VTMIS-NET

Vessel Traffic Management and Information Services – NETwork

EC Transport - 4th Framework

WATERBORNE TRANSPORT

Contract - N°: PL97 - 2135

Project 6.3.4, Task 30

WP 1

Final Report
As part of the CD ROM Compendium

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VTMIS-NET **Vessel Traffic Management and Information Services - NETwork**

WP 1

Final Report

Extract of the CD ROM Compendium

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Technical Abstract:

This report represents the outline of all work carried out within the project . The aim of this document is to introduce the values achieved as well as the existing shortcomings to all interested parties in the improvement of safety and efficiency of maritime transport and to all possible users of Vessel Traffic Management and Information Services.

Keywords:

Requirements, improvement, safety, efficiency, architecture, network, communication, methodology, guidelines, Task Force, data dictionary, information exchange, HAZMAT, ETA, SPIN, TRACS, ECDIS, AIS, CNIS, VHF, demonstration, VTMIS, VTS

WP 1 Final Report

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1. Partnership

There were 29 partners taking part in the VTMIS-NET project. They represented 8 countries from the EU together with Russia and Norway and came from various areas of maritime research, industry and authority.

For more detailed information about the partners profile please refer to CD ROM VTMIS-NET Compendium attached.

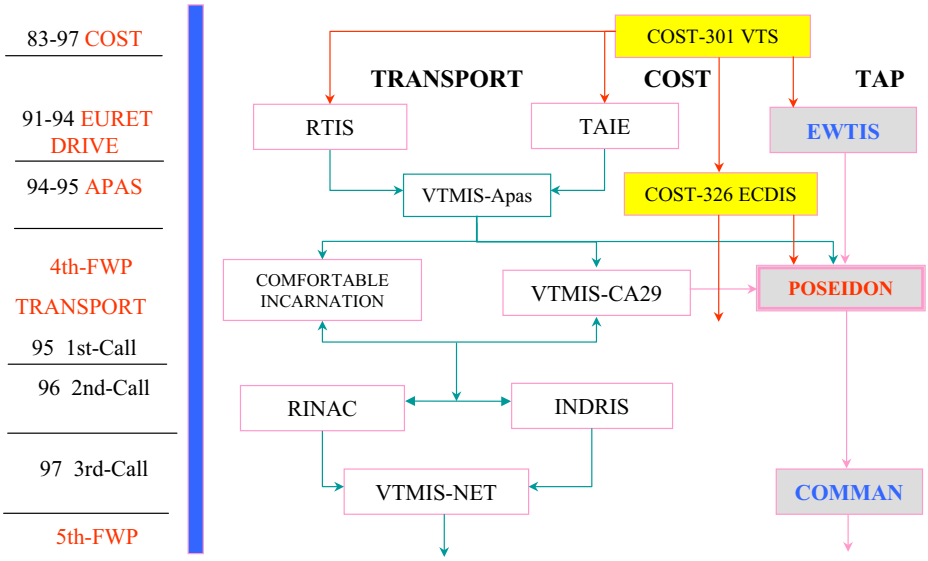
	Organisation Name	**Country Code**	**Type of entity**
1	ISSUS: Institute of Ship operation, Sea transport and Simulation	**DE**	PARTNER RESEARCH INSTITUTE
2	TRUTh: Trans European Consulting Unit of Thessaloniki	**GR**	CONSULTING PARTNER
3	Daimler-Chrysler Aerospace AG	**DE**	INDUSTRIAL PARTNER
4	ISL: Institute of Shipping Economics and Logistics	**DE**	PARTNER RESEARCH INSTITUTE
5	CNIIMF: Central Marine Research and Design Institute (CNIIMF)	**RU**	PARTNER RESEARCH INSTITUTE
6	Expertel: Expertel Consulting	**FR**	CONSULTING PARTNER
7	PAH: Le Havre Harbour Authorities	**FR**	ASSOCIATE PARTNER PORT AUTHORITY
8	ELISYS: ELISYS S.R.L.	**IT**	INDUSTRIAL PARTNER
9	METTLE: Maritime Engineering and Technology for Transport, Logistics and Education, snc	**IT**	PARTNER RESEARCH AND INDUSTRIAL DEVELOPMENT
10	SNAV:	**IT**	SHIPPING

