad-hoc meeting can be called upon request of different SP members or in case of emergency upon the written request of one SP member.

The PC or members of the TCT Team shall participate to these meetings, as appropriate.

The WP leader (WPL) is responsible for the implementation of the WP programme and of the content and the quality of the work performed. The WPL is in direct and constant contact with the PC and TCT, other WPLs and WP participants. The WPL takes decisions reaching across individual work packages. The WPL reports to the SPL and the TCT.

Objectives
- Achievement of WP objectives
- Periodic reporting
- Management of expenditures

Activities
- To ensure the scientific monitoring and co-ordination of the WP and their implementation.
- To monitor the implementation of tasks within WP on the basis of planned deliverables and milestones
- To motivate partners of the WP to perform their tasks in the duly and timely manner
- To ensure that agreed protocols and procedures are respected
- To provide assistance to the partners seeking guidance
Organisation

WPL will organise internal WP meetings with WP participants. The PC or members of the TCT Team shall participate to these meetings, as appropriate.

8.1.5 Management Board

The Management Board of EFFORTS will be overseeing the overall EFFORTS work programme as a management body of the project consortium. Every major decision related to EFFORTS will have to be formally approved by the European Commission and the Management Board. The Management Board shall also have the authority to identify knowledge that should be subject to either protection, restricted use or wide dissemination. The proposals for these decisions will be made by the TCT, on the basis of the planned publications and activity reports issued by SP.

The management board consist of one representative of each (i) D’APPOLONIA as Project Coordinator, (ii) ISSUS/TUHH as leader of the Technical Coordination Team, (iii) CETMEF as leader of the High Level Group, and one representative of each SP Leader with main objectives to achieve integration in between SP and verify project achievements. It will play the role of platform where the TCT-leader, SP leaders, HLG representative and PC have their place to talk, exchange information, opinion... and where consensus can and must be found.

The first management board meeting will allow to review and approve the detailed schedule of the project implementation. Subsequent meetings will allow to control project progress and ensure integration of activities.

Objectives

Align project objectives with partners’ business needs and strategies

Ensure the compliance of the project objectives and implementation with the joint research strategy

Facilitate co-ordination with other on-going research projects where relevant

Resolve potential conflicts between partners in the project

Activities

Approval of Description of Work and the Plan for use and Dissemination

Approval of the consortium budget and the allocation of the European Commission’s grant among various activities and partners

Validation of the incurred expenditure in accordance with the budget

Authorization of the accession of a new partner or withdrawal of an existing partner

Members

one representative of each

- D’APPOLONIA as Project Coordinator,
- ISSUS/TUHH as leader of the Technical Coordination Team,
- CETMEF as leader of the High Level Group
- and one representative of each SP Leader

These members will be entitled to jointly carry out most of the obligations related to the contract with the EC and to oversee the overall project implementation.

Organisation

Meetings organisation will be flexible and set up according to requirements occurring along the project. Meetings will normally take place twice a year. In case of emergency it will be possible to call an ad-hoc meeting upon the written request by one of the members.
9 Project Time Table

Sheet 1/6:

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### WP III: Education, Training and Human Development

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#### Deliverables

- D III.1: Port Training Needs Report
- D III.2: European Port Training Inventory Data Base
- D III.3: European Port Training Report
- D III.4: European Port Training Data Base

### WP IV: Exploitation, Protection of IP, Dissemination

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#### Deliverables

- D IV.1.1: Exploitation Plans guidelines
- D IV.2.1: Knowledge management plan
- D IV.2.2: Knowledge exploitation
- D IV.2.3: Recommendations for future developments and new policies
- D IV.2.4: Recommendations for future developments and new policies
- D IV.3.1: Dissemination plan
- D IV.3.2: Online web portal
- D IV.3.3: Project leaflet
- D IV.3.4: 1st Newsletter: (1st newsletter month 1, next month 12)
- D IV.3.5: 2nd Newsletter
- D IV.4.1: CD-ROM
Sheet 4/6:

### WP 1.3 Port ECDIS

**Duration**

**Milestones**
- M 1.3.1 Potential users and requirements
- M 1.3.2 Port ECDIS specification (first specification phase)
- M 1.3.3 Port ECDIS specification (new specification)
- M 1.3.4 Port ECDIS prototype (basic dataset)
- M 1.3.5 Information of relevant national and international bodies to in
- M 1.3.6 Port ECDIS prototype (extended dataset)
- M 1.3.7 Tests with Port ECDIS prototype and evaluation of tests (incl)
- M 1.3.8 Port ECDIS follow-up requirements (first phase)
- M 1.3.9 Port ECDIS follow-up requirements (second phase)
- M 1.3.10 Port ECDIS demonstration

**Deliverables**
- D 1.3.1 Potential users and requirements (structured questionnaire, etc)
- D 1.3.2 Port ECDIS specification (document)
- D 1.3.3 Port ECDIS prototype (software and dataset)
- D 1.3.4 Tests with Port ECDIS prototype (based on basic dataset) and
- D 1.3.5 Port ECDIS follow-up requirements (document)

### WP 2.1 Clean Energy Management

**Duration**

**Milestones**
- M 2.1.1 Input data validation...
- M 2.1.2 Energetic solution development results validation...
- M 2.1.3 Evaluation results of virtual solutions implemented...
- M 2.1.4 Final presentation of results and recommendations

**Deliverables**
- D 2.1.1.1 Report including final energy requirements in ports
- D 2.1.1.2 Report including the potential of RGS for different European g
- D 2.1.1.3 Simplified computer-based scenario development platform for
- D 2.1.1.4 Simulation running results report after introduction of the ch
- D 2.1.1.5 Evaluation and recommendation report

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**EFFORTS**
EC Contract No. FP6-031486

### Sheet 5/6:

**WP 2.2 Water Quality**

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**WP 2.3 Port Air Quality**

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<td>D2.3.3: Demonstration and validation [improvement for ports] report</td>
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**WP 2.4 Noise Annoyance of Ports**

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Document Code: EFFORTS-WPI.1-DEL-300908-TUHH-FINAL-Description of Work
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## Detailed Work Description

### 9.1.1 Work Package List

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23 The total number of person-months allocated to each workpackage (and are referred to the II phase of the project – M13-42).
24 Relative start date for the work in the specific workpackages, month 0 marking the start of the project, and all other start dates being relative to this start date.
25 Relative end date, month 0 marking the start of the project, and all ends dates being relative to this start date.
26 Deliverable number: Number for the deliverable(s)/result(s) mentioned in the workpackage: D1 - Dn.

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<td>O</td>
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27 Deliverable numbers in order of delivery dates: D1 – Dn
28 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.
29 Please indicate the nature of the deliverable using one of the following codes:
   R = Report
   P = Prototype
   D = Demonstrator
   O = Other
30 Please indicate the dissemination level using one of the following codes:
   PU = Public
   PP = Restricted to other programme participants (including the Commission Services).
   RE = Restricted to a group specified by the consortium (including the Commission Services).
   CO = Confidential, only for members of the consortium (including the Commission Services).
<p>| D IV.1.1 | Exploitation Plans guidelines | Month 16 | R | PU |
| D IV.2.1 | Knowledge management plan | Month 17 | R | CO |
| D IV.2.2 | Knowledge exploitation | Month 36 | R | CO |
| D IV 2.3 | Recommendations for future developments and new policies – interim | Month 32 | R | PU |
| D IV 2.4 | Recommendations for future developments and new policies –final | Month 42 | R | PU |
| D IV.3.1 | Dissemination plan | Month 13 | R | PU |
| D IV.3.2 | Online web portal | Month 1 | O | PU |
| D IV.3.3 | Project leaflet | Month 13 | R | PU |
| D IV.3.4-8 | Newsletters in final phase | Month 25, 31, 37 ... | R | PU |
| D IV.3.5 | CD-ROM | Month 42 | O | PU |
| D 1.1.1 | Report and software module for 3D potential flow code | Month 33 | R | CO |
| D 1.1.2 | Report and software code for fender/collision computation | Month 33 | R | CO |
| D 1.1.3 | Report on architecture for moving lee zones | Month 32 | R | CO |
| D 1.1.4 | Demonstration of tug simulator including all the developed features | Month 36 | D | CO |
| D 1.1.5 | Combined tug master-pilot training course | Month 39 | D | PU |
| D 1.2.1 | Pilot situation display software | Month 34 | O | CO |
| D 1.2.2 | Tug master situation display software | Month 36 | O | CO |
| D 1.2.3 | VTS-centre/ Harbour office situation display software | Month 37 | O | CO |
| D 1.2.4 | Protocol description standard for Pilot-Tug-VTS communication | Month 38 | R | PU |
| D 1.2.6 | Shadow effect for tugs | Month 30 | R | PU |
| D 1.3.1 | Potential users and requirements (structured questionnaire, study) | Month 29 | R | PU |
| D 1.3.2 | Port ECDIS specification (document) | Month 32 | R | PU |
| D 1.3.3 | Port ECDIS prototype (software and dataset) | Month 42 | O | CO |</p>
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<td>Port ECDIS follow-up requirements (document).</td>
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<td>D 2.1.1</td>
<td>Report including final energy requirements in ports (PAH)</td>
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<td>D 2.1.2</td>
<td>Report including the potential of RES for different European ports, and the evaluation of different concepts and scenarios for the implementation of a DPE in ports, and the mapping tool</td>
<td>33</td>
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<td>D 2.1.3</td>
<td>Simplified computer based scenario development platform for decision making and concept evaluation to provide solutions for environmental-friendly and low cost solutions (which will be owned &amp; operated by CT)</td>
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<td>Simulation running results report after introduction of the chosen scenario (CT)</td>
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<td>Evaluation and recommendation report (PAH)</td>
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<td>D 2.2.1</td>
<td>Report identifying properties of available active substances, previous test results, feasibility for onboard use, selection of active substances &amp; micro-organisms for laboratory scale test trials.</td>
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<td>Test results from the laboratory scale trials, recommendations for full/large scale test trials.</td>
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<td>Systems design for full/large scale test trials, results, conclusions and recommendations.</td>
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<td>Requirements</td>
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<td>32</td>
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<td>D 2.3.3</td>
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<td>Handbook of Process Modelling – A guide to create process diagrams</td>
<td>Month 12</td>
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<td>D 3.1.2</td>
<td>Process Ontology and Process Modelling Platform</td>
<td>Month 12</td>
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<tr>
<td>D 3.1.3</td>
<td>Port Process Map</td>
<td>Month 22</td>
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<td>D 3.1.4</td>
<td>Procedure Model for Specification, Implementation and Quality Assurance of Interfaces</td>
<td>Month 29</td>
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<td>D 3.1.5</td>
<td>Prototype Framework for development and testing of Interoperability solutions, based on standard business Cases</td>
<td>Month 26</td>
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<td>D 3.1.6</td>
<td>Prototype System for port process optimisation</td>
<td>Month 33</td>
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<td>D 3.1.7</td>
<td>Verification and Validation of the Pilot Installation</td>
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<td>Month 20</td>
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<td>D3.2.2</td>
<td>Risk Assessment (Report and procedural model of Risk Management Framework developed in EFFORTS for risk assessment)</td>
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<td>D3.2.3</td>
<td>Risk Management ( Report, procedures and software tool RTM )</td>
<td>Month 34</td>
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<td>D.3.2.4</td>
<td>Recommendation on Techniques &amp; strategies for integration and implementation (Platform of software tool &amp; case study)</td>
<td>Month 38</td>
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9.2 Work Package Descriptions

9.2.1 Horizontal Work Packages

WP I: Co-ordination and Management

<table>
<thead>
<tr>
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Objectives
This WP will ensure the overall co-ordination of the consortium and the management of all related activities and achievements. It is split into two tasks, the administrative and financial co-ordination and the technical-scientific co-ordination.

The overall co-ordination objective is to manage the consortium in order to maximise project achievements in the most efficient way and in the view of European cohesion and harmonization. Hence the work package is not restricted to mere production activities but includes teambuilding and avoidance of group conflicts. Successful European networking in the field of port research and operation lasting beyond the duration of the project is an identified spin off to be achieved.

Description of work

Task I/1: Administrative and financial co-ordination
Task leader, and at the same time work package leader, D'Appolonia will be responsible for

- Consortium Agreement
- Contract preparation
- Association and withdrawal of consortium partners
- Budgeting and allocation of funds
- Control of project resources
- Financial and administrative procedures
Reporting according to the EC-requirements and according to agreed consortium standards

- Communication between the consortium and the EC
- Organisation of administrative and financial meetings
- Organisation of evaluation meetings and audits
- Organisation of Management Board Meetings
- Communication with the High Level Group (HLG)
- Management of administrative and financial conflicts within the consortium and in relation to the EC.

**Task I/2: Technical Co-ordination**

This task is dealt with by the Technical Co-ordination Team (TCT) under the leadership of ISSUS/TUHH supported by TLA and ICES. The TCT is responsible for

- Monitoring all technical and scientific development
- Assessment and evaluation of work plans and achievements
- Assessment of reports and deliverables
- Quality assurance
- Organisation of technical meetings and workshops
- Organisation of demonstrations
- Organisation of TCT-meetings
- Communication with the project co-ordinator
- Contribution of technical content to all reports according the requirements from the EC and according to internal standards
- Consortium help desk for all technical and scientific issues
- Links to relevant national, European and international projects to exchange information in order to avoid double work and to achieve synergies.

**Milestones and expected result**

- M I.1: Development kick off (month 13),
- M I.2: Detailed WP work plans (month 13)
- M I.3: First progress assessment (month 19)
- M I.4: Consortium meeting and second progress assessment (month 25)
- M I.5: Third progress assessment (month 31)
- M I.6: Forth progress assessment (month 37)
- M I.7: Consortium meeting and final progress assessment (month 41)
- M I.8: Final Conference (month 42)
**Deliverables**

D I.1: Description of Work (DoW) – Implementation Plan (month 29 – September 08)
D I.2: Quality Plan (month 13 – May 07)
Further deliverables according to the EC reporting requirements
WP II Integration

<table>
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Objectives

EFFORTS sub-projects and work packages are dealing with distinct aspects of port and terminal operations. The WP “Integration” aims at comprising a coherent set of project components having the potential to improve port operations significantly. The integration activities, however, may not blur the potential of individual research results but result in an umbrella concept clearly showing the pre-requisites and impacts of those results. The solutions to improve the effectiveness of port operations are not uniform for all European ports, therefore tailor-made selections of project results must remain possible even if the integration aspect has a very high significance and hence is a top goal of the project approach.

According to the EC-guidelines “Provisions for Implementing Integrated Projects” the following integration aspects shall be considered:

- Vertical integration
- Horizontal integration
- Activity integration
- Sectorial integration
- Financial integration.

There is no “financial integration” of resources other than from EC and the consortium partners, however, indirect financial benefits are expected from close co-operation with other EU-projects (such as MARNIS and MOSES) and relevant national projects in order to avoid double work and to base EFFORTS developments on a wider state-of-art platform.

The other o.m. integration objectives will be achieved by

- the EFFORTS management structure jointly with the “high level group” to ensure “vertical” (from “user” to “researcher” and vice versa) and “horizontal” (multidisciplinary approach) integration”,
- the EFFORTS activities levels mirrored in the “Description of Work”
  - vision
- research plan
- development
- validation
- demonstration
- dissemination
- training
- exploitation

to ensure “activity integration”,

- the composition of the EFFORTS consortium consisting of industry (mostly SMEs), administration, academia and consultants to ensure “sectorial integration”.

This WP covers the tasks
1. Evaluation
2. Demonstrations
3. Validation.

The other above stated integration aspects are covered by
- WP I: Co-ordination and Management
- WP III: Education, Training and Human Resources Development
- WP IV: Exploitation, Protection of Knowledge and Dissemination
- The High Level Group (advisory body).

WP 3.1 “Port Processes” provides the integration platform on working level elucidating interrelations and interdependencies of individual processes.

### Task II/1 – Evaluation

#### Objectives

This WP is dedicated to provide the methodology, guidelines and performance plan for evaluation of detailed task objectives, work plans, methodologies and applied technologies and tools in order to identify the most appropriate (in scientific, technical and economic terms) approach and to ensure optimum interoperability and interconnectivity.

#### Description of Work

Development of a methodological framework based on the project/WP/task objectives, a plan and procedures for both, continuous and event-based (e.g. trials) evaluation.
Milestones and Expected Results
- Methodological framework (Month 18 - October 07)
- Evaluation results (Month 35 - March 09)

Deliverables
- Evaluation Guidelines and Procedures (month 18 - October 07)
- Evaluation Report (month 35 - March 09)

Task II/2 – Demonstrations

Objectives
Demonstrations is an essential part of EFFORTS in order to assess development results under real-life conditions but also to involve related project-external parties and to disseminate results in the most efficient and convincing way. In order to achieve a high efficiency, demonstrations are causing high costs through installation and organisation efforts, activities will be focused on regional demonstration ports wherever possible.

Description of Work
Synchronization of individual work plans to allow for comprehensive demonstrations. Organisation of demonstrations jointly with related working parties, ports and port communities and policy makers. Wherever possible related events of other parties, such as other projects, workshops, conferences or fairs, shall become combined in order to address and attract a larger participation and audience. A close co-operation with WP IV is required.

Milestones and Expected Results
- Demonstration Plan (schedules, participants and contents) (Month 30 – October 08)
- Evaluation and Assessment of Demonstrations. (Month 39 – July 09)

Deliverables
- Demonstration Plan (month 30 – October 08)
- Demonstration Report (month 39 – July 09)

Task II/3 – Validation

Objectives
Validation comprises all assessment activities in relation to technical (performances, ...), social (impacts on employment, working conditions, security, qualification, training, ...), societal (impacts on environment, safety, ...), economic (investments, exploitation and maintenance costs, ROI) and ecologic issues. The validation will reflect the achievement
of the quantified WP-objectives but also provide related future trends and technologies and recommended strategies.