	Aliscafi SNAV SpA		COMPANY
11	RMPM: Rotterdam Municipal Port Management	**NL**	PARTNER MUNICIPAL PORT AUTHORITY
12	MSR: Marine Safety International Rotterdam B.V.	**NL**	ASSOCIATE PARTNER RESEARCH
13	Maran Marine Analytics	**NL**	ASSOCIATE PARTNER RESEARCH AND DEVELOPMENT
14	DERA: Defence Evaluation and Research Agency – Sea Systems	**UK**	PARTNER DEFENCE AGENCY RESEARCH & DEVELOPMENT
15	CNS: Community Network Services Ltd.	**UK**	ASSOCIATE PARTNER COMMUNICATION INDUSTRIAL
16	ABP: Associated British Ports	**UK**	ASSOCIATE PARTNER. ASSOCIATION OF BRITISH PORTS. USER
17	RACAL: RACAL Radar and Defence	**UK**	ASSOCIATE PARTNER INDUSTRIAL
18	SI-MRC: Southampton Institute – Maritime Research Centre	**UK**	PARTNER RESEARCH AND DEVELOPMENT
19	Alenia MARCONI Systems: Naval Systems Division	**IT**	INDUSTRIAL PARTNER
20	EIS: EIS electronica ingeneria sistemi s.p.a.	**IT**	PARTNER RESEARCH AND DEVELOPMENT
21	CCS: Centro de Cálculo de Sabadell, S.A.	**ES**	PARTNER RESEARCH AND DEVELOPMENT
22	ECC: Electronic Chart Centre	**NO**	INDUSTRIAL PARTNER

23	SMA: Swedish Maritime Administration	**SE**	PARTNER GOVERNMENT AUTHORITY
24	STN ATLAS: STN ATLAS Elektronik GmbH	**DE**	INDUSTRIAL PARTNER
25	YDAB: YDAB Sweden	**SE**	INDUSTRIAL PARTNER

2. Executive Summary

The European Union has followed and supported the development and initiation of Vessel Traffic Services since the start of the COST 301 project in 1983. There are currently two EU Directorates working in the area of waterborne transport, DG TREN (Transport and Energy) and DG INFSO (Information Society)



Approach of establishing VTMIS in the area of transport and traffic management

From January 1998 to February 2000 the VTMIS-NET project was sponsored by DG TREN (formerly DG VII) following the expansion of VTS to VTMIS. Whilst the protection of development in the transport sector was initially to the fore, the emphasis with this project has been on interchanging pre- and post- waterborne transport related information.

Vessel Traffic Services (VTS) and Vessel Traffic Management and Information Services (VTMIS) currently operate on a local level (port VTS) or on a national level (coastal VTS). From the point of view of European integration, the question was how far local or national information can be obtained on a European level to increase the efficiency of such services and their information flow throughout Europe.

The aim of this project was to create pan-European methods and platforms for exchanging information based on already existing systems and services, whether on a local, regional, national or EU level to be used independently.

3. Objectives

From the point of view of European integration, the question is 'how far can local or national information be projected, at the European level, to increase the efficiency of such services and their information flow throughout Europe?' Investigation of possible implementation of waterborne transport information exchange at the European level and the examination of the efficiency of such services for the information throughout Europe are necessary. To do this an information exchange network needed to be realised, starting with specific examples.

Achieving this, it was necessary to

- draft a methodology, guidelines and examples for the development of a VTMIS network in technical, institutional, organisational and administrative respects, based on the existing conditions within the participating countries/sites and the actors.
- capture the user requirements
- specify an appropriate architecture of all relevant system levels
- use and develop tools for enhanced network operations allowing interoperability of individual local solutions.

Methodology used

The methodology was adapted as the early stages of the project were being evolved, monitored and put into practice by the Task Force. Problems encountered:

- Divergent VTS/VTMIS understanding in different countries, in respect of Implementation and Regulations of governing authorities at the international, national, regional and local level.
- Different understanding of the meaning of the terms VTS and VTMIS.

Thus

- turning the incorrect but widespread opinion VTMIS = „VTS de luxe" into a more abstract and general connotation, i.e. a network of systems, services and databases,
- relying on a common system architecture and data dictionary, in which the individual demands of waterborne transport are taken into account,
- not interfering with, or changing, existing systems, services and communication channels,

were the main tasks.

The ability to exchange information and data between different technical platforms was provided by the Automatic Interconnectivity Manager (AIM) and CORBA (Common Object Request Broker Architecture).

Thus it is

- easy to expand a modular network by connecting new users or providers of information,
- connecting different systems („make them talk to each other“) without causing any additional burden or workload to the users.

A Task Force was established, as a mobile sub-set of the consortium, which had a core of regular members and also included local members, capturing the requirements and state of the art information, visiting each site participating in the project and discussing the project’s aims with users.