**Milestones and Expected Results**
- Validation objectives, methodologies and procedures (Month 29 – September 08)
- Validation plan (schedules and participants). (Month 33 – January 09)

**Deliverables**
- Validation Guidelines (months 33 – January 09)
- Validation Report (month 39 – July 09)
- Report Future Trends (month 42 – October 09)

**Deliverables**
D II.1.1 Evaluation Guidelines and Procedures (month 18 – October 07)
D II.1.2 Evaluation Report (month 35 – March 09)
D II.2.1 Demonstration Plan (month 30 – October 08)
D II.2.2 Demonstration Report (month 39 – July 09)
D II.3.1 Validation Guidelines (months 33 – January 09)
D II.3.2 Validation Report (month 39 – July 09)
D II.3.3 Report Future Trends (month 42 – October 09)

**Milestones and expected result**
M II.1.1 Methodological framework (Month 18 – October 07)
M II.1.2 Evaluation results (Month 35 – March 09)
M II.2.1 Demonstration Plan (schedules, participants and contents) (Month 30 – October 08)
M II.2.2 Evaluation and Assessment of Demonstrations (Month 39 – July 09)
M II.3.1 Validation objectives, methodologies and procedures (Month 29 – September 08)
M II.3.2 Validation plan (schedules and participants) (Month 33 – January 09)
WP III  Education, Training and Human Resources Development

### Workpackage number

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### Needs of Ports

#### Objectives

Effective Port operations are central to the success of the Shipping and logistics chain. Sub-projects 1, 2 and 3 deal with the technological, environmental and process aspects of port operations. While all of these facets of the operations are critical and greatly contribute to success and efficiency, the human resource holds the key to continued success, competitiveness and sustained growth.

The objective of this work package therefore will be to ensure that we research how best to invest in the development of our greatest resource, our people.

The ultimate objective will be to develop a “Skills and Competency Ports Passport” for those who work in European Ports and to set a benchmark for integrated training and development programs to ensure greater operational cohesion and freer movement of people across the EU in line with the strategy as outlined in ‘The Blue Book’. This will in turn lead to better levels of business knowledge enhancing inter-change of staff and helping to establish a culture that will align business strategy with the human development strategy. This includes the development of a strategy to provide and exploit training facilities on European level in order to achieve both, a high-level staff qualification and cost savings in training equipment such as simulators.

Ports have a long tradition in work organisation and drastic changes in operations and organisations are hard to achieve especially when higher productivity results in job losses. The very nature of the business is greatly influenced by global events, such as the current volatility of fuel prices, thus there is a requirement for future proofing based on known trends. Training and education not only for the ports environment but also to foster transferability of staff to related areas other than port logistics therefore is an essential part of effective change management. This aspect therefore will also be covered by this WP.

The active participation of the international trade movement as well the associations of port operators will be sought to complete in order to make the outcomes of this work
package acceptable to all actors across the entire spectrum of port operations.

**State of the art**

The current process is somewhat haphazard with standards differing from country to country and within countries. In general ports tend to either outsource their training needs or provide them in-house. It is rare to find cross-sector training and development schemes within the Shipping and Logistics chain. Consequently, uniform standards of the definition of skills and competencies required in the business are difficult to find. The novel EFFORTS approach will greatly enable harmonisation in this area with the emphasis on port processes which are, of course, common to all ports. In line with this approach, there is a need to investigate greater concentration on the provision of shorter term and targeted training directed towards filling training gaps in ports.

The legislative and operational environment too is complex and disparate. There are many operational and legislative models within Europe and there are numerous players within the chain. However many of the challenges to employees and managers are common to all. The need to be at and remain at, the leading edge of knowledge and expertise are prerequisites. A number of models for development exist within Europe.

Livorno and Dublin have co-operated in this field over a number of years and TUHH since 5 years is active in developing academic curricula for the port management level, which currently exist only on national level in very few member states. Livorno, with the assistance of EU Funding have already developed an Observatory of Port Professions which is web based software profiling the job, training and development needs of all employees across some 70 companies within the shipping and logistics chain. Dublin Port Company in association with Livorno, FAS, the National College of Ireland, and Technical University of Hamburg-Harburg (TUHH) has developed a skills and competencies development network within the port environs. The network has conducted a training needs analysis in partnership with FAS, the Irish State training and development agency. The network will provide over 6000 training days to some 2500 employees in 2006-2007.

**Deficiency/aims of improvement**

While port companies and authorities may not experience the same degree of difficulty, other companies within the chain report great difficulty in recruiting and retaining staff of the highest calibre. Given the small scale of many operations, defining and delivering training and development programs can be beyond the reach of some for financial and operational reasons. Many port companies and authorities on the other hand, experience a different set of challenges, arising from difficulty in aligning a civil service style culture to the culture of modern business. The reasons for deficiency are many and varied. Many companies experience high levels of turnover of key staff for a number of reasons including lack of mobility, few opportunities to develop limited opportunities for promotion and frequently, inhospitable working environments. The establishment of a European Port Skills and Competencies will undoubtedly assist in addressing some of these problems, in improving organisational culture, in assisting
Educational and training institutions in focusing on the needs of the industry and in contributing to a perception of shipping and logistics as a desirable career prospect for future employees. It will also assist the establishment of an informal network of port employees which will enable through social interaction a fuller understanding of the many and varied port processes. A clearer view of existing barriers to sectoral organisational cohesion will also assist legislators in planning a more coherent ports services environment for Europe.

Member state ports do not have the same level of training equipment such as for example simulators. A European Port Training Inventory and access opportunities shall contribute to achieve and raise common standards and exploit synergies in the use of training facilities.

**Methods/Tools**

The methodology will build on the Livorno/Dublin model, using the software package already developed by Livorno. The WPIII strategy will be to fundamentally re-direct the current Livorno ‘Observatory’ to be based on port processes and to move away from the previous base of roles and responsibilities. On an academic level the approach for national purpose developed by TUHH will become extended for European application jointly with Imperial College and ICES thus involving the member states Ireland, Italy, Spain, Poland, France and Germany to ensure acceptance of results on European level.

**Description of work**

In consultation with all participating ports we will;

- Profile company organisation.
- Describe employees’ roles and duties
- Profile company functions
- Describe production/operational processes (in close cooperation with WP3.1)
- Describe the skills, competencies and expertise related to the production/operational processes
- Survey staff attitudes and behaviours with a view to determining the gap between desired organisational culture and that existing
- Produce training and development reports to the individual participant companies to assist future strategic development and company development
- Investigate the significance of training for the introduction of new technologies and change management
- Produce a high level training and development plan based on findings and also on the output from the other sub projects within efforts so as to ensure that functions roles and processes are properly aligned to employees’ skills competencies and expertise
- Suggest a skills and competencies port passport for European ports.
The ensuing findings will be tested in a selected number of sites with the assistance of our university and occupational psychology partners.

Expected results/beneficiaries:
- A European port operations skills and competency passport.
- A profile of the training learning and development needs of ports in Europe.
- An inventory of employment in port operations.
- An inventory of structures and functions with ports and a description of the various models of management and service delivery.
- Greater understanding of barriers to the development of the human resource within ports.
- Greater mobility among staff.
- Production of information databases of assistance to universities and training institutions and organisations.

The production of an enhanced observatory for all port operations, benefiting all involved in port operations, legislators and planners, training and development institutions software companies and trades unions and employers within the industry, community groups and NGO’S.

### Deliverables

D III.1 Port Training Needs Report (month 17 – September 07)
D III.2 European Port Training Inventory Data Base (months 19 – November 07)
D III.3 European Port Training Report (month 32 – December 08)
D III.4 European Port Training Data Base (month 36 – April 09)

### Milestones and expected result

M III.1 European Port Training Needs (month 14 – June 07)
M III.2 European Port Training Inventory (month 17 – September 07)
M III.3 European Port Training Strategy, Methodologies and Programs (month 30 – October 08)
M III.4 European Port Training Data Base (month 34 – February 09)
WP IV: Exploitation, Protection of Knowledge and Dissemination

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</tbody>
</table>

Objectives
This WP aggregates all activities related to dissemination, exploitation and protection of knowledge.

**Exploitation** activities will aim to define guidelines for further research and business developments and for implementation. The EFFORTS Exploitation Plan will be built addressing the market, and managerial aspects of exploitation. It will be structured around a technology implementation plan, a market analysis and a business plan.

This WP will also work to ensure protection (acquisition whenever possible) and management of knowledge. A knowledge management infrastructure will be settled and upgraded on the basis of the results acquired during the project. Legislation & standards will also be considered, with objective to bring all required information on the current framework and promote recommendations arisen from EFFORTS results toward concerned standardisation & regulatory bodies.

**Dissemination** activities will work to promote and inform about the developed tools, software and research results in a responsive and proactive way, using a web portal, newsletters, DVD ROM, and conferences. The demonstration ports will be the locations of the workshops and will have an integrative role in their organisation.

Description of work

**Task IV/1 – Exploitation and Implementation**

**Task IV/1.1 : Technology and concept implementation plan**
The Technological and concept implementation plan will be developed, describing the potential exploitable results and the way exploitation should be realised. Possible follow up development will be identified.

**Task IV/1.2 : Market analysis**
This task will analyse all market aspects dealing with the various results of EFFORTS. It will propose estimation of their types, sizes and spans. Prospective visions will be made so as to dispose of views for the future. These assumptions will integrate impacts of potential evolutions of technologies, but also legislation and standards.
Task IV/1.3 : Business plans
This task concerns the elaboration of business plans for the concerned technological developments. It will address issues dealing with their commercialization. This task will allow to issue financial indicators (e.g. return on investments...) on the adequate time span; it will include investments, financial programme. All these analysis will be realized in deep relations with SP and WPs leaders so as to acquire the relevant information and validate results. The EFFORTS Exploitation Plan will be formed aggregating and integrating the different WP contributions and will be treated as confidential. It will be prepared and reported with the final report. A final dossier will also be prepared dedicated to be used by decision-makers.

Task IV/2 – Protection and Exploitation of Knowledge

Task IV/2.1 : Knowledge Management
A knowledge management infrastructure will be upgraded on the basis of the results acquired in the course of the project (notably demonstrations) in the different SPs. This task also concerns to select knowledge to be disseminated (WP IV.3), associated tools and actors. The partnership plans to diffuse the result of EFFORTS widely in the European Community. Once the legal protection is acquired and whenever possible, relevant result from the project will be largely communicated in specialized scientific meetings and targeted audience and publications (see WP IV.3 activities). As the project includes various European ports, it is clear that all the main results will be exploited internally by the participants themselves. According to an open approach, selected results will be available for possible exploitation to other companies, especially SME’s, both included as project participants or outside the project. These activities will be closely linked with Management, Training and Dissemination Activities to be organised by the project: the consortium will establish synergies between these aspects, especially in terms of producing the relevant tools and materials. This task will also provide assistance upon request to EFFORTS partner for every need in terms of IPR & confidentiality issues.

Task IV/2.2 : Standards
Special attention will be paid on the overall contribution that will be made to achieve the implementation of future standards regarding ports systems, operations and organizations. The work performed in EFFORTS has to be connected with standards regarding two aspects: (i) Use the already existing European standards and directives, (ii) Identify, evaluate and promote needs for further standardisation and harmonisation. A norms overview will be transmitted to partners. Recommendations identifying evolutions to bring to the current standard framework as a consequence of research developed inside the EFFORTS project will be elaborated based on vertical WP partners contributions. To reach this goal, a dedicated Task Force will be proposed to be implemented, gathering representatives from each WP.

Task IV/2.3 : Legislation
In terms of legislation, EFFORTS will take into account the current situation and try to make it evolve under policy recommendations. A legislation overview will be
transmitted to partners. Recommendations identifying evolutions to bring to the current legislative framework as a consequence of research developed inside the EFFORTS project will be elaborated based on vertical WP partners contributions. To reach this goal, a dedicated Task Force will be proposed to be implemented, gathering representatives from each WP.

**Task IV/3 – Dissemination**

**Task IV/3.1 : Dissemination Plan**

*This task is completed.*

**Task IV/3.2 : Online Portal**

The EFFORT portal:
- Informs the general public & manage on-line forums on hot points
- Offers public project deliverables and downloadable documents
- Promotes the tools, software and research results, the workshops and the conference
- Allows both members of the public and project members to post associated news
- Gives links to partners and other relevant organisations web sites

**Task IV/3.3 : Project Information Material**

A full and informative 2-4 pages newsletter detailing each six months of the project is distributed by mail and email to the freight logistics database maintained by EURIFT (TuTech) and the other partners, especially ports. A CD-ROM will be compiled with public deliverables and results. It will be handed out at workshops and conferences, and posted.

**Task IV/3.4 : Conferences, Publications and Presentations**

EFFORTS will hold an international conference to promote its results. This will be a prestigious event with international speakers. The conference will be held before, after or during major events such as Maritime Development Conference in Rotterdam. The project will also use the media of academic journals, trade publications and presentations at related conferences, workshops and trade shows. Academic partners will work to submit scientific papers to international and national peer reviewed journals. Of equal or greater importance, partners will write and submit for publication articles to trade papers and magazines across the EU. Presentations and papers will be made at workshops, conferences and trade shows across Europe. On the field actions will be ensured notably during demonstration phases to ensure widest coverage.

**Task IV/3.5 : Networking**

- Ensure networking to other dissemination activities of 3.XX research activities or technology platforms but also communication with other national, EC or international projects
- Link with representative groups like ELA/ Freight Forwarders Europe /Shipping lines/etc
• Set up a dissemination network over Europe and include also organisations outside Europe

Milestones and expected result
M IV 1.2: Market analysis completed (month 40 – August 09)
M IV 1.3: Business plans completed (month 40 – August 09)
M IV.2.3 : Interim policy recommendations (month 32 – December 08),
M IV.2.4 : Final policy recommendations (month 42 – October 09), 6 Workshops & 1 Final conference

Deliverables
D IV.2.2: Knowledge exploitation (month 36 – April 09),
D IV 2.3: Recommendations for future developments and new policies – interim (month 32 – December 08)
D IV 2.4: Recommendations for future developments and new policies –final (month 42 – October 09)
D IV.3.4.1- 8: 3 Newsletters (month 25 – May 08, month 31 – November 08, month 37 – May 09)
D IV.3.5: CD-ROM (month 42 – October 09)
9.2.2 Sub-Project 1: Navigation in Ports

WP 1.1: Tug Assistance

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<th>Month 13</th>
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<td>L&amp;R</td>
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<td>DPC</td>
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</table>

Needs of ports:
European ports need to handle increasing ship sizes and increasing traffic efficiently and safely. Ships carrying dangerous cargo through environmentally sensitive areas and to exposed offshore terminals need to be operated with a high degree of safety. Effective use of tug assistance is one way to meet this need, particularly when combined with improved information systems providing the pilot and tug masters all the relevant information for assessing the situation at all times. New, very manoeuvrable and flexible tug types make tug use much more efficient once the pilots and tug masters have learned to utilise this capability. Significantly accelerated training of pilots and tug masters is achieved by using advanced training simulators. The US Coast Guard has implemented a mandatory licensing of tug masters where two thirds of the two year qualification programme may be performed in an approved simulator setup. In order to use simulators for this purpose it is mandatory that they accurately model all the important factors, which influence the behaviour of the tug and the assisted ship and that the visual display meets satisfactory standards.

Targeted results:
The result of the project will be a top class tug simulator, which can be used by ports and tug operators to train pilots and tug masters in efficient and safe use of new tugs, for planning of tug use in ports and at terminals, and for decision-making concerning the introduction of new tug types and sizes. Experience so far indicates that training may be accelerated significantly. As an example, SvitzerWijsmuller has stated that the training period for a new mate may be reduced by half by introducing extensive training in the tug simulator, thereby reducing the time needed onboard.

Deficiency:
The following table summarizes the items identified as shortcomings in present state-of-the-art of tug simulators.

<table>
<thead>
<tr>
<th>Item</th>
<th>Shortcoming</th>
<th>Comments/ Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual system</td>
<td>The projection system does not enable reliable assessment of distances.</td>
<td>3-D system is available but very costly.</td>
</tr>
<tr>
<td></td>
<td>Artificial display system implemented to</td>
<td>Testing on a smaller scale might be</td>
</tr>
<tr>
<td></td>
<td></td>
<td>interesting.</td>
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Document Code: EFFORTS-WPI.1-DEL-300908-TUHH-FINAL-Description of Work
Date: 30.09.2008
<table>
<thead>
<tr>
<th>Item</th>
<th>Solution</th>
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<tbody>
<tr>
<td>Propulsion system</td>
<td>Deterioration of tug’s bollard pull when operating in waves is based on qualitative estimates.</td>
</tr>
<tr>
<td></td>
<td>The effect is considered very important.</td>
</tr>
<tr>
<td>Ship-ship interaction</td>
<td>The hydrodynamic interaction between the hulls of the tug and the assisted ship are qualitatively known, only. Tug masters judge that the effect is inadequately implemented in simulator.</td>
</tr>
<tr>
<td></td>
<td>The effect is of utmost importance.</td>
</tr>
<tr>
<td>Fenders</td>
<td>There are two shortcomings in relation to fender modelling:</td>
</tr>
<tr>
<td></td>
<td>Geometrical: 2-D “collision” between ships, only</td>
</tr>
<tr>
<td></td>
<td>Mechanical: Forces generated in the horizontal plane, only</td>
</tr>
<tr>
<td></td>
<td>Solving the mechanical shortcoming is very important for simulating tug assistance in waves.</td>
</tr>
<tr>
<td></td>
<td>Solution to the geometrical problem may be “nice-to-have”.</td>
</tr>
<tr>
<td>Moving lee zones</td>
<td>The wind, current and wave sheltered lee zone behind the assisted ship is not represented in the simulator.</td>
</tr>
<tr>
<td></td>
<td>The effect may in some cases be important, e.g. in tug assistance at offshore terminals.</td>
</tr>
</tbody>
</table>

Aims of further research/development/validation during the final period:

- Implement 3-D projection system.
- Onboard display system developed in WP1.2 may be adequate.
- Obtain information from SAFETUG joint industry project and/or industrial data and implement in simulator. Assess the possibility of implementing direct calculation of propeller efficiency on the basis of instantaneous water particle velocity and direction at propeller. If feasible, implement this method.
- Implement on-line, real-time potential flow solver in simulator to calculate interaction forces, including finite water depth. Implement empirical corrections to potential flow calculations where these do not provide sufficiently accurate results.
- Geometrical: Implement full spatial check for “collision” between tug
and assisted ship and determine fender compression.