Achieved added values are

In general

- improved dissemination of traffic information for traffic and transport operations and management
- access to vessel data
- access to cargo data when required for safety reasons
- application of AIS in the operation of VTS/ VTMIS

On European level

- setting milestones for industrial development in the VTS and transport resource management area
- establishment of a European cohesive Research and Development (R&D) network aiming at a co-operative research in VTS and relevant fields
- setting new research requirements

4. Users' involvement in VTMIS-NET

VTMIS-NET was a strongly user and demonstration oriented R&D project. A thorough survey of user requirements was therefore the first step towards the determination of information types to be exchanged within a VTMIS-Net network.

The analysis of the current situation of VTS/ VTMIS operation was made by establishing a Task Force visiting the participating VTS sites and organising user fora in order to capture the operational and technical requirements for such a network.

4.1. User Groups targeted

- users afloat
  - vessel commands
  - pilots
  - tug services
- Navigation and information services
  - VTS operators
  - pilot services
  - tug services
  - mooring services
  - lock services
  - (meteorological services as information provider)
  - (hydrographic services as information provider)
- Resource planning of shipping companies, ports and terminals
  - ship owners
  - agents
  - port authorities
  - terminal operators
  - freight forwarding companies
  - cargo shippers

- Shore-based crew support services
    - health services
    - unions
    - seamen organisations
    - catering services
- Emergency services
    - search and rescue (SAR)
    - fire fighting
    - pollution combating services
- Safety agencies
    - port state control
    - marine safety agencies
    - harbour police
- Other administrations and services
    - coast guard
    - customs
    - immigration
    - marine police
    - health control
    - defence services

- Other individual pre-water and post-water transport modes, hinterland users and user groups
    - coastal population
    - shipping companies
    - police
    - Wholesale trade
    - Train shipper
    - Cargo Airports
    - Cruise terminals
    - Travel agents
    - Automobile Industry (Just in time concept)

It proved extremely difficult to reliably derive user requirements because of user attitudes. It was observed that users in general adapt themselves to severe operational and system deficiencies and hence have difficulties to articulate needs. The user fora organised, prior to discussing requirements, aided users' familiarisation with relevant advanced information technologies and information exchange concepts.

4.2 Generic user requirements :

Administrative/organisational	***Technical***
Access to all types of information related to vessel movements such as ETA, ETD, vessel identity, cargo, berth, weather, etc.	ETA continuously updated to allow appropriate resource planning, setting a flag for dangerous cargo aboard
Information about a particular vessel (ship deficiencies, defects, "black list") (port authorities, VTS, terminal operators, pilots, coast guard)	Automatic transmission of accurate ETA of one vessel to the next port of call at or after departure by port authorities, VTS
Access to Port State Control (St. Malo database) (port authorities, VTS)	Fully automated HAZMAT system (port authorities, VTS, coast guard)
Access to sailing plans in order that the pilot can determine e.g. timing and under keel clearance (VTS, pilots)	Use of AIS for monitoring / scheduling the voyage of a vessel
Promulgation of recommended navigational routes to vessels as navigational assistance service (VTS, pilots)	Authorised and controlled access to data in standard report formats for consistency and ease of transmission
Information about shore-based resources relevant to the vessel, the cargo and the crew (vessel, agent, port authorities, VTS)	Call information server to make information available to port users (port authorities, port users)
Information on / for piloting (VTS, pilots)	Automated handover of vessels from one VTS/ port of departure to the adjacent VTS/ port of arrival

	Data about ship movements using AIS
	Need for networks, hardware, software, report formats etc. to comply to common standards, to ensure consistency of systems that need to communicate (port authorities, VTS, pilots, terminals, customs, agents)

5. Deliverables

Following deliverables were produced; except D06 all available for public use (refer to VTMIS-NET CD ROM)

Del. No	**Title**	WP Leader
D01	Final Report	ISSUS
D02	Task Force Workplan	DERA
D03	Specification of systems, services and network requirements	RMPM
D04	Specification of possible enhancements	RMPM
D05	Functional and communication architecture of VTMIS NET (Study)	DERA
D06	Specifications and software tools	ECC
D07	Status Report- Realisation of the VTMIS-Network	ISSUS
D08	Demonstration Report	EXPERTEL
D09	Final Assessment Report	TruTh
D10	Implementation Requirements Report	ISSUS
D12	Exploitation Plan	RMPM
D14	St. Petersburg – Site	CNIIMF