Mechanical: Calculate all three force components at contact point

| Moving lee zones | The lee factors may be calculated in advance as functions of relative heading of the assisted ship and overlaid the environmental data. |

Description of work

**Visual system:** Testing of a 3D visual system will be performed on a small scale on various systems, including projection systems and head mounted systems. The particular complication of the user having to be able to view both the real instruments and the virtual out-of-window view has to be solved. This work will be performed by FORCE.

Another activity in this task is to integrate and demonstrate the onboard display system developed in WP 1.2 as well as implementing a laser docking system in the simulator. This work is performed by FORCE in cooperation with Marimatech.

**Bollard pull in waves:** Particularly when operating at offshore terminals in waves up to 3 m significant height the effective force exerted by the tug on the assisted ship may be significantly reduced. Existing model test data will be analysed and implemented in the simulator model as an average deterioration of the bollard pull. As an alternative and physically more correct method it will be attempted to introduce a direct calculation of water particle velocities at the propeller plane and determine the propeller efficiency from that. This will presumably give a more accurate and time varying propeller efficiency. This work will be performed by FORCE.

**Ship-ship hydrodynamic interaction:** A 3D potential code will be developed to compute the forces generated in the interaction between two ships manoeuvring in close proximity at low speed, including the effect of finite water depth. The code will be organised as a module that will provide the forces in real time to the simulation program. The code will be validated against existing experimental data. A parametric study will be performed to optimise the panelling of the models that is an acceptable compromise between the accuracy and the computation time required for real time use of the code results. In situations where the potential flow code does not provide sufficiently accurate results it will be attempted to implement empirical corrections. The code development will be performed by IST and the integration into the simulator software by FORCE.

**Fenders/collision:** A 3D geometrical collision module will be developed to detect and determine in real time the objects that are colliding with each other. The 3D models will be composed of objects such as fenders, hull, superstructure etc. that will be identified by the collision engine. In case of a collision elsewhere than on a fender the module will give a collision alert. In case of collision on a fender the module will provide the position, the surface normal vector and the collision dynamics, which will be used to calculate the 3D fender forces acting on the colliding ships. The geometrical collision identification module will be developed by IST and the calculation of fender forces by FORCE.

**Moving lee zones:** The architecture for implementing an overlay of a moving lee zone on the
environmental data in the simulator exercise will be developed by FORCE and will be tested on one case of a tanker berthing at an offshore terminal with waves, wind and current.

Validation and testing: All the features developed and implemented in the simulator will be extensively validated by tug masters and port pilots from Svitzer and Lürssen & Reimers and pilots from the participating ports, Port of Lisbon, Dublin and Hamburg.

Case study: The upgraded tug simulator thus developed will be used in case studies with the objective of optimising tug use in the ports of Lisbon, Dublin and Hamburg and at an offshore LNG terminal to be selected. The study will identify the optimal type, number and size of tugs for the particular operations and the procedure to be implemented by the pilot. In this connection, visual models of the relevant ports will be generated. Likewise, a mathematical model of a rotor tug will be generated. The system thus developed may be used for training of personnel operating in these ports.

**Deliverables**

D 1.1.1: Report and software module for potential flow code – month 33 – January 09 – R/CO
D 1.1.2: Report and software module for fender/collision computation – month 33 – January 09 – R/CO
D 1.1.3: Report on architecture for moving lee zones – month 32 – December 08 – R/CO
D 1.1.4: Demonstration of simulator including all developed features – month 36 – April 09 – D/PU
D 1.1.5: Demonstration of use of simulator in training – month 39 – July 09 – D/PU

**Milestones**

M 1.1.3: Demonstration of tug simulator including all the developed features – month 36 – April 09
M 1.1.4: Report and software module for 3D potential flow code – month 33 – January 09
M 1.1.5: Report and software code for fender/collision computation – month 33 – January 09
M 1.1.6: Report on architecture for moving lee zones – month 32 – December 08

**Integration potential**

The development in this WP is closely related to WP 1.2 and 1.3. WP1.1 is relying on the results of 1.3 and results of 1.2 are integrated in the tug simulator.
WP 1.2 Precise Navigation and Manoeuvring in Ports

<table>
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<tr>
<td>Person months per participant</td>
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**Port needs:**

**Improved safety and efficiency during docking and manoeuvring in fairways and in ports.**

**Innovation:**

Software tool to improve situation awareness for Pilot/tug master/VTS, including visualization of information exchange.

The human element in pilotage is the highest risk to accidents. A majority of accidents are related to human errors. An accident is normally related to a combination of several elements such as non-familiarity of ships equipment, multinational bridge team, or poor weather conditions. These three main elements may combine to lead directly to a worst case scenario.

Especially container vessels are increasing in size faster than fairways, locks and port approaches can be dredged and widened thus margins for safe manoeuvring are narrowing. Conventional onboard equipment of vessels according to international carriage requirements (SOLAS V) does not allow for sufficiently precise navigation under such circumstances. Increasing dredging costs also call for improved determination of necessary manoeuvring space which then has to be safely used by all types of vessels. Since about 10 years attempts are made to develop precise navigation equipment as carry on equipment for pilots as “Portable Pilots Unit (PPU)” but recent tests in the ports of Rotterdam and Hamburg provide a promising basis for eventually passing the threshold from experiment to successful application.

The ports needs to increase safety and efficiency by introducing new tools in order to, lower the human error factor introduced by verbal communication, and high precision positioning giving the pilot aid in safe maneuvering and docking. Tug operations safety need to be strengthened to make sure that the Tug master follows the Pilots commands. The Tug master/Pilot needs to have better situation awareness.
State of the Art

Baseline
There are already different companies offering PPU systems on the market, one of them is project partner MARIMATECH (www.marimatech.com). They sold some systems (E-Sea Fix MKII, see appendix) but the take-up of PPU technology by pilots has been slower than anticipated. There is also some experience in the development and application of PPU systems on the academic level like that of a prototype developed by TUHH within the EU-project IPPA and tested on large container vessels on the river Elbe.

What is left undiscovered
There are still deficiencies in functionalities, design and layout preventing from break through. Situation overview and interchange of mission info between Pilot, Tug master and VTS.

What needs to be innovated
The remaining barriers hindering the broad break-through of PPU systems on board will be removed. This is particularly reducing of the weight and implementing the PPU into the coming infrastructure in the individual harbour (port information system, see also WP 1.3) and a easy-to-use reliable technology in setting the system up and for operation not distracting a pilot’s attention from his vital conning task. For navigation in restricted areas (coastal, fairway and port), being piloted or under tug assistance, and for berthing ports require an advanced technology they can rely upon not being dependent on vessels' equipment of quite distinct quality and performance features. Thus safety as well as efficiency needs to be addressed.

Deficiency/Aims of Improvement
Today the Master, the Pilot, VTS-centre and the Tug-master experiencing a high workload by multiple tasks to be performed mostly in parallel. This make the tug and berthing operations inefficient as well as the security could be increased.

The shortcomings can be summarized to 5 groups:

- **VTS - Pilot interaction**
  VTS centre has only radar/AIS and verbal communication with the pilot, to asses the situation at hand. This means that there is no 100% secure and reliable means of communication in order for the VTS system to warn about collisions, speed warnings when passing to close to passing ships moored vessels. The radar signals are not accurate enough for guidance once ships are close to obstructions. AIS information often is not accurate either as a rather high percentage of ships have non calibrated systems combined with failures in interfacing to the gyro or deficient setup. Through PPU-technology a big step can be made towards a "silent" VTS where most of the information for the onboard pilot is being displayed visually instead of verbal exchange.

- **Pilot – Tug master co-operation during approach and berthing**
manoeuvres
There is no standardized communication procedure for commanding the tug master over the VHF radio that is used for communication between the tug master and the pilot and the pilot cannot be sure if the tug master is following orders. Failures in radio communication and misunderstandings/misinterpretations can lead to accidents. Thus unambiguous visual information displayed to both, the tug master and the pilot, will dramatically improve the situation awareness and timely perception of required manoeuvres as available space in ports is continuously decreasing.

- **Reliability of AIS**
  Today many of the AIS installations onboard the vessels are inaccurate and very often transmit incorrect data. This means that this, otherwise very useful, technology cannot be always trusted. An improvement is on its way, but there will always be ships giving problems. It therefore is important that the PPU is fully independent from the vessels' navigation system. This includes an own navigation sensor and AIS receiver unit to identify and track other targets. As far as the tug system is considered big vessels and shore-based installations might shadow GPS/DGPS-signals for positioning. Development will be highly challenged to provide solutions and EFFORTS will research most promising solutions.

- **Precise positioning of all vessels within fairways and harbour areas**
  Increasing size of ships is narrowing manoeuvring space in fairways and ports where locks and bridge passages present a special challenge. Encountering and overtaking manoeuvres in fairways need very precise navigation to maintain sufficient passing distances to avoid undesired hydrodynamic effects. The same applies to navigation in ports where minimum passing distances to constructions and vessels berthed have to be maintained to avoid damage. The PPU technology will provide the required level of accuracy and precision. The equipment needs to be portable that it can be carried by pilots aboard all vessels, however, where same vessels will apply the equipment frequently like tugs and ferries regularly calling the same ports, fixed installation must be possible adjacent to already installed equipment. The ideal mounting position will need some human engineering considerations.

**Objectives**
Based on preparatory work, also within the DG Infosoc project IPPA, and as part of a tested set up on the river Elbe (approach to Hamburg) in autumn 2006 current portable pilot units (PPU) will be evaluated and selectively improved covering functionalities, weight, flexibility to become adapted to individual regional needs. Adaptation of the PPU solution for tug operations, and lock operations.

**Expected Results/Beneficiaries/Impacts**
A reliable, easy to carry (low weight!) PPU meeting the requirements of safe and efficient pilotage in fairways, locks and during port approaches, including the software
tools to increase situation awareness. The software will be written in Java, and therefore it will be cross platform, allowing it to be used on Window, Linux, Mac OS X, Unix Solaris. As the Marimatech system uses standard GPS receivers with a serial output, the software can be used by 3rd. party on standard GPS receivers. The software will use the new object library delivered by WP "Port ECDIS", containing the location of Fender etc. The pilot software needs these information to provide distance to fender line, speed towards fender line, safe navigation, and so on.

Possibility for fixed installation onboard various other port and fairway maintenance and service vessels such as survey boats, buoy vessels, dredgers and especially tugs to support close quarter navigation through bridges and locks and during berthing and de-berthing.

Description of Work

Methods/Tools

The work can be based on the quite far progressed PPU-development of MARIMATECH globally in use to pilot all kind of vessels. Required additional work mainly comprises

- Investigation of needed commands between Tug master and Pilot, by doing surveys aboard tugs and assisted vessels
- Make user survey on GUI prototype.
- Investigate method to overcome shadow effect on tugs
- Investigation of communication method, UHF, VHF, Wireless LAN, WiMax, AIS network.
- Refinement specification
- PPU system Improvement
- Trials in 4 ports.
- Enhancement of the system for further applications.

Validation will be performed by expert rating, i.e. through involvement of highly competent professionals.

Partner Work Allocation

a. Marimatech: WP-leader. System provider and development competence
b. TUHH (Hamburg Technical University): Analysis of refinement specification and scientific development of solutions. Integration with other WP in the SP. Coordination of Trials.

c. HPA (Hamburg Port Authority): User Requirements. Test bed provider shore-based.
d. Tredit: Analysis of refinement specification and scientific development of solutions (for Thessaloniki Test bed)

e. ThPA (Thessaloniki Port Authority): User Requirements. Test bed provider.
f. **DPC (Dublin Port):** User Requirements. Test bed provider.
g. **L&R (Lüttgens & Reimers, Hamburg-based tug company):** User requirements, tug providers for development and test bed.
h. **Force (Force Technology):** Provider of simulation facility for development and testing; training issues.
i. **PAH (Port of Le Havre):** User Requirements. Test bed provider.

**Integration potential**

It is very important that the protocol for communication will be open and standards based. It also needs to be backed by an international organisation. To be able to succeed with a new system that uses data from different sources, it is important to use an open protocol. That does not mean that security has to be compromised, as it is feasible to include digital signatures. Taking this into account it should be possible with minimal effort to have 3rd party system delivering data to the Pilot-Tug-VTS protocol.

**Deliverables**

- **D 1.2.1:** Pilot situation display software (month 34 – February 09)
- **D 1.2.2:** Tug master situation display software (month 36 – April 09)
- **D 1.2.3:** VTS-centre/ Harbour office situation display software (month 37 – May 09)
- **D 1.2.4:** Protocol description standard for Pilot-Tug-VTS communication (month 38 – June 09)
- **D 1.2.6:** Shadow effect for tugs (1-10-2008)

**Milestones and expected results**

- **M 1.2.1:** Month 18 – October 07: Pilot – Tug – VTS Communication Issues and Standards
- **M 1.2.2:** Month 20 – December 07: GUI Requirements Pilot Display
- **M 1.2.3:** Month 22 – February 08: GUI Requirements Tug Master Display
- **M 1.2.4:** Month 24 – April 08: GUI Requirements VTS Display
- **M 1.2.5:** Month 28 – August 08: Survey Communication Bearers
- **M 1.2.7:** Month 32 – December 08: Systems Refinement Specification
- **M 1.2.8:** Month 34 – February 09: Systems Improvement
- **M 1.2.9:** Month 36 – April 09: Trials
- **M 1.2.10:** Month 40 – August 09: Validation
WP 1.3: Port ECDIS

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Needs of ports:
Masters and pilots approaching a seaport may nowadays use an Electronic Chart Display and Information System (ECDIS) where data coverage is provided to obtain the required navigational information they need. The common ECDIS standard supports navigation in the open sea and coastal areas, additionally the Inland ECDIS standard was developed for navigation on inland waterways. The chart requirements for manoeuvring big ships in narrow fairways (harbour access channels) and harbours and for the port maintenance (dredging, fairway and channel and design and construction work) are not sufficiently covered by the current ECDIS standard in scale, accuracy, chart objects and attributes (“object catalogue”, in future “feature catalogue”) and call for a specific “Port ECDIS”. Managing bigger vessels, increasing traffic, less harbour space, berth organisation, dredging purposes etc. requires accurate and up-to-date high-resolution geographic and bathymetric data to provide all necessary information, in some cases also in real-time. As GIS (Geo Information System) the Port ECDIS is able to interact with other port related data sources for a more beneficial use and to improve the interoperability of harbour related tasks to support the maintenance work of the port authorities. WP 1.3 therefore is a basic WP for any enhancement of port services and operations.

Targeted results:
The outcome will be a comprehensive concept as basis and input for European/international standardisation proved by validation tests in the Port of Hamburg.
Because international standardisation is a cumbersome and lengthy process this can only become initiated during the project. A measureable project result in this aspect will be the willingness of responsible parties (national shipping authorities, International Hydrographic Organisation (IHO) and International Maritime Organisation) to accept the Port ECDIS Concept to support it during the standardisation process and to allow a Port ECDIS Registry within the emerging S100
Application of the concept realised for prototype equipment for manoeuvring of vessels (portable pilot unit) and tug assistance will be part of the validation.

Deficiency:

ECDIS is the geographical information system (GIS) for seagoing ships. It is based on the IHO/IMO standards S57 (Chart Data Model and object catalogue) and S52 (Chart Presentation Library). For inland navigation exists meanwhile also a compatible GIS standard (Inland ECDIS).

Navigation in ports and fairways (harbour access channels) with minimal under keel clearance and port maintenance require information distinct from sea and inland navigation. The available ECDIS / Inland ECDIS standards lack the following items to comply with the specific port requirements:

- high accuracy charts (for using RTK-DGPS, local RTK - DGPS services deliver cm accuracy, position must fulfil or be better than IHO - S44 Special Order)
- large scale information (1:500 up to 1:5000) with up to date information including special objects / features for port navigation and operation such as e.g. fenders etc.
- 3 D possibilities (Grid / Raster / TIN)
- designed / constructed reference models e.g. for dredged areas.

Aims of further research/development/validation during the final period:

Describe how the work package will achieve the targeted results.

All users of a Port ECDIS and their needs have been identified. In the next step the technical specification of Port ECDIS and subsequent development of prototype organized in functional areas (e.g. object/feature catalogue) and application areas (e.g. port and waterway maintenance) will be done, followed by testing of prototype(s) and defining requirements for follow-up developments and standardization. The WP will be concluded with an overview of arguments (cost-value ratio: Port ECDIS production costs versus harbour maintenance and traffic, navigation costs etc.), defining cost and business related figures, why a Port ECDIS could be an economical and beneficial product.

- Accurate large scale charts (1:500 – 1:2500/1:5000) generated directly from surveys not digitised from paper charts.
- Area wide 3D DTM depths information for digital comparison between actual and required (theoretical 3D nominal harbour bottom = reference model / design model) depths also to identify, plan, perform, monitor and validate dredging efforts.
- Inclusion of tidal information, current data, water quality data and other relevant data.
- Compatible to inland ECDIS or even merging of both.
- Identification of port “objects” (features) and attributes to allow high-precision port-specific operations such as berthing, docking, mooring, manoeuvring etc. and for traffic management services (link to WP 1.2)
- Port ECDIS / GIS for PPU and tug assistance (link to WP 1.2 and WP 1.1).
- Platform for comprehensive port information services.
- European input to international standardization.

With respect to the current state of standardisation S57 will become extended (e.g. accuracy, features, gridded bathymetry overlay) without blocking the emerging S100 standard.

Similar to the development of the inland ECDIS which also was triggered through EU-research, prototype functions and a template will foster standardisation work of the Port ECDIS which is a pre-requisite for application in international shipping. It is intended to channel the standardisation process through the Inland ECDIS Expert Group (involving non EU-states like Russia and the U.S.A.) and in line with the Directive 2005/44/EC on harmonised river information services (RIS) and inland waterways in the Community and in co-operation with United Nations Economic Commission for Europe (UNECE), Working Party on the Standardisation of Technical Safety Requirements in Inland Navigation (SC.3/WP.3). All other relevant bodies dealing with or having an impact on standardisation such as EMPA, EHMC, IPHA, IALA, PIANC, IHO and IMO will be informed.

**Description of work**

**Task 1** – Listing of users of high accurate Port ECDIS / GIS in ports and their needs Description of potential user groups, related functional requirements and application of expected results, at the same time providing the validation criteria.

**Task 2** - Port ECDIS - Technical specification
This task will develop solutions using the current Inland ECDIS standard to identify
what is left with respect to Port ECDIS specification. The following topics will be investigated.

Keywords are:
Port ECDIS accuracy (versus common ECDIS accuracy); precise survey of the port topography and aids of navigation and transforming local coordinates into WGS 84; special new Port ECDIS objects (features and attributes); GPS, DGPS and RTK-DGPS solutions for precise navigation in the port and fairway area and PPU use; precise 3D depth information using Digital Terrain Models (DTM) technologies; developing and implementation of a 3D reference DTM (the nominal harbour bottom = reference model/design model/channel model) for calculating variance comparisons.

**Task 3** – Prototype of a Port ECDIS
This task will develop the Port ECDIS prototype for the Port of Hamburg. The main development of the dataset for a very precise Port ECDIS will be done by the HPA.

**Task 4** – Testing of prototype(s)
Tests with the first prototype will be conducted on board of a HPA survey vessel. Special navigational tests (navigation, berthing, mooring, turning in a turning basin etc.) will be done using the PPU on board of a container vessel, cruise liner etc. in the port area of the Port of Hamburg and the river Elbe (deepwater port access channel and inland waterway).

**Task 5** – Defining requirements for follow-up developments and standardization (Port ECDIS Roadmap).
This WP will only develop a prototype to get things going on; the final product could be rather something like a PORTIS (Port Information System) which also includes AIS, radar, VTMIS, dredging information, river and port basin maintenance information, current and velocity etc. Follow-up work to enhance the prototype, widen its application and organise standardisation will be described.

**Task 6** – Benefit analysis of Port ECDIS.

**i. Partner work content allocation**
HPA contribution: (Hamburg Port Authority) WP-leader. Identification of users, Technical Specification, preparation of a Port ECDIS, testing of the prototype (on board of survey vessels, together with the harbourmaster and the Hamburg Port Pilots, on board of larger vessels using the PPU as navigational device), defining requirements, defining cost and business related figures.

ISSUS/TUHH contribution: (Hamburg Technical University, ISSUS/TUHH developed the ECDIS standard) Identification of Users, Technical Specification, preparation of a Port ECDIS, testing of prototype, defining requirements, making benefit analysis, integration with other SP1 WPs.

All WP-members: Identification of users, technical specification (especially with respect
to Inland ECDIS), defining requirements and Harbour ECDIS objects, defining cost and business related figures.

CARIS BV contribution: technical specification, prototyping, testing of prototype with respect to PORTIS solutions

### Deliverables

<table>
<thead>
<tr>
<th>Deliverable</th>
<th>Milestone Details</th>
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<tr>
<td>D 1.3.1 Potential users and requirements (structured questionnaire, study)</td>
<td>– month 29 (September 2008) - PU</td>
</tr>
<tr>
<td>D 1.3.2 Port ECDIS specification (document)</td>
<td>– month 32 (December 2008) - PU</td>
</tr>
<tr>
<td>D 1.3.3 Port ECDIS prototype (software and dataset)</td>
<td>– month 42 (October 2009) - CO</td>
</tr>
<tr>
<td>D 1.3.4 Tests with Port ECDIS prototype (based on basic dataset) and evaluation of tests (report)</td>
<td>– month 38 (June 2009) - PU</td>
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<tr>
<td>D 1.3.5 Port ECDIS follow-up requirements (document)</td>
<td>– month 42 (October 2009) - PU</td>
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### Milestones

#### Milestones and expected result

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<td>M 1.3.1 Potential users and requirements</td>
<td>– month 24 – April 08</td>
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<tr>
<td>M 1.3.2 Port ECDIS specification (first specification phase)</td>
<td>– month 23 – March 08</td>
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<tr>
<td>M 1.3.3 Port ECDIS specification (new specification)</td>
<td>– month 32 – December 08</td>
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<tr>
<td>M 1.3.4 Port ECDIS prototype (basic dataset)</td>
<td>– month 32 – December 08</td>
</tr>
<tr>
<td>M 1.3.5 Information of relevant national and international bodies to initiate standardisation</td>
<td>– month 32 – December 08</td>
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<tr>
<td>M 1.3.6 Port ECDIS prototype (extended dataset)</td>
<td>– month 42 – October 09</td>
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<tr>
<td>M 1.3.7 Tests with Port ECDIS prototype and evaluation of tests (including PPU tests)</td>
<td>– month 38 – June 09</td>
</tr>
<tr>
<td>M 1.3.8 Port ECDIS follow-up requirements (first phase)</td>
<td>– month 38 – June 09</td>
</tr>
<tr>
<td>M 1.3.9 Port ECDIS follow-up requirements (second phase)</td>
<td>– month 42 – October 09</td>
</tr>
<tr>
<td>M 1.3.10 Demonstration of results jointly with WP 1.2</td>
<td>– month 38 (June 2009)</td>
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Integration potential
The Port ECDIS is closely linked to WP 1.1 Tug assistance and WP 1.2 precise navigation is ports.
9.2.3 Sub-Project 2: Ports and Environment

WP 2.1: Clean Energy Management

<table>
<thead>
<tr>
<th>WP number</th>
<th>Start date or starting event:</th>
<th>Month 13</th>
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<tr>
<td>Participant id (leader in bold letters)</td>
<td>ATA</td>
<td>CT</td>
</tr>
<tr>
<td>Person months per participant</td>
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</table>

Needs of Ports

More and more in Europe, Ports authorities focus their activities on infrastructure development, ship reception, regulation controls, promotion and land management. Ports are not “energy producers”, but as land planner have the possibility to integrate energy producers in their domain of management.

As a corollary mission, they are responsible for improving port activities meanwhile minimizing their impacts on inhabitants, fauna and flora. Such as other companies, Ports have also now to deal with the greenhouse effect. Energy has to be better used, to decrease the thermal balance of the planet. Besides, due to their locations, Ports have a high primary energy potential: on the waterfront, with the possibility to install windmills; in estuaries or on rivers, with the possibility to use current power; hosting activities (and/or closed to industrial or human activities) generating wastes. Moreover, according to EC Directive 2000/59, on port reception facilities for ship-generated waste and cargo residues, “Member States shall ensure the availability of ports reception facilities adequate to meet the needs of the ships normally using the port”.

In parallel, the concepts for energy production, transport and transformation are today moving. The classical concept of production and distribution leads to a low efficiency from the raw material to the end-user and to a high environmental impact. In order to improve the situation two ways of development are considered (and combined): distributing energy production and integrating Renewable Energy Sources (RES).

Two ports are currently involved in WP2.1: the ports of Le Havre and Dublin. The port of Antwerp has also manifested his support.

Deficiency

Examples of utilisation of RES and clean energy can be identified in some large European ports (Rotterdam, Hamburg...), but these technologies are not so spread at EU level, mainly as a result of their specificity and lack of integration. More globally, a
mix energy approach is missing. Most ports rely on the national electricity network, implying in-line losses and over-cost for society. Nuisances (pollution, noise...) due to the type of energy and its usage have also to be considered.

Port activities are also high energy consumers. The global explosion of energy prices increases the associated stakes. And ports energy consumption could increase in the coming years if electricity is provided to ships at berth. Furthermore ports sometimes offer a service to other port actors by providing electricity thanks to their local network.

Ports therefore need solutions to help them build and explain to the wide community of concerned actors their development policy and energy strategy, considering RES and energy recovery from waste for the development of a cost-effective, environmentally-friendly and "secured" integrated concept of distributed production of energy.

**Targeted results**

WP2.1 aims to analyse and propose solutions for management of energy issues in European ports at short, medium and long terms. It concerns the optimisation of planning and management of energy consumption and supply based on:

- The utilisation of clean and RES (solar, wind, sea...), as much as possible,
- Wastes energy recovery,
- In situ possibilities (weather, geographical, legal constraints).

It is centred around ports activities (handling, AMP, rail shunting, naval repair, locks, storage and warehousing...) but considers also some industrial activities located in the port area, in order to emphasize the waste recovery, energy transformation and distribution potentialities.

The tool, main deliverable of the WP, will allow to model the port activities consumption, test the implantation of energy production system (classical, RES, energetic valorisation, new energy vectors), and simulate by anticipation the adequacy between the energy needs of the port domain and the offer (combining local RES and the network supply), based on scenario of evolutions of the port activities.

Therefore, it will help port actors:

- To optimise and validate the interest and feasibility of implementation of:
  - Local energy production system: classical, RES (windmill, sun, tide, wave...), energetic valorisation solutions (e.g. wastes...) or utilisation of new energy vectors (H₂, compressed air, gas, steam)
  - New consumption posts (e.g. AMP)
  - New technologies with lower consumption and/or pollution
  - Collaborative approach with local industries
- To communicate on these interests
- To day by day or minutes after minutes manage efficiently and cost-effectively the adequacy between energy needs and production capacity (future development of the tool)

Using this tool, ports will be able to negotiate better (knowledge on consumption allows to reduce the over-dimensioning and margin and to obtain better tariffs) and more often (better planning allows to fix various negotiation steps). This is all the more important in a liberalised energy market.
Ports will also be able not to limit themselves to the mere research of the best energy supplier at the best rates, but also utilise the potential of local energy sources (e.g. RES and energetic valorisation solutions), and realise the right investments in terms of finance or land utilisation.

The tool will help the ports authorities to build their development policy, define their land planning and energy supply strategy in a cost-effective, safe and environmentally-friendly way, considering the local renewable energy sources, the industrial activities in the vicinity, the local public feelings. Last but not least, it will act as a scientific communication tool, allowing to present and explain the chosen strategy to the port community and local population.

To resume, ports will have a better knowledge regarding how they can increase the efficiency and cost-effectiveness of their energy supply, decrease the negative impacts on environment, but also, they will be able to elaborate a new energy strategy concerted with the actors located on the port area, and why not to offer new services. Therefore, in the future, port authorities, or organisations gathering port stakeholders might decide to manage in common the energy issue; it could be the case that companies are created in ports aiming to manage port actors energy supply, e.g. acting as broker, and why not as investor in new (clean) installation. In this context, the interest of the tool would increase: higher are the energy needs, higher will be the benefits using the tool.

Aims of further research/development/validation during the final period:

WP2.1 will achieve the targeted results owing to:

- Modelling, mapping and simulation
- Specification, design, test, demonstration
- Cost evaluation and environmental assessment.

It has to be noted that on site measurements have been realised during the previous phase in the port of Le Havre to dispose of accurate information on unitary operations consumptions.

**Description of work**

Work is made at generic level and in more details for the port of Le Havre.

**Task 2.1.1: Requirements (TLA)**

Sub-task 2.1.1.1: The evaluation of energy consumption (at consumer level) in ports (TLA)

This consists in the evaluation of energy needs (type, power, characteristics...) on shore (transhipment, warehouses, industrial processing...) and off shore (ships...). The task is completed.

Sub-task 2.1.1.2: The identification & characterisation of problems related to energy production and utilisation to be solved in ports (VTT)

This consists in the evaluation of problems to be considered and the definition of the associated constraints and/or performances:

- The security of energy services (reduce vulnerability facing threats, ensure energy supply with uninterrupted capacity and delivery, reserve capacity,
etc.),
- Integration to local / community energy systems (power, heat, cooling, liquid/solid waste),
- The environmental protection (pollution (CO2-free power generation, cleaner fuels), noise (use of shore power or sun energy to reduce noise caused by auxiliary engines), ballast water treatment, ship waste management, total emission solutions,
- Optimised energy production and cost reduction,
- Fuel and energy storing as well as connection to optimised energy production,
- Energy consumption management in real time and hot spots integration,
- Territory constraints.

Sub-task 2.1.1.3: The final energy requirements (synthesis) in ports (PAH)
This consists in defining the final energy needs taking into account 2.1.1.1 and 2.1.1.2 results. The task is in course of finalisation. Deliverable D2.1.1, gathering main results of the task, will be edited on month 30.

Task 2.1.2: Identification & characterisation of available energy sources in ports (ATA)

Sub-task 2.1.2.1: The evaluation of energy recovery value of different waste (TLA)

Sub-task 2.1.2.2: The potential of renewable energy sources in different ports (ATA)

Sub-task 2.1.2.3: The evaluation of alternative energies (fuel cells, hybrid, electrolyser...) and new technologies that might be applied for the development of an integrated DPE in ports (ATA)

Task 2.1.3: Energetic solution development (ATA)
This consists in optimally adapting the primary energy solution to effecting operational and procurement decisions.

Sub-task 2.1.3.1: Energy system definition (ATA)
This consists in optimising the energy chain from the primary source to the final energy consumption using the adapted “energy flow (electricity, steam, gas, H2, water, others)” in terms of high efficiency, lower cost, high environmental compatibility and optimum safety level.

Sub-task 2.1.3.2: Decision making support tool using a computer based scenario development platform (specification, design, developments and laboratory test) (CT)
This consists in specification, unitary design, development and tests in laboratory of:
- A model of the port energy consumption and costs, function of time and situation (e.g., traffic),
- A mapping tool allowing to present the level of energy consumption (obtained from the model) per type of port operation and geographical areas,
- A virtual clean energy supply system based on the integration of different technologies (fuel cell, wastes recovery, solar, wind, sea).

Management process and methods (notably for assessment of energy consumption / supply and environmental impacts) will be proposed.
The help to decision tool development is organised in two phases:

- Development of the simplified simulator using data from ports of Le Havre and Dublin (modelling of the energy circuits, functional modelling of the control-monitoring system, installation of the hardware configuration and tool validation by comparison with the existing situation in Le Havre)
- Simulator upgrading using data from the new scenario (task 2.1.4).

**Task 2.1.4: Integration and validation (TLA)** *(this task concerns only the port of Le Havre)*

Sub-task 2.1.4.1: Tool personalization / validation / calibration (PAH)

Sub-task 2.1.4.2: Virtual dedicated energetic solution (CT)

This consists in simulation running after validated scenario (2.1.4.1) integration and development of the new virtual energetic exploitation plan (analysis and evaluation of results).

**Task 2.1.5: Port demonstration (PAH)**

This consists in the virtual implementation of a DPE using the data of the ports of Le Havre and Dublin for demonstration.

**Task 2.1.6: Evaluations and recommendations (PAH)**

This consists in the final evaluation and elaboration of recommendations dedicated to port actors.

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**Deliverables**

D.2.1.1 (R-RE): Report including final energy requirements in ports (PAH) – month 30 – October 08.

D.2.1.2 (R-PU): Report including the potential of RES for different European ports, and the evaluation of different concepts and scenarios for the implementation of a DPE in ports, and the mapping tool (ATA) – month 33 – January 09.

D.2.1.3 (D-PU): Simplified computer based scenario development platform for decision making and concept evaluation to provide solutions for environmental-friendly and low cost solutions *(which will be owned & operated by CT)* (CT) – month 36 – April 09

D.2.1.4 (P-PU): Simulation running results report after introduction of the chosen scenario (CT) – month 42 – October 09

D.2.1.5: (D-PU) Evaluation and recommendation report (PAH) – month 42 – October 09

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**Integration potential**

**Methodological:** environmental impacts assessment (WP IV.3), simulation & demonstration.
**Technical:** SP2 WP on air quality (ship supply & impact on air) and cathodic protection.

**Operational:** process analysis (WP3.1).

### Milestones and expected results

**M2.1.1:** Input data validation, characterisation of available energy sources in ports, launching of task 2.1.3, main scenario, and basic set-up of the computer based platform (month 31 – November 08)

**M2.1.2:** Energetic solution development results validation (task 2.1.3), scenarios, simplified simulator, and launching of the virtual implementation (task 2.1.4) (month 31 – November 08)

**M2.1.3:** Evaluation results of virtual solutions implemented using the simulation tool (task 2.1.4)

  - Definition of the demonstration event (launching of task 2.1.5) (month 35 – March 09)

**M2.1.4:** Final presentation of results and recommendations (month 42 – October 09)
WP 2.2: Water Quality

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</tr>
<tr>
<td>Person months per participant</td>
<td>26</td>
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WP 2.2.1: Ballast waters pollutions during ships reception

Needs of Ports

Invasive aquatic species are one of the four greatest threats to the world’s oceans, and can cause extremely severe environmental, economic and public health impacts.

More than 7,000 living species are travelling per day in the world through ship’s ballast waters; by de-ballasting in ports or close proximity, ships spread various unwanted living species which can proliferate, leading to economic disasters and human health blows, even casualties (e.g. epidemic of Vibrio cholerae on south American coasts in 1991, impacts on coastal ecosystems by toxic algae...). Various non-EU countries are carrying intensive research to deal with this, which results, if accessible, will be taken into account. At EU level, significant results have already been obtained through the MARTOBO program, but there are currently only few treatments which comply with the last IMO conditions (MEPC 55, oct/2006) and each one imply major drawbacks (high energy consumption, high costs, low performance, ...).

Two ports are currently involved in WP2.2.1: the ports of Le Havre and Dublin.

Deficiency

Ports are currently not assessing the impact from ballast water but need to ensure that discharge of ballast water from ships does not affect the port, river and coastal biosphere so they must be aware of the current status and impact of different harmful aquatic organisms in ballast water and eliminate or at least reduce negative consequences. In case of economic, public health or ecological disaster, the ports liability (and not only ship owners) could be at stake. Treating ship’s ballast waters or enforcing the regulations by realistic and effective measures must be done as soon as possible. It is of tremendous importance to go further in the development of effective treatments, without impending ship’s trade competitiveness.

Targeted results

Ports have to fully control what happens in port waters to prevent from any undesired
impact and to preserve and improve the ecological system. In relation to ballast water operations the overall objective is to develop tests on some active substances and determine the most effective and economic one(s), considering minimum (or none) impact on the marine environment and coastal activities, feasibility for onboard and/or ashore use & cost effectiveness.

Benefits for ports will be a better knowledge of the various on board treatment method and guidelines to, on one hand check the ballast water quality when the ship is in its basins and, on the other hand, act when there is a contamination risk, with the maximum efficiency /cost rate.

By the end, ports would be able to evaluate the cost of these new controls and the impacts on their activity.

Main expected results concern:

- Assessment of tested substances efficiency against selected bacteria, phyto- and zooplankton;
- Determination of the most viable active substance(s) for ballast water treatment;
- Design of “easy-to-use-at-reasonable-cost” systems and processes to use the selected active substance(s) aboard ships (or ashore)
- Recommendations for treatment methods approval considering the forthcoming IMO criteria and to help port authorities regarding control activities (e.g. sampling procedures, tools…) and to prevent from ecological impacts through harmful aquatic organisms in ballast water.

Beneficiaries are the ports, citizens, the environment and all industries dependent on an intact aquatic biosphere like fishing, aquaculture and tourism.

**Aims of further research/development/validation during the final period:**

WP2.2.1 will achieve the targeted results owing to:

- Finalisation of laboratory scale test trials to set efficiency of these active substances against micro-organisms; and tests on bioassays in agreement with IMO directives e.g. MEPC/53/24/Add1.
- Full scale test trials with the most promising active substance based on previous results.

**Description of work**

**Task 2.2.1.1: Choice of active substances and micro-organisms (IFREMER)**

*Subtask 2.2.1.1.1: Choice of active substances*
This task is completed.

*Subtask 2.2.1.1.2: Choice of micro-organisms*
This task is completed.

**Task 2.2.1.2: Laboratory scale test trials (Unicaen)**

*Subtask 2.2.1.2.1: Effectiveness tests in laboratory*
Laboratory tests have been carried out for two substances (on three) in order to assess their efficiency against bacteria, phytoplankton and zooplankton and/or hydrozoans. The tests protocol have been defined considering the ongoing discussions in the IMO concerning active substances. It includes issues such as dosing/concentration of active substances, contact time.... Tests have been carried out in laboratory facilities of Ifremer, University of Caen / Corrodys, and FIMR. As a result, the effectiveness of active substances for selected micro-organisms and their impact on ecosystem can be evaluated. As soon as lab test have been completed with the third active substance, the most suitable will then be selected for onboard test trials. Intermediate stage tests between laboratory and onboard ship will be carried out using a pilot system (built in FP 5 MARTOB program) reproducing the environmental conditions inside a real ballast tank.

Subtask 2.2.1.2.2: Toxicological study

Physico-chemical analyses of treated water will be undertaken. The composition of the substances noxious for the environment will be compared with toxicity thresholds found in literature and set by regulations. Environmental acceptability of such treated water will be checked on various bioassays (e.g. oysters or mussels larvae tests, phytoplankton inhibition tests).

Task 2.2.1.3: Onboard test trials (IFREMER)

Systems and processes to use the selected active substance onboard ships will be designed. The first step will consist in determining the optimal concentration and volumes of the selected active substance needed in the full scale installation. Process will be designed describing how to introduce it in the ballast tanks, to mix it with ballast water and then release it after treatment, taking into account ship design and operational constraints. Issues will be solved concerning microbial effectiveness. System(s) design will consider environmental protection and cost aspects. Procedures for full scale test trials will be set in order to help ports for future implementation. The test vessel, location/route and procedure will be selected by WP2.2 partners. Recommendations will also be issued for treatment methods approval considering the forthcoming IMO criteria and to help port authorities regarding control activities (e.g. sampling procedures, tools ...). Results will be reported to IMO through national governments.

WP 2.2.2: Aluminium pollution related to the protection of ports infrastructures

Needs of Ports

Ports steel infrastructures are generally protected by sacrificial anodes usually in aluminium which dissolved in seawater. For example, PAH estimates that cathodic protection rejects 24 tons of aluminium per year in seawater. Aluminium is not recognized as a toxic substance, and acts as an indicating parameter that can be exceeded.... “There is a lack of information on the subject ... We do not have scientific bases proving the toxicity of this metal” (Mrs. GALAL GORCHEV, 1997, W.H.O secretary). According to various researchers, its toxicity for human health cannot be denied.
Two ports are currently involved in WP2.2.1: the ports of Le Havre and Dublin.

**Deficiency**

There’s currently no data on the toxicity of aluminium in seawater. Ports needs to be given realistic information regarding the toxicity and fate of aluminium, to know if aluminium can enter the food chain and if concentrations are dangerous or not for human health. This is of the utmost importance to ensure optimal prevention of accident on human health.

If no negative impact is found on fauna and flora, ports will be able to answer scientifically about this matter to any association having any doubts regarding this cathodic protection operation.

**Targeted results**

WP2.2 aims to study the pollution due to the degradation of metallic materials (anodes, steel structures) in seawater, assess their effects on human beings considering the various ways of transfer from the marine environment (sediments, water, organisms...), and propose solutions to limit impacts.

A scientific database on aluminium toxicity in seawater will be realised. A tool will be set up to help port managers to make their choice for the protection of ports infrastructures, considering the efficiency, the safety, the risks on environment and the cost-effectiveness of existing solutions, but also their constraints in terms of installation, operation and maintenance. Identification of pollution sources, environmental risk assessment, possible solutions and tools will help ports with respect to the environmental legislation regulation. This WP will contribute to help ports to integrate the environmental dimension in their choice and strategy. It could also lead to legislative evolutions.

**Aims of further research/development/validation during the final period:**

Chemical analyses on the water column and sediments in the port of Le Havre will be finalised, such as ecotoxicological tests and determination of aluminium speciation, to assess the toxicity of aluminium present in seawater and in the food chain. Based on chemical analyses results, solutions will be studied in order to limit the pollution from the use of sacrificial anodes (dredging, cathodic protection by imposed current, “green” sacrificial anodes...).

**Description of work**

**Task 2.2.2.1: Determination of pollution levels and fate (Unicaen)**

This task is nearly completed. Analyses have been carried out in the port of Le Havre on the column water, the sediments, as well as on living organisms present in ports (algae, shellfish). The contamination level has been determined in these various environmental compartments and the most polluted areas in related elements have been identified. Periodical analyses have been performed to get a better knowledge on the aluminium evolution in the whole harbour in space and time, in correlation with natural or anthropogenetic phenomena. Laboratory and field scale experiments have been realised with aluminium sacrificial anodes in order to study the mechanisms involved in the aluminium release by sacrificial anodes and the fate of the released element in the
harbour environment. The complete set of results is about to be obtained (chemical analyses still in progress), depicting the aluminium evolution in water and sediments and the interactions between these two environmental compartments, in natural (in situ) and controlled (laboratory) conditions.

These very first results are discussed under control of an independent expert (Pr Lei-Chou, Université Libre de Bruxelles). They will be completed and confirmed through other similar tests performed on other locations.

**Task 2.2.2.2: Ecotoxicological tests (Unicaen)**

This task is nearly completed. Ecotoxicological tests have been carried out to evaluate the toxicity of the dissolved aluminium present in seawater. The results complete the few data existing on aluminium impacts in seawater, and give information to ports authorities on the related environmental risk. The potential bioaccumulation of aluminium in tissues has been studied. Data on first and second campaigns (November 2007 and February 2008) are known and it remains to get data from campaign of July and next October, what will allow to provide complete results of total Al recorded in *in-situ* samples in a cycle of one year (November 2007 to November 2008) in relationship to physiological answer of organisms. Transfer within the food chain will now be explored, in particular thanks to the results of the chemicals analyses of organisms in harbours and surrounding areas, to finally estimate the potential threat towards human health.

**Task 2.2.2.3: Scientific data base & help-to-decision tool development (Unicaen)**

Solutions will be evaluated in order to limit the pollution related to the use of sacrificial anodes. On the one hand, alternative cost-effective solutions for cathodic protection will be studied. On the other hand, solutions to reduce the environmental risk (by keeping aluminium sacrificial anodes as cathodic protection) will be investigated. Based on the various results obtained, a tool will be set up to help port managers to make their choice for the protection of ports infrastructures and, a scientific data base on aluminium toxicity (and fate) in seawater will be initiated.

**Deliverables**

D 2.2.2: Test results from the laboratory scale trials, recommendations for full/large scale test trials. – month 33 – January 09  
D 2.2.3: Systems design for full/large scale test trials, results, conclusions and recommendations. – month 42 – October 09  
D 2.2.4: Report presenting environmental issues – analytical results and ecotoxicological impact – related to infrastructure protection. – month 33 – January 09  
D 2.2.5: Realization of a tool and a scientific data base on toxicity of seawater aluminium. – month 42 – October 09

**Integration potential**

Document Code: EFFORTS-WPI.1-DEL-300908-TUHH-FINAL-Description of Work  
Date: 30.09.2008  
106
**Methodological:** Environmental impacts assessment (WP IV.3), tests protocols and demonstration

**Operational:** Impacts on navigation (SP1), SP3 port operations and ship design, SP2 WP on energy

### Milestones and expected result

- **M2.2.1.2:** Interim report and laboratory tests completed (month 32 – December 08)
- **M2.2.1.3:** Final report and recommendations, and on-board trials completed (month 42 – October 09)
- **M2.2.2.1:** First report, ecotoxicological tests completed & solutions studied (month 33 – January 09)
- **M2.2.2.2:** Final report, tool and scientific data base set up (month 42 – October 09)
WP2.3: Port Air Quality

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Needs of ports

Various national, European or world regulations lead ports to be obliged to quantify the air pollution emanating from their business. This obligation is particularly pressing when city areas are located near the ports, which is often the case. Port air quality is an issue for all European ports, especially within the scope of the European Directives 2008/50/CE and 96/62/CE on ambient air quality assessment and management, those on the control of volatile organic compounds (94/63/63) and the MARPOL convention’s Annex VI.

Ports activity actually generates various air pollutions that affect the health of workers and people living in nearby communities and contribute significantly to regional air pollution. The main sources of air pollution concerns (i) combustion gas exhausts from ship machinery and straddle carriers, (ii) terminal traffic (VC, trucks) that generated emissions including those from traffic congestions caused by traffic from terminals, (iii) vessels at engine start-up with release of particulate-containing smoke stack blows, and (iv) pilots, tugs, and auxiliary generators on vessels at berth producing an important part of the air emissions from ocean-going vessels. Main pollutants are VOCs mainly resulting from the petroleum product transfers during the storage and loading operations at terminals and contributing to the formation of ground-level ozone harmful to health and to the environment, sulphur compounds, NOx (Nitrogen Oxides, ozone precursor that significantly contributes to smog) and ultrafine particles (toxic air contaminants including diesel exhaust soot). Besides, according to the Air Protection Plan launched some years ago in France, VOCs and SOx have been identified as the two major air pollutants resulting from ports activities.

Two ports are currently involved in WP2.1: the ports of Le Havre and Dunkirk for the demonstration. It has also to be noted that one direct end-user (CFT who owns and operates barges in various ports) is involved.

Deficiency

To raise environmental risk awareness in ports innovative and global solutions are still
required to decrease the pollution from ships, and cargo handling or transport equipments and reach efficient port operations meeting requested regulations. Such an innovation implies to treat a large range of pollutants, including VOCs, NOx, sulphur compounds (H2S and SO2) and soot, as the main pollutants affecting the air quality in ports. The need is to apply appropriate systems using a global technology to mitigate air pollutions coming from port operations. This demand is all the more pressing, especially for ports neighbouring city areas, taking into account the expected evolution of port traffics, operations and legislation.

**Targeted results**

WP 2.3 aims to improve the management of port air quality. In this scope, an innovative system based on photocatalysis will be first developed for treatment of VOCs, and sulphur compounds (H2S and SO2) generated by ports operations. Furthermore, the approach will consider NOx and soot pollutant (bibliography, on site tests) so as to know if the global innovative solution could be globally exploited for treating the pollutants affecting air quality in ports.

This WP proposes to give solutions and recommendations to ports managers, operators and ships owners to improve port air quality and thus facilitate environmentally efficient management of ports, in terms of noxiousness for human being and toxicity for air. This will be supported by tests and on-site demonstration measurement operations and calculation of the global environmental benefit. The innovative system based on photocatalysis will definitely be a way for the port community / users to decrease impacts of their activity on air quality. Main advantages of this technology are as follows: high efficiency, low costs for set up, low energy-consuming, low maintenance (frequency), numerous possibilities of use, easy to adapt to new situations due to a high flexibility, easily transportable, and financially acceptable. Detailed technical and operational recommendations including cost-benefit considerations are being provided how this system could be applied in any port. It will contribute to help ports to significantly decrease the impacts of port operations on the human health (neighbourhood, port workers and users) and their contribution to the regional air pollution (all the most sensitive when ports are near city areas).

**Aims of further research/development/validation during the final period:**

WP2.3 will achieve the targeted results owing to:

- Finalisation of design and built-up of laboratory-scale micro-pilots for the targeted pollutants;
- Design and built-up of a semi-industrial pilot for the targeted pollutants;
- On site measurements, demonstration operations (on a barge delivering fuel): principally due to the fact that all the areas of the barge delivering fuel have to be considered as ATEX (EXplosive ATmosphere) zone; the installation of the equipment implies strong requirements on the equipment and an approval for installation. In this scope, a dedicated process has been set up and is currently running, in consistency with the initial planning. It is estimated that the installation will get the required permits by month 32 (December 2008) to respect the planning and allow sufficient time for installation and test (for completion in month 35 i.e. March 2009).
- Tests will also be performed on SOx, NOx and PM with exhaust gases from an inland ship engine. They will not require any approval for installing and operating the
equipment (except conditions given by CFT).

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<td><strong>Task 2.3.1: Requirements (TLA)</strong></td>
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<td>The deliverable will be finalised presenting:</td>
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<tr>
<td>• The main requirements concerning the air pollution in European ports, the technical solutions to reduce/control it, as well as the legislative framework</td>
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<tr>
<td>• Ports operations (and concerned ship, cargo handling, and ground transport source emissions of main pollutants such as VOCs, NOx, fine particles, sulphur compounds) have been more finely estimated in the port of Le Havre;</td>
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<tr>
<td>• The estimation of main contributors to pollution has been performed in the Port of Le Havre to receive up-to-date fully-useful data and facts;</td>
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<tr>
<td>• The global impact of the photocatalysis technology has been estimated;</td>
</tr>
<tr>
<td>• Requirements for the key-case of the demonstration have been detailed;</td>
</tr>
<tr>
<td>• A comparison has been made with existing non-photocatalytic systems.</td>
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| **Task 2.3.2: Elaboration of a new innovating system for air pollutants reduction (BIOWIND)** |
| This task which is in course to be finalized (expected to be ended month 32) has mainly consisted of following activities: |
| • Design and built-up of laboratory-scale micropilots for the targeted pollutants |
| • Scientific work at the laboratory scale for the different targeted pollutants (VOCs, sulphur compounds); the experimental research axes of this scientific research project will be mainly performed within a PhD Thesis at the Louis Pasteur University of Strasbourg (ULP). |
| • Bibliography work including technology transfer and scale-up problematic on soot and NOx pollutants |
| • Scale-up, design and built-up of a pilot for the barge delivering fuel: |
|   o Technological aspects of the scale-up of the photocatalytic technology |
|   o Economical aspects of the scale-up |
|   o Pilot built-up and on-site measurement analytical devices applied to the barge delivering fuel case: tests are currently realised on the box and UV lamps to guarantee their potential utilisation in ATEX zone. Based on this approval, the design of the equipment will be finalised in laboratory and tested. |

| **Task 2.3.3: Demonstration, evaluation and validation (PAH)** |
| An important aspect of the work will deal with the scale-up of the photocatalysis technology and the corresponding design of the pilot. The demonstration will allow analysing the operational applicability and efficiency of the innovative system based on photocatalysis. Global gains will be estimated, taking into account the sources of emissions, direct pollutant reduction and emission, energetic and technological aspects and global CO\textsubscript{2} balance and benefits on-site, together with flexibility and adaptability aspects. It will address the global reduction of pollution level, with VOCs and sulphur... |
pollutants from a barge delivering fuel (CFT) in Port of Dunkirk. This will consist in: (i) dimensioning of the prototype, (ii) follow-up of design, installation, and start-up, (iii) monitoring and adaptation, (iv) presentation of demonstration results.

In parallel to the demonstration case study, on-site tests will also be performed on SO$_x$, NO$_x$, and PM with exhaust gases from an inland ship engine. They will not require any approval for installing and operating the equipment (except conditions given by CFT).

At last, WP results will be evaluated and validated in the view of applicability to ports in general and with strong interface with horizontal WP IV.

**Task 2.3.4: Dissemination, education & training (ULP)**

This task will be led with strong interface with horizontal WP III and IV. It will notably consist in: technology transfer, presentation of work’s results and PhD defence, dissemination of knowledge and the resulting scientific advances and progresses, education & training issues. Dissemination of both academic results and technology scale-up improvements will be made within the scientific community of researchers and technical engineers, through the ELCASS European associate laboratory and the IDECAT (Integrated Design of Catalytic Nanomaterials for a Sustainable Production) NoE network involving 11 European states and thus potentially numerous ports, management companies, and port end-users. This task will also allow to promote the new technology.

**Deliverables**

D2.3.1: Requirements (month 32 – December 08)
D2.3.2: Air quality improvement system at laboratory scale (month 32 – December 08)
D2.3.3: Demonstration and validation (improvement for ports) report (month 35 – March 09)
D2.3.4: Technical description and applicability report (month 40 – August 09)

**Integration potential**

*Methodological:* environmental impacts assessment (horizontal WP IV.3) & demonstration

*Technical:* on energy (impacts on ship supply and resulting pollution; see “cold iron”)

*Operational:* impacts on port operations & ship design

**Milestones and expected result**

M2.3.2: Air quality improvement system developed at laboratory scale (month 32 – December 08)
M2.3.3: Demonstration finished (month 35 – March 09)
M2.3.4: Final assessment (month 40 – August 09)
WP 2.4: Noise annoyance of ports

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Needs of ports:

State of the art

National, European and world regulations lead ports to be obliged to quantify the noise emanating from their business. This obligation is particularly pressing when city areas are located near the ports, which is often the case. The most significant regulation regarding noise in ports is the Directive 2002/49/EC relating to the Assessment and Management of Environmental Noise.

Current environmental noise research work has been focused on predicting and characterizing the weather induced variation of sound propagation and immersion. EU project IMAGINE was a direct follower of EU project HARMONOISE and utilized principles developed in HARMONOISE. Road, rail, aircraft and industrial noise sources were evaluated and comparable noise monitoring and measurement methods were developed. The methods suggested by IMAGINE can be further utilized in EFFORTS. However, the annoyance character of noise sources in ports has not been evaluated thoroughly. ECOPORTS/NoMEPorts project has demonstrated the use of noise mapping and management systems specifically for port industrial areas and provided a Good Practice Guide on Port Area Noise Mapping and Management. The objective was to reduce noise, noise-related annoyance and health problems of people living around ports. EFFORTS will further develop metrics assessing noise annoyance related to port specific sound sources, which can be implemented to the noise management systems demonstrated in NoMEPorts project.

The main sources of noise in ports are gantry container cranes, straddle carriers, container refrigeration units, ship generators, road trucks and trains. Apart from noise emitted due to the operation of the machinery, vehicles and vessels, various sudden clangs, bangs and alarm sounds are emitted within the port area. These sounds are regarded especially annoying among the residents in the vicinity of port activities.
Deficiency/aims of improvement
The key issue is to minimize annoyance. Increasing amount of cargo and global trade dictates the need for ports to expand their operations. This urge for expansion is often in conflict considering land use, the ports being located close to inhabited areas and can at worst be even restricted because of the feared annoyance to the community.

The aim is not only to fulfill legislative norms, but to minimize annoyance of port noise. Many annoying sound sources can be below the regulatory values but still disturb the nearby residents and result as complaints aimed at ports. Handling complaints take up resources of the port authorities and personnel and the complaint process can be harmful for the image of the port.

In order to evaluate annoyance both physical measurements and psychoacoustic listening tests are required. Metrics of annoyance exist, but they are source dependant. In order to create annoyance maps for port noise, the metrics specifically for port operations will have to be developed.

A significant problem related to environmental noise evaluation is managing the uncertainties due to weather. Weather conditions affect the frequency content and sound pressure levels of noise. Annoyance is affected by sound pressure level, the frequency and time-domain contents of the noise. Managing the uncertainties will help identify correctly the most annoying sources of the port area.

Objectives
Based on the NoMEPorts/Ecoports work and results WP 2.4 aims to contribute to the reduction of port-generated noise and effectively mitigate the noise annoyance of port operations. The objective is to develop a concept of a noise annoyance map that can also evaluate the uncertainties caused by meteorological factors. The concept will be able to evaluate the most annoying sources of the port at varying environmental conditions and focus the means of noise abatement on those sources.

Targeted results:
• Development of novel metrics and a mapping tool for evaluating the impact of noise.
• Reduced amount of uncertainty of annoyance evaluation.
• Minimized noise annoyance of port operations thorough efficiently selected abatement solutions.
• A guide to combat noise considering annoyance aspects. This can be used for any port

Through gained knowledge the handling process of complaints will be become more efficient. The amount of complaints will be reduced and the overall impression of nearby residents towards ports will improve.

Methods/tools to achieve the results
• According to the measured sound samples annoyance metrics will be developed
for noise sources distinctive to ports using psychoacoustic descriptors and
listening test evaluations.

- The developed annoyance metrics will be applied to evaluate the impact of
  noise: create annoyance maps and a comparison between the traditional noise
  indicators and annoyance indicators will be made.
- New innovating practices and systems for controlling noise will be applied,
  especially focusing on the most annoying sources.
- All methods and solutions developed shall be sufficiently feasible to be applied
to any port.

### Description of work

**Task 2.4.2. Source annoyance ranking identifying individual sources**

Task 2.4.2 will define the most important and **annoying** noise sources in the ports
with the aspects of habitation nearby. Noise annoyance metrics defined in task 2.4.4
will be applied to evaluation of noise annoyance. The task will collect long-term input
data for the evaluation of annoyance. Analysis of the most significant sources which
include vessels, terminal tractors, stackers, straddle carriers, cranes, truck and rail
traffic will be carried out. Various ranking methods such as annoyance descriptors will
be utilized (new technology). Sound samples will be evaluated by calculating both
standardized and **psychoacoustical descriptors** like loudness, L_{N10}, sharpness,
fluctuation strength, tonality, roughness, UBA - unbiased annoyance and sensory
pleasantness. In addition A, B, C and D weighted sound pressure levels will be
compared to the annoyance indexes developed.

**Task 2.4.3 Long-term annoyance evaluation and annoyance variation**

The variations in annoyance levels due to the different meteorological conditions will
be evaluated in task 2.4.3. The sound pressure levels at a distance can vary 80 dB
due to the changes in the atmosphere (see Fig 1b.) and cause variations to annoyance
levels. In this task the long-term annoyance metrics will be calculated for noise
captured at locations defined by task 2.4.1.

**Task 2.4.4 Annoyance metrics for ports**

There are certain noise annoyance metrics available, which might be useful in
evaluation of port noise. In addition, VTT has developed new annoyance metrics based
on long experience with mobile machinery. Available methods will be evaluated and
psychoacoustic methods will be applied to define new specific metrics for port noise.

**Task 2.4.5 Reduction of noise levels and annoyance**
Based on the evaluation of noise sources noise control measures will be carried out for especially annoying noise sources. The work will utilize the latest vibro-acoustic modelling methods for designing new silenced structures of the sources of noise aiming to reduce noise generation and radiation. The effect of the use of new innovative solutions, such as optimized damping materials will be modelled and simulated resulting in a feasibility study of material variations. Source optimized sound attenuators will be developed and evaluated at specifically selected targets.

**Task 2.4.6 Evaluation of actions, validation and dissemination**

The task will evaluate the results of previous tasks by validating the developed annoyance metrics among the selected test ports. Best feasible ways to control noise annoyance will be applied to the test port noise sources. Noise maps created by models will be evaluated by validation measurements at different weather conditions. Disseminate results as Input to standards and regulations and exchange findings and recommendations with NoMEPorts/Ecoports.

**Deliverables**

D2.4.1: Description and justification of selected case ports Turku and Dublin (month 18 – October 07)

D2.4.2: Setup plan of facilities for annoyance evaluation (month 22 – February 08)

D2.4.3: Source ranking data (sound power level & annoyance data) (month 29 – September 08)

D2.4.4: Target setting: implementation plan for emission control **R** (month 34 – February 09) **CO**

D2.4.5: Emission control treatments and measures to reduce annoyance **R** (month 41 – September 09) **CO**

D2.4.6: Guide to combat noise annoyance of ports **R** (month 41 – September 09) **CO**

**Milestones**

M2.4.1: Port specific requirements (month 16 – August 07)

M2.4.2: Setup for long-term annoyance evaluation (month 19 – November 07)

M2.4.3: Source ranking data analysis completed (month 25 – May 08)

M2.4.4: Implementation innovative means to control emission (month 36 – April 09)

M2.4.5: Knowledge compilation in the form of a Guide to combat noise annoyance of ports (month 40 – August 09)
Integration potential

There are common issues with noise annoyance and “Clean Energy Management”. By finding new low energy ways of operation it can be possible to find low noise solutions, too. A new innovative air pollution device integrated with sound attenuation properties should be evaluated. Similar approach on “Port air quality” and changing meteorological conditions is obvious, too. Connecting noise generation to the processes of port will be essential.
9.2.4 Sub-Project 3: Port Organisation

WP 3.1: Port Processes

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Needs of ports

State of the art:
The efficiency of port operations depends heavily on the quality and timeliness of the information exchanged. This comprehends all phases of the port call of a vessel and relevant port and terminal operations, examples are:

- Transmission of weather and other environmental information, coordination with pilots and tug services during the vessel arrival/departure
- Exchange of position information and towage conditions during berthing/un-berthing
- Exchange of stowage information and mooring conditions during the load/discharge phase

A further increase of efficiency can only be accomplished by means of optimised automated processes supported by complex IT solutions. In this context interoperability between processes and interconnectivity between ICT systems plays an important role.

Deficiencies/aims of improvement:

Interoperability between partners along the logistics chain is more and more carried out on process than on data level. This means it is no longer sufficient to only understand the data content exchanged. In fact, a deep understanding of the own
processes as well as the partners’ processes is necessary to ensure smooth progression along the logistics chain and to allow automated or semi-automated interoperability operations.

This is in particular for activities along the transport chain which are highly integrated into the processes of the partners involved, e.g.:

- Customs procedures require a high degree of interoperability between carrier, agent, consignor/consignee, terminal etc. This is not limited to exchange of data but involves direct interoperability between the partner processes on distinct levels.
- Timeliness and accuracy of data plays an important role for ship support (pilots, tugs and mooring teams) and stevedoring activities. These activities are characterised by high demands with respect to flexibility and short reaction times on unexpected changes during the process.
- Information and communication technology (ICT), both on data carrier side (wireless and wire bound) and as data specification (e.g., XML or EDIFACT) is readily available. However, common and agreed upon standards that are easily implementable are largely missing.

The increasing degree of automation requirements to allow reliable and quick interoperability between partners meets increasing intricate, costly and error-prone operations. State of the art procedures for specification, implementation and testing of potential solutions are still based on a data-centred view of interoperability rather than on a process-related view. Furthermore, development of such solutions today still is more an art than an engineering task. As a result, process automation is a chancy challenge in particular for small and medium sized port administrations and industries.

Past and ongoing RTD projects are dealing with application specific interoperability aspects relevant to the respective problem domain, but what is still missing is a comprehensive procedure model ('roadmap') for specification implementation and testing of interoperability solutions in the maritime sector based on a sound understanding of relevant port and terminal processes.

Objectives

Methods/Tools:

WP 3.1 aims in providing the methodology and necessary tools to create interoperability solutions between stakeholders in ports. Application of a structured procedure for specification, implementation and testing makes development of interoperability solutions calculable thus minimizing project costs and risks. Because process capturing and modelling is one of the basic activities within WP 3.1, this work package furthermore supports process-related work packages during the modelling process. This ensures a consistent application of modelling techniques and methodologies within EFFORTS.

The basic objectives of WP 3.1 are as follows:
• Capturing and visualisation (port process map) of relevant port and terminal processes and related stakeholders in a port process model to host all relevant processes, relations/interdependencies and responsibilities open for later extensions and modifications by involved parties

• Specify a set of standard business cases as templates for the implementation of interoperability solutions.

• Analyse ICT requirements associated necessary to optimize the business cases and align the requirements with existing, emerging and missing standards.

• Provide a procedure model as a guideline to specify, implement and test interoperability solutions between stakeholders in port operation.

• Develop tools to implement and monitor these interfaces.

• Use these tools to develop interfaces for selected port operations, such as berthing, and pilot test them in multiple ports with diverse characteristics, such as size and type of cargo handled.

• Support other process-related work packages within EFFORTS in specification and development of the corresponding process models.

The work is based on a process-centred approach. A set of standardized business cases will be used as basis for specification, implementation and testing of interoperability solutions. These business cases form a set of ‘pre-defined building blocks’ for the creation of concrete implementations. The tools developed within this work package will follow a Service Oriented Architecture. This makes it possible, to use them in any target ICT system independent of the underlying specific architecture.

In order to avoid unnecessary duplication of work, relationships to the following projects will be investigated:

• MarNIS (Maritime Navigation and Information Services); the focus of this project is on vessel traffic management. Related to the applications developed within MarNIS there are several activities on information and process modelling which could be used within this work package to complement the set of standard business cases to be specified within task 3.1.2 (see below).

• PORTMOS (Portugal Motorway of the Sea); the main objective is to integrate the national ports into the network of European sea highways. In this context the project deals also with ICT infrastructures which could complement the research work within this work package.

**Involved or supporting ports:**

The pilots will be run in the ports of Thessaloniki and Dublin. Other involved and supporting ports are the ports of Sines, Antwerp and Barcelona.

In addition to the above mentioned ports others are invited to share their knowledge and expertise by visiting the EFFORTS home page and by commenting on the processes presented in the Process Modelling Platform (PMP). The users do not oblige
to register. It is free to decision if they would like to stay anonymous. The log-in area is however provided to allow interested entities of port to higher involvement in the port process modelling activities. The PMP will be promoted in e.g. EFFORTS newsletter.

**Expected results/beneficiaries/impacts:**

The result of this work package provides a port process map and supports the development process by a systematic procedure model and an adequate tool support during the implementation phase; furthermore this approach enables systematic quality assurance and testing of interoperability solutions. Additionally, necessary means are provided to monitor data processing after successful commissioning of interfaces.

Due to its generic approach based on standardized business cases, the results of this work package are applicable for interoperability solutions on business/organisational as well as on technical level.

The achievements of the Work Package will be assessed and verified by means of a pilot installation. Due to the high number of stakeholders and interdependencies, a highly relevant service offered by the port or a relevant scenario will be selected as a pilot. The high traffic density and workload in ports today require a high degree of flexibility with respect to the planning of traffic flows and support resources. A serious bottle-neck is the availability of berthing sites. In particular if changes of the berth plan in short term are required, a high number of different information needs to be assessed in order to make decisions: capacity and measurements of the vessel, necessary number of tug boats, necessary capacity for mooring, etc. Today, this information has to be captured from very different sources which do usually not interoperate. A common ICT platform allows interoperability between these sources and provides all information for berth planning in a centralised way.

Measurable benefits are expected in particular in following fields:

- Semantic port process platform to ensure a common view and understanding of port operations between all related parties.
- Reduced costs and development times for complex interoperability solutions
  Due to the use of pre-configured business cases, the number of individual adaptations can be minimized. This reduces costs and development times significantly.
- Improved maintainability and flexibility
  The procedure model incorporates detailed documentation of the interoperability solution developed; this is also supported by the tools to be developed within this work package. This simplifies maintenance or later modifications.
- Improved quality of the resulting interoperability solution
  Because each solution is based on sound standardized business cases,
possible sources of errors are restricted to the small number of individual adaptations deviating from the standard.

Beneficiaries will be all partners involved in port operations. In particular small and medium sized service providers like tug operators, lines handler or stevedore companies. The approach described allows them to offer customized interoperability solutions for reasonable costs.

It needs to be pointed out that the result of this work package is not limited to a specific set of applications. Due to the generic approach applied it can be used to establish links to any kind of external systems like e.g. inland waterway navigation. Because the exchange of data strictly complies with industrial standards like EDIFACT/XML, data interchange requirements according to EMSA/SafeSeaNet can be also fulfilled easily.

Deficiency:
Aims of further research/development/validation during the final period:
The work package will achieve the targeted results by:

1. Emphasize promotion and dissemination of the link to the Process Modelling Platform (PMP) to ensure satisfactory participation of ports within Europe. The ports shall be of different sizes and types such that the PMP in the end contains as many different processes as possible.
2. Start pilot installation as soon as possible to be able to collect and validate results.
3. Emphasize dissemination of results and aim at having validated results ready for the international port conference that will find place in Geneva in May 2009.

Description of work
WP 3.1 consists of the following tasks

3.1.1 Capturing of port processes and implementation into a port process model and visualisation in a port process map (TUHH)

This task aims at capturing port processes which are done in accordance with the standard process model developed as a unified modelling framework. In order to provide the access and possibility for improving the effectiveness of the processes – amongst project partners and external parties - a web-based platform is created to serve as a common communication tool for the modelled processes. The visualisation of the port processes helps foster a comprehensive understanding of these processes and their relations to other processes.
3.1.2 Specification of standard business cases (NundP)

Identification of standard business cases relevant for interoperability solutions within the scope of EFFORTS. The work is based on the process encyclopaedia developed during the verification phase. Identification and further refinement is carried out in close co-operation with the affected work packages of sub project 1. The business cases will form the rule base for transmission of information between port processes.

3.1.3 ICT and standards (MARINTEK).

Identify the ICT requirements that can best support the implementation or adjustments of the business cases. Align the ICT requirements with existing, emerging and missing international standards. In particular, the usefulness of wireless communication in implementing terminal business cases and emerging standards from the electronic document community (UN/CEFACT and OASIS/ebXML) will be investigated for usefulness. Also, the possible utilization of the ship oriented standards from MarNIS, e.g., on Electronic Port Clearance will be included in the investigation and improvement suggestions.

3.1.4 Definition of a procedure model for specification, implementation and testing of interoperability solutions (NundP)

The objective of this task is to define a procedure model as a guideline or a framework for the development of interoperability solutions for port operations. It will provide a formalised methodology which comprises all phases of the system development lifecycle: analysis, design, implementation, testing, and maintenance. The standard business cases specified within task 3.1.2 will be part of the procedure model, forming a ‘construction kit’ which allows composition of interoperability solutions from pre-defined ‘building blocks’.

3.1.5 Specification of framework for the development and monitoring of interoperability solutions (TREDIT)

The objective of this task is to specify a set of processes and underlying technologies allowing the development of interoperability solutions according to the procedure model generated in task 3.1.4. The framework is meant to facilitate easy access to the standard business cases and rapid implementation and testing of ICT interoperability solutions. Furthermore, they will support monitoring of information exchanged after commissioning of the solution.

3.1.6 Design and development of planning and management tools for port process optimisation (TREDIT)

The objective of this task is to apply the framework specified in Task 3.1.5 for
the development of planning and management tools facilitating efficient execution of port processes through appropriate ship-port interfaces. The end-product will support (indicatively)

- Human and equipment resource calculation and allocation, e.g. straddles to yard areas and cranes, cranes to ships
- Berth/slot allocation, within an arbitrary accuracy – also benchmarks, adherence to the schedule, dynamic re-planning if a ship misses its allocated slot
- Cargo handling equipment such as??
- Stevedoring, including maintenance, refuelling, waste reception and other activities at the port
- Information exchange platform/network (provider/subscribers model) in order to support customs/border crossing processes (e.g. intra-EU, international, including special conditions and requirements, such as US), invoicing, necessary permissions

3.1.7 Pilot installation (ThPA)

A pilot installation of the tools developed in Task 3.1.6 will be deployed and tested. For this installation, a system to support berth planning has been selected, because it shows a high number of different information types collected from different sources.

3.1.8 Verification and validation of the pilot installation, assessment of benefits and return on investment (PAG)

The objectives of this task are twofold: first, formal verification and validation of the approach and the pilot installation; second, the evaluation of the benefit. To achieve the second objective, suitable measures need to be defined.

3.1.9 Process Helpdesk – support of process-related work packages during specification and creation of process models (TUHH)

Support EFFORTS work packages during the phase of process modelling. The objective of this task is to ensure that a consistent methodology for process modelling will be applied within EFFORTS. Furthermore, due to a central co-ordination of modelling activities unnecessary doubling of modelling work can be avoided. The support will take place via tele-collaboration or dedicated workshops.

Deliverables
D 3.1.1 Handbook of Process Modelling
   - A guide to create process diagrams – month 12 – April 07 (PU / R)
D 3.1.2 Process Ontology and Process Modelling Platform – month 12 – April 07 (CO
Milestones
M 3.1.1 Port process map (month 19 – November 07)
M 3.1.2 Procedure Model for specification, implementation and testing of interoperability solutions (month 15 – April 08)
M 3.1.3 Consensus on framework specification (month 18 – October 07)
M 3.1.4 Completion of port-process optimisation system development (month 30 – October 08)
M 3.1.5 Pilot installation deployment (month 32 – December 08)
M 3.1.6 Pilot installation test completion (month 34 – February 09)

Integration potential

The procedures and tools developed within this work package facilitate rapid implementation of interoperability solutions with high quality between partners within ports. The use of a Service Oriented Architecture allows the application of this methodology within arbitrary system architectures.

Whereas the main focus of this work package lies on the implementation of interoperability solutions between ICT systems, the process centred approach is also suitable for interoperability projects on an organisational level.
WP 3.2: Risk Management Framework

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**Needs of Ports**

There is a wide variety of risk assessment methods available all requiring however a sound knowledge of processes in order to specify relevant risk scenarios. The innovative issue of this WP is to "translate" port processes and risk scenarios to risk experts and to allow application of a selected risk assessment method (Formal Safetey Assessment as the IMO-recommended method) by operative port people. The expected benefit is twofold:

- relevant scenarios to calculate risks and hence reliable results
- transparent risk mitigation methods understood by operational port staff adequately applied within routine and special operations.

This will provide a common and realistic understanding of port-related risks by all parties involved in operations of ports and within policy-making in relation to communities and residentials and hence agreements on risk control options to become effectively and efficiently applied.

**State of the Art**

Ports have to politically negotiate on community level when e.g. extending or modifying sites and/or operations close to residential areas. The local policy makers usually are not able to assess associated risks and would be supported if an accepted European standard risk management framework would provide guidance by means of procedures, methods and tools/simulations.

Ports are a critical element of the supply chain. They operate in complex environments and have specific needs that vary considerably in direct relation to many parameters such as: port typologies, (management structure and ownership) type, eg. Public or private; landlord/tool port etc., cargo/ passengers, geographical and hydrographical features, position and logistic chain etc,
Consequently different ports confront different risk exposures, have different risk perceptions and different risk cultures and related risk management experience. Port safety and security activities are regulated at International (IMO), European, national and regional or local level. This complex legal and regulatory framework is difficult to comply with and it is even more difficult to integrate compliance seamlessly into the basic port functions.

Each port has to commit expensive resources to manage the regulatory framework and to deal with safety and security issues and integrate them with their specific operations.

**Research activities** in the past were developed to assess safety critical functions associated with maritime traffic (SAFECO), to provide maritime accident analysis and human factors (CASMET), to provide the safety assessment and environmental assessment of ship operations (FSEA), to provide the risk assessment in navigational equipment (ATOMOS), to apply the formal safety assessment process in high speed craft (TOHPIC), to propose the formal safety assessment process in different ship – port areas (THEMES), to develop the risk assessment for tanker design and operations (POP&C PROJECT), to develop the risk assessment for hazmat transportations (SEALOC). On going research activities are now on progress inside MARNIS (mainly oriented to the navigation and vessel - port information systems)

**Deficiency/aims of improvement**

The main aims of improvement for port operators are:
- to include all the stakeholders in the risk assessment framework, not only the port entities but also the port users and customers e.g. transportation companies, logistic operators, etc.
- to integrate the port protection plans with local regional, national and European plans.
- to have a flexible protection plan able to include all the dynamic changes of the port operations and regulations.
- to develop an integrated methodology covering safety so as to deliver a tool/methodology to meet the needs of ports now and in the future.

**Objectives**

- To develop the Risk analysis associated to the different ship types, traffic congestion, environmental conditions
- To develop the Risk management in order to mitigate major hazards in ports areas, as well as to evaluate the residual risk on land and water including collision and grounding.
- To develop the cost/benefit analysis related to the introduction of mitigation measures
- To develop modelling and simulation tools for risk assessment and risk management
- To develop a model to include in the risk assessment/management tool the requirements and the results of scenarios defined inside the port area.
- To provide a model for risk assessment and hazard control measures of those selected hazards in order to enable the ports to integrate their safety and security activities and the port protection plans with relevant local, regional, national and
European plans.
- To integrate safety concerns/activities with the normal operations (to have safety as planning and operational parameters).

The WP results hence shall provide the tools and the methodologies to assess and manage port risks in a standardised way and to provide an accepted system to estimate hazards of installations and operations for port internal purposes but also for negotiations with third parties.

**Methods/Tools:**
Because IMO recommends Formal Safety Assessment (FSA) for all navigational issues it will be applied in order to perform **the whole risk management** of the port area. Then it is crucial that the operators understand and participate at this approach and not only the scientists/consultants.

Usual FSA steps are:

1) hazards identification
2) risk assessment (according to probability and average damage)
3) risk control options
4) cost-benefit assessment for control options
5) recommendations at technical, organisational or behavioural measures or a combination of all

Then it will be developed:

a) a **“catalogue” of possible hazards** in ports including cause – impact determinations
b) **proven risk assessment methods** and as far as possible a standardization of algorithms and values for probabilities and average damages; with associated distributions of probability applying Monte Carlo simulation. The risk assessment methodology will be also tailored for threat analysis and vulnerability.

c) risk manager training/certificates enabling operators to perceive, assess, **reduce** and manage risks including the ability to build up risk awareness of employees.

d) **Standardised catalogue** of mitigation measures from the technological point of view

e) Methods and tools to evaluate the **cost/benefits for the mitigation measures** in the specific context.

f) Methods and tools to connect the previous evaluation inside the regulatory framework.

The most critical issue in FSA step 2 is the identification of risk scenarios which requires very detailed process knowledge only available at the operational site. A successful risk assessment therefore depends on the quality of co-operation **between risk experts and operators**. Here EFFORTS could work out recommendations how to establish such co-operation.

**Expected results/beneficiaries/impacts:**
Two main results are expected:

1. A proven risk assessment for ports allowing standardisation.
2. Proven control options to mitigate the hazards (best practices)
The methodology for risk assessment detailed for the prioritized hazards will be capable of being integrated with port protection plans and regulations at different levels (International, European, national and local).

It will certainly not be possible to cover all possible risks in ports within EFFORTS but this is not essential as long as the approach provides already applicable results for certain areas and can easily become extended by the operators themselves. Such a continuous improvement also should become institutionalized and shared by other ports. The beneficiaries will be the port stakeholders. The impact is expected in the areas of safe operations related to workers, passengers and the general public.

Description of work
**Task 3.2.1: Hazard Identification based on Survey of Hazards associated with Port Operations (JRC, IST, DAPP, TUHH, PAG, DPC, APL)**

This task is aimed at
1. Definition / categorisation of the hazards / risks relevant to EFFORTS (i.e. economic, health, environmental, physical safety etc)
2. Analysis for generic port functionalities, processes and interactions and key actors involved (i.e. workers, public, passengers, administrations, authorities etc) coming from WP 3 task1.
3. Mapping of the generic hazards, as categorised in (1), to the generic port processes and actors (as from 2)
4. Workshop on Port Operations Hazards and consequences for Hazard final Assessment
5. Processing the results of the WS as well as additional historical and any other data to produce a the final deliverable of 3.2.1 in the form of a database or portal serving (potentially) as a decision support tool for port operators and administrators.

The HAZard IDentification will be performed by using the available information and statistical data and methods such the consequence analysis and the Structured What-If method.

This work will identify the panel of issues depending on port locations (North / South of Europe, Estuary / Open sea), type of management of the port (private or public, multi-actor), port size, type of activity (multi-purpose / specialized terminal) and type of goods (dangerous / non dangerous). The main output of this task (to be used in task 2) will be the detailed list of specific hazards, and general scenarios.

**Task 3.2.2: Risk Assessment (TUHH, DAPP, ISDEFE, PAG, DPC, APL)**

This task will develop:
1. specific risk indexes defined taking into account and comparing the risk indexes already used for the vessel operations such as the severity classes and frequency indexes
2. a comprehensive matrix of exposures and indexes.
3. a model to guide the ports how to use available complex information on risk management to customize to their own requirements and providing support for the detailing of the risk scenarios. A successful risk assessment therefore depends on the quality of co-operation and coordination among stakeholders/actors involved in port processes. Here EFFORTS will work out recommendations how to establish such co-operation and coordination
4. an umbrella model to describe how the cumulative risks can be determined from individual process risks (by using simulations based on Monte Carlo tool)
5. methods and tools for threat identification and vulnerability analysis, as far as the security items are concerned
6. The development of a risk assessment case study for a major hazards in the operational scenarios.

**Task 3.2.3: Risk Management (IST, DAPP, PAG, DPC, APL, ISDEFE)**

Finally the risk Management will be performed by means of

1. Definition of RCO's
2. Calculation of risks of specific port activities.
3. Development of the GIS model
4. The refinement /application of the software tool (already provided in task 3.2.2) in order to evaluate the **residual risk** and the cost/benefits of the introduction of control options/ **risk mitigation strategies**

**Task 3.2.4 Recommendations for integration and implementation (DAPP, TUHH, JRC, PAG, DPC, APL, ISDEFE)**

This task will detail:

1. how the different steps of the risk management must be developed,
2. how the procedures must be followed and the tools used,
3. the platform of software tools translating the umbrella model for the development of risk scenarios is detailed and described.

4. **a case study suggested by the port operators** in order to integrate the risk assessment and the mitigation measures inside the protection plans and the regulatory framework.
5. the general guidelines for future extensions of the risk management tool.
Deliverables

D 3.2.1 Hazard Identification (report and overview description of hazards in ports) - (Month 20 – December 07)
D 3.2.2 Risk Assessment (Report and procedural model of Risk Management Framework developed in EFFORTS for risk assessment) - (Month 29 – September 08)
D 3.2.3 Risk Management (Report, procedures and software tool RTM ) – (Month 34 – February 09)
D 3.2.4 Recommendation on Techniques & strategies for integration and implementation (Platform of software tool & case study) –(month 38 - June 2009)

Integration potential

To ensure that the approach is systematic: the results from WP 3.1 (port processes) need to provide the basis. The inherent potential of the WP 3.1 approach is that processes can become linked to all possible attributes.

The risk management applications integrated with port protection plans and specific regulations (International, European, national etc)

Milestones and expected result

M3.2.1 Hazard Identification (Month 20 – December 07)
M3.2.2 Risk Assessment (Month 29 – September 08)
M3.2.3 Risk Management (Month 34 – February 09)
M3.2.4 Platform of tools and case study (Month 38 – June 09)
10 Project Resources and budget overview

10.1 Efforts from month 25 to month 42

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Document Code: EFFORTS-WPI.1-DEL-300908-TUHH-FINAL-Description of Work
Date: 30.09.2008
## 10.3 Overall budget (months 1-42)

### 10.3.1 Form A3.1

<table>
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<tr>
<th>Participant no.</th>
<th>Organisation short name</th>
<th>Cost Model Used</th>
<th>Estimated eligible costs and requested EC contribution</th>
<th>Costs and EC contribution per type of activities</th>
<th>Total (€)</th>
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<td>Consortium management activities (4)</td>
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| 1 | DAPP | FC | Eligible costs | Direct costs (a) | 380,089.58 | 142,200.00 | 522,289.58 |
|   |      |    |                | of which subcontracting | 266,062.71 | 99,540.00 | 365,602.71 |
|   |      |    |                | Total eligible costs (a+b) | 646,152.29 | 241,740.00 | 888,892.29 |
|   |      |    |                | Requested EC contribution | 584,164.14 | 241,740.00 | 825,904.14 |
|   |      |    |                | of which subcontracting | 801,666.67 | 100,000.00 | 1,801,666.67 |
|   |      |    |                | Total eligible costs (a+b) | 88,000.00 | 20,000.00 | 108,000.00 |
|   |      |    |                | Requested EC contribution | 944,400.00 | 205,600.08 | 1,150,000.08 |
| 2 | TUHH | AC | Eligible costs | Direct costs (a) | 7,280.00 | 7,280.00 |
|   |      |    |                | of which subcontracting | 1,456.00 | 1,456.00 |
|   |      |    |                | Total eligible costs (a+b) | 8,736.00 | 8,736.00 |
| 3 | AUTH | AC | Eligible costs | Direct costs (a) | 22,660.00 | 22,660.00 |
|   |      |    |                | of which subcontracting | 22,660.00 | 22,660.00 |
|   |      |    |                | Total eligible costs (a+b) | 45,320.00 | 45,320.00 |
| 5 | CTO  | FC | Eligible costs | Direct costs (a) | 27,200.00 | 27,200.00 |
|   |      |    |                | of which subcontracting | 27,200.00 | 27,200.00 |
|   |      |    |                | Total eligible costs (a+b) | 54,400.00 | 54,400.00 |
| 6 | DORIS | FC | Eligible costs | Direct costs (a) | 3,966.44 | 3,966.44 |
|   |      |    |                | of which subcontracting | 3,966.44 | 3,966.44 |
|   |      |    |                | Total eligible costs (a+b) | 7,932.88 | 7,932.88 |
| 7 | FORCE | FC | Eligible costs | Direct costs (a) | 635,700.00 | 635,700.00 |
|   |      |    |                | of which subcontracting | 1,059,500.00 | 1,059,500.00 |
|   |      |    |                | Total eligible costs (a+b) | 529,750.00 | 529,750.00 |
| 8 | ISQ  | FC | Eligible costs | Direct costs (a) | 3,318.53 | 3,318.53 |
|   |      |    |                | of which subcontracting | 3,318.53 | 3,318.53 |
| 9 | JRC  | FCF | Eligible costs | Direct costs (a) | 166,582.67 | 166,582.67 |
|   |      |    |                | of which subcontracting | 33,118.53 | 33,118.53 |
|   |      |    |                | Total eligible costs (a+b) | 199,699.20 | 199,699.20 |
| 10 | MARINTEK | FC | Eligible costs | Direct costs (a) | 327,638.48 | 327,638.48 |
|   |      |    |                | of which subcontracting | 555,114.33 | 555,114.33 |
| 11 | NundP | FCF | Eligible costs | Direct costs (a) | 224,493.33 | 224,493.33 |
|   |      |    |                | of which subcontracting | 44,898.67 | 44,898.67 |
|   |      |    |                | Total eligible costs (a+b) | 269,392.00 | 269,392.00 |
| 12 | NTUA | AC | Eligible costs | Direct costs (a) | 14,000.00 | 14,000.00 |

**Requested EC contribution**

1. CTO FC: 944,400.00
2. AUTH AC: 9,400.00
3. BMT FC: 22,660.00
4. CTO FC: 22,660.00
5. DORIS FC: 22,660.00
6. FORCE FC: 22,660.00
7. ISQ FC: 22,660.00
8. JRC FCF: 166,582.67
9. MARINTEK FC: 227,925.85
10. NundP FCF: 224,493.33
11. NTUA AC: 16,800.00

**Total (€) (1+2+3+4)**

1. 529,750.00
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**Estimated eligible costs and requested EC contribution**

1. Direct costs (a): 27,200.00
2. Indirect costs (b): 33,116.53
3. Total eligible costs (a+b): 50,316.53
4. Requested EC contribution: 16,800.00

**Total (€) (5)**

1. 529,750.00

**Estimated eligible costs**

1. Direct costs (a): 144,200.00
2. Indirect costs (b): 8,736.00
3. Total eligible costs (a+b): 152,936.00
4. Requested EC contribution: 8,736.00

**Total (€) (6)**

1. 529,750.00
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<th>Participant n°</th>
<th>Organisation short name</th>
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<th>Costs and EC contribution per type of activities</th>
<th>Total (%)</th>
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Financial Information - whole duration of the project

**Total eligible costs:**

- Direct costs: 67,200.00
- Indirect costs: 120,748.40
- Total eligible costs: 187,968.40

**Requested EC contribution:**

- Requested EC contribution: 14,439.40
- Total requested EC contribution: 149,500.00

**Total (%):**

- RTD or innovation related activities: 114,482.25
- Demonstration activities: 22,896.45
- Training activities: 123,378.70
- Consortium management activities: 137,378.70
- Total: 499,639.90

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Document Code: EFFORTS-WPI.1-DEL-300908-TUHH-FINAL-Description of Work

Date: 30.09.2008
### Financial Information - whole duration of the project

<table>
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<tr>
<th>Participant No.</th>
<th>Organisation short name</th>
<th>Cost Model Used</th>
<th>Estimated eligible costs and requested EC contribution (whole duration of the project)</th>
<th>Costs and EC contribution per type of activities</th>
<th>Total (%): (1)+(2)+(3)+(4)</th>
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**Eligible costs**

- Direct costs (a)
- Indirect costs (b)

**Total eligible costs (a+b)**

**Requested EC contribution**

**Total (%): (1)+(2)+(3)+(4)**

**Note:** The table provides financial information for each participant, including estimated eligible costs and requested EC contribution, along with their respective costs and EC contributions per type of activities.
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<th>Participant no.</th>
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<th>Total eligible costs (a)+(b)</th>
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<th>Demonstration activities (2)</th>
<th>Training activities (3)</th>
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10.3.2 Form A3.2

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The amounts “estimated grant to the budget” for months 1-12 (815.222.88 €) and for months 13-24 (3.578.801.21 €) are the payments already received.

The total “estimated grant to the budget” in the form A3.2 (7.900.650.40 €) is referred only to the Consortium; the JRC “estimated grant to the budget” is 99.349,60 € (the total is 8.000.000 €).
## 10.4 Budget for the next 18 months (months 25-42)

### 10.4.1 Form A3.3

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10.5 Management level description of resources and budget

10.5.1 SP Horizontal

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<td>11,375.00</td>
<td>5,100.00</td>
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**Budget Calculation 18 Months**

| Personnel | 41,089.63 | 169,467.56 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 35,595.64 |
| Trains | 5,919.99 | 48,378.94 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4,495.96 |
| Prototype | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Equipment | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Others | 355,100.57 | 163,859.21 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 44,842.44 |

**Budget Calculation 42 Months**

| Personnel | 130,200.00 | 302,500.00 | 5,280.00 | 3,500.00 | 4,800.00 | 16,418.00 | 9,200.00 | 5,000.00 | 5,000.00 | 996,111.50 | 4,000.00 | 7,000.00 | 6,100.00 | 11,375.00 | 51,000.00 |
| Trains | 12,600.00 | 83,666.70 | 2,000.00 | 2,000.00 | 2,000.00 | 2,000.00 | 2,000.00 | 2,000.00 | 2,000.00 | 2,000.00 | 27,425.00 | 2,000.00 | 2,000.00 | 2,000.00 | 6,100.00 |
| Prototype | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Equipment | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Others | 263,182.78 | 103,333.34 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**Total Direct costs**

| 365,264.76 | 468,455.04 | 7,280.00 | 3,500.00 | 4,800.00 | 17,418.00 | 9,200.00 | 5,000.00 | 5,000.00 | 996,111.50 | 4,000.00 | 7,000.00 | 6,1000.00 | 11,375.00 | 51,000.00 |

**Budget Calculation 18 Months**

| Subcontracting | 0.00 | 1,590.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**Budget Calculation 42 Months**

| Subcontracting | 263,182.78 | 103,333.34 | 1,458.00 | 6,650.00 | 8,866.44 | 3,463.20 | 1,832.00 | 1,400.00 | 1,400.00 | 847,072.50 | 6,000.00 | 9,000.00 | 8,100.00 | 11,375.00 | 51,000.00 |

**Indirect costs**

| 246,733.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**Subcontracting**

| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**Total Direct costs**

| 405,281.76 | 467,050.06 | 7,280.00 | 3,500.00 | 4,800.00 | 17,418.99 | 9,200.00 | 7,000.00 | 7,000.00 | 996,254.50 | 4,000.00 | 7,000.00 | 6,100.00 | 11,375.00 | 51,000.00 |

**Indirect costs**

| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

**Subcontracting**

<p>| 263,182.78 | 103,333.34 | 1,458.00 | 6,650.00 | 8,866.44 | 3,463.20 | 1,832.00 | 1,400.00 | 1,400.00 | 847,072.50 | 6,000.00 | 9,000.00 | 8,100.00 | 11,375.00 | 51,000.00 |</p>
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**BUDGET CALCULATION**

**18 MONTHS**

- **Personnel**
  - 18 months: 90,000
  - 42 months: 22,523.86

- **Travels**
  - 18 months: 0.00
  - 42 months: 10,660.00

- **Prototype**
  - 18 months: 0.00
  - 42 months: 15,364.00

- **Equipment**
  - 18 months: 0.00
  - 42 months: 16,206.00

- **Others**
  - 18 months: 7,403.86
  - 42 months: 0.00

**Total Direct costs**

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<td>103,701.26</td>
<td>263,698.80</td>
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**Indirect costs**

- 18 months: 20,740.25
- 42 months: 51,678.48

**Subcontracting**

- 18 months: 13,461.19
- 42 months: 219,749.00

**Total**

- 18 months: 117,161.41
- 42 months: 305,447.88

**BUDGET CALCULATION**

**42 MONTHS**

- **Personnel**
  - 13,461.15
  - 2,000.00

- **Travels**
  - 13,461.15
  - 2,000.00

- **Equipment**
  - 13,461.15
  - 2,000.00

**Total Direct costs**

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**Indirect costs**

- 13,461.15

**Subcontracting**

- 13,461.15

**Total**

- 15,461.15

**BUDGET SUMMARIZED**

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*Document Code: EFFORTS-WPI.1-DEL-300908-TUHH-FINAL-Description of Work*

*Date: 30.09.2008*
## 10.5.2 Navigation in Ports

### NAVIGATION IN PORTS

|                | TGH | BMF | FOR | MAKER | SARI | PES | TRIT | STER | DAB | ALA | IST | TIF | NAT | MARMA | PPA | PPN | DPC | DVO | APL | CARS | SW | UWU |
|----------------|-----|-----|-----|-------|------|-----|------|------|-----|-----|-----|-----|-----|------|------|-----|-----|-----|-----|-----|------|----|-----|
| Total costs    | 5,500.00 | 10,330.00 | 7,600.00 | 11,486.00 | 8,336.00 | 11,032.00 | 4,000.00 | 6,760.18 | 4,655.17 | 7,500.00 | 6,500.00 | 11,533.00 | 14,583.00 | 6,200.00 | 4,700.00 | 10,000.00 |
| Indirect costs | 5,500.00 | 10,330.00 | 7,600.00 | 11,486.00 | 8,336.00 | 11,032.00 | 4,000.00 | 6,760.18 | 4,655.17 | 7,500.00 | 6,500.00 | 11,533.00 | 14,583.00 | 6,200.00 | 4,700.00 | 10,000.00 |

### BUDGET CALCULATION

#### 18 MONTHS

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<th>Travels</th>
<th>Prototype</th>
<th>Equipment</th>
<th>Others</th>
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#### 42 MONTHS

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<th>Direct costs</th>
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## 10.5.3 Ports and Environment

### Ports + Environment

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<td>9,888.00</td>
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### BUDGET CALCULATION

#### 18 MONTHS

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<tr>
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<td>115,932.13</td>
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#### 42 MONTHS

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<th>Others</th>
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### Budget Calculation - 18 Months

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### Budget Calculation - 42 Months

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### Budget Summary

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- **Personnel**: 283,832.64
- **Equipment**: 50,000.00
- **Others**: 0.00
- **Indirect Costs**: 58,937.55
- **Subcontracting**: 0.00

Date: 30.09.2008

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### Port Organisation

#### BUDGET CALCULATION 18 MONTHS

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<th>CORS</th>
<th>JPC</th>
<th>MAN/TEK</th>
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| BUDGET CALCULATION 42 MONTHS

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<th>CORS</th>
<th>JPC</th>
<th>MAN/TEK</th>
<th>NWP</th>
<th>TRIDEC</th>
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<th>TRIP</th>
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<tr>
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<td>33,600.00</td>
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</table>

**Budget Calculation 18 Months**

- **Personnel**
  - Indirect costs: 38,695.49
  - Total Direct costs: 104,311.92
- **Travels**
  - Indirect costs: 6,255.77
  - Total Direct costs: 343.43
- **Prototype**
  - Indirect costs: 0.00
  - Total Direct costs: 0.00
- **Equipment**
  - Indirect costs: 0.00
  - Total Direct costs: 70.96
- **Others**
  - Indirect costs: 0.00
  - Total Direct costs: 0.00
- **Total Direct costs**: 116,925.88
- **Indirect costs**: 81,848.12
- **Subcontracting**: 0.00
- **Total**: 198,774.00

**Budget Calculation 42 Months**

- **Personnel**
  - Indirect costs: 38,695.49
  - Total Direct costs: 104,311.92
- **Travels**
  - Indirect costs: 6,255.77
  - Total Direct costs: 343.43
- **Prototype**
  - Indirect costs: 0.00
  - Total Direct costs: 0.00
- **Equipment**
  - Indirect costs: 0.00
  - Total Direct costs: 5,000.00
- **Others**
  - Indirect costs: 0.00
  - Total Direct costs: 0.00
- **Total Direct costs**: 116,925.88
- **Indirect costs**: 81,848.12
- **Subcontracting**: 0.00
- **Total**: 208,166.67
11 Ethical Issues

National legislation:
We certify that we conform to legislation and regulations in the countries where the research will be carried out and applied.

EC Legislation:
We certify that we conform to EU legislation such as:

- The Charter of Fundamental Rights of the EU
- Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data.

We also certify that the proposed research has no clinical, medicinal, biotechnological, genetic or any other content which to our knowledge could conflict with ethical rules within the EC.

International Conventions and Declarations:
We certify that we conform to the following international conventions and declarations:

- Helsinki Declaration in its latest version
- UN Convention on the Rights of the Child
- Universal Declaration on the human genome and human rights adopted by UNESCO

We certify that we take into account to the opinions of the European Group of Advisers on the Ethical Implications of Biotechnology (1991–1997) and the opinions of the European Group on Ethics in Science and New technologies (as from 1998).

We also certify this research will not conduct experiments on animals.

We confirm that the proposed research does not involve:

- Research activity aimed at human cloning for reproductive purposes,
- Research activity intended to modify the genetic heritage of human beings which could make such changes heritable.
- Research activity intended to create human embryos solely for the purpose of research or for the purpose of stem cell procurement, including by means of somatic cell nuclear transfer;
- Research involving the use of human embryos or embryonic stem cells.

Privacy Issues:

Document Code: EFFORTS-WPI.1-DEL-300908-TUHH-FINAL-Description of Work
Date: 30.09.2008
EFFORTS will comply with the EU Privacy Guidelines and will not engage into research or developments compromising the privacy of EU citizens. No personal information will be used in the EFFORTS developments.
12 Other Issues

12.1 Policy Issues

EFFORTS’ goals are totally in line with the strategic aims set out in the European Commission document ‘Transport Policy to 2010: time to decide’.

The aims of EFFORTS are therefore widely shared throughout European Community and the maritime industry in general and it is essential that EFFORTS engage with actors beyond the research field, to spread awareness and knowledge and to explore the wider societal implications of the work.

The main mechanism for this dialogue will be WP II, which is responsible for the liaison to international standards and legislative bodies. EFFORTS will engage with outside actors through being represented in a number of their bodies by EFFORTS partners. Several participants in EFFORTS regularly attend IMO meeting as representatives of their governments or other non-governmental organisations (NGO). EFFORTS, again through its participants, also has representatives in all the major international committees that work with maritime ICT standards, IEC TC80, IEC TC18 and ISO TC8.

Dissemination and dialogue will also be conducted via the Support Group, which will meet twice a year and to which a wide-ranging representation of all the relevant actors will be invited. The AC will comprise all the ports and port related organisations in the project. A number of outside organisations will be invited, amongst which the European Maritime Safety Agency (EMSA), the International Transport Federation (ITF) and the International Maritime Organization.

EFFORTS will also undertake specific representation actions towards the major societal bodies. These will be led by the chairperson of the Support Group which will be a person enjoying a wide recognition as the acknowledged voice of the port community.
APPENDIX A: Consortium Description

A1: Subcontracting

TUHH
In Work package 1.3 “Port ECDIS” it is foreseen to subcontract the company SevenC’s, Hamburg, Germany. They have unique core competences in relation to the ECDIS kernel, object/attribute/relationship issues of chart objects and task-oriented visualization.

A well focused sub-contract shall cover:
- provision of development and test platform
- contribution to large scale functions of ECDIS
- contribution to specific port-related objects.

SevenC’s very successfully provided a similar service within the development framework for the inland navigation ECDIS, however, once another provider will show up offering an equal service at better conditions, they might become selected instead of SevenC’s. Currently the consortium does not have any knowledge of such an alternative.

ICES
Mr Jean-Marie Deyris is jurist, retired from Police. In his career, Mr Deyris was General Attorney, specialised in the financial domain. He has been sub-contracted by ICES to contribute to the activities of WPIV in the EFFORTS project since one year.

Mr Deyris’ contributions will be focused on:
- institutional juridical scope
- dissemination scope for SP2 and sensitive problems
- Patent protection for SP2
- All internal juridic problem

Mr Deyris contributes to the redaction of the deliverable “Knowledge and management”, participating to all SP2 meeting in this field and in all internal discussion between partners. He is adding significant and substantial value to the project.

Mr Deyris has been selected and hired on the basis of a best “value-for-money” approach, which is normally in use by ICES while selecting their consultants for carrying on highly specialised activities.
LPA

In Work Package III “Education, Training and Human Resources Development” it is foreseen for the Livorno Port Authority to have a subcontractor for the Activity "Implementation of a web-based tool for training needs detection" (Subcontractor: Zero Infinity snc, Livorno. Partita IVA 01518870496).

Zero Infinity software house has operated as technological partner of the Port Authority of Livorno over the last years, developing software applications for many European projects in which the Port Authority of Livorno has participated. The amount foreseen for the subcontractor is Euro 25.000 (VAT Included).

One of the activity foreseen in the framework of WP III DoW is to gather and analyse several kinds of training-related information coming from the companies operating in the various ports involved, such as employees' roles, duties, skills, competencies, expertise, etc...

The development of a specific IT tool, jointly usable over the Internet by all the partners involved, will be a necessary step in order to facilitate the achievements of that goals, allowing the partners the possibility of recording, organizing, sharing, comparing and analyzing all the information gathered during the various phases.

On the basis of the common experience of Dublin Port Company and Livorno Port Authority in the field of Vocational Port Training Networks and exploiting a previous experience made in the port of Livorno through the Observatory, the web-based tool for training needs detection will be made available by Port Authority of Livorno, through subcontracting the implementation, improvement and adaptation to the specific EFFORTS needs of the existing tool already in use in the port of Livorno, coordinating the development phase, in accordance with the indications provided by the WP III Leader, and acting as interface between the subcontractor and WP III members.

Activities foreseen:

1. Requirements analysis, in order to individuate the appropriate data set and information useful for addressing the WP III needs;
2. Software development;
3. Software testing and releasing.

A2: Third Parties

TuTech Innovation GmbH

Relationship: TuTech Innovation GmbH is 51% owned and controlled by Technische Universität Hamburg-Harburg (TUHH), acting as a technology transfer department for TUHH.

Resources may be provided to TUHH on the basis of the respective agreement which has been passed to the COM." This is TUHH's tried and tested standard throughout FP6. Please do not change it.

There is no "portion of the budget of TuTech that will be used by TUHH".

The participation of the two parties will be divided accordingly with the following list:

Technische Universität Hamburg-Harburg:
- WP 1.2 (Precise navigation and manoeuvring in ports)
- WP 1.3 (Port ECDIS)
- WP 3.1 (Port processes)
- WP 3.2 (Risk management framework)
- WP I (Coordination and management)
- WP II (Integration)
- WP III (Education, Training and Human Resources Development)

TuTech Innovation GmbH:
- WP IV (Exploitation protection of knowledge dissemination)