6. Network

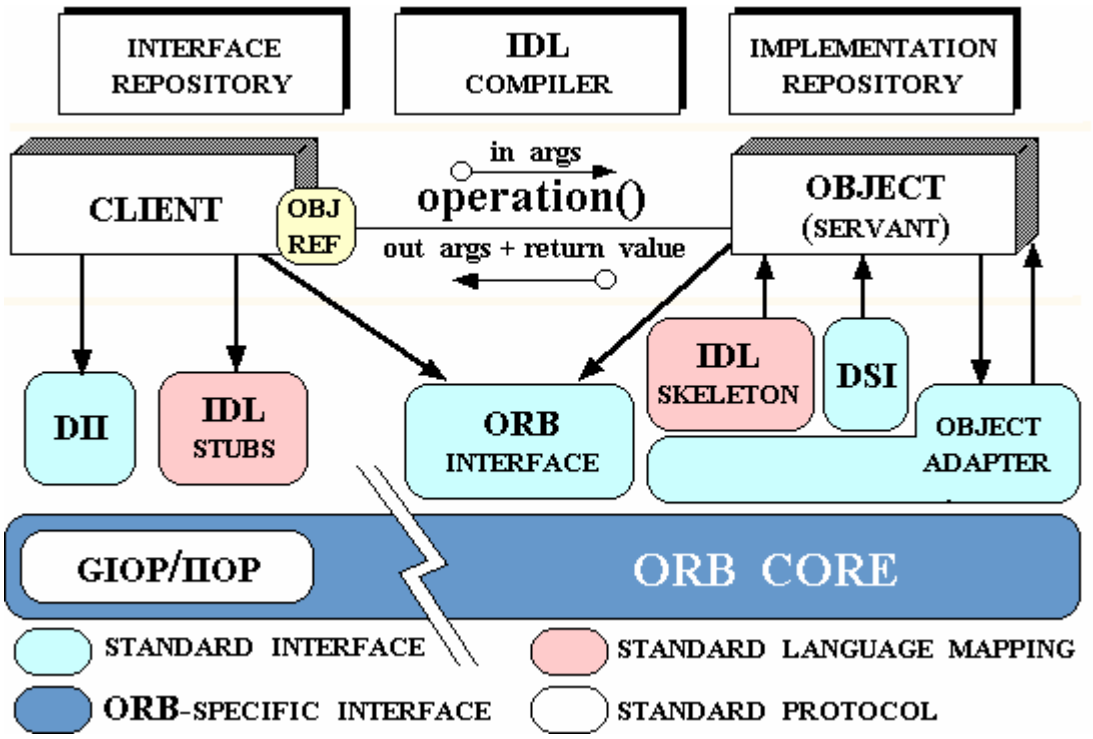
Clustering the participating demonstration sites, the VTMIS-Network realised was concentrated in the North Sea Area (test bed) at the following locations :

- Port of Le Havre (France),
- Several sites in the UK (Southampton, Humber, Harwich, CNIS)
- Port of Rotterdam (in the Netherlands)
- VTS of Wilhelmshaven associated with the Port of Hamburg (in Germany).
- Stavanger (Norway), a virtual node[1] was set up, in order to co-operate with the Norwegian National Maritime Demonstrator (NMGD).

In order to transfer the agreed messages (refer to Data Dictionary), a CORBA architecture was used.

CORBA ORB Architecture

The following figure illustrates the primary components in the CORBA ORB architecture.



[1] Actually, the information came from the Port of Oslo, but was introduced manually into the system by the Norwegian partner ECC located in Stavanger, which was the partner responsible for the overall project developments.

Data Dictionary

A set of exchange messages was developed to handle basic vessel information for the full VTMIS-net data dictionary. This data dictionary was based on the MOVIT Communication Standard and was modified to meet the VTMIS-NET specific requirements. In addition a further set of messages, dealing with dangerous goods information between the ports of Rotterdam and Le Havre, was agreed using existing X400/EDIFACT interfaces.

For further information refer to CD ROM for download the data dictionary

7. Demonstrations

The demonstrations have been classified in geographical areas but also by combining similar thematic issues:

Map of VTMIS-NET sites

Mediterranean area (High Speed crafts/Traffic Information Exchange) :

- the Livorno-La Maddalena-Rome area, involving the VTS of Livorno, a mobile VTS in La Maddalena and the Operating Centre of the Italian Coast Guard in Rome;
- the Naples area, involving the SNAV Company and the Port of Naples and Palermo.

Baltic Sea area, (AIS application):

- St. Petersburg
- Oeresund area involving the Flint VTS (Malmoe, Sweden) and the Drogden VTS (Copenhagen, Denmark);
- Warnemuende area involving the VTS Centre Rostock-Warnemuende.
- Kiel Canal area, involving the Brunsbüttel VTS.

North Sea Channel area (VTS/ VTMIS/ ECDIS/HAZMAT):

- Port of Le Havre (France),
- Several sites in the UK (Southampton, Humber, Harwich, CNIS)
- Port of Rotterdam (in the Netherlands)
- VTS of Wilhelmshaven associated with the Port of Hamburg (in Germany).
- Stavanger (Norway), a virtual node[2] was set up, in order to co-operate with the Norwegian National Maritime Demonstrator (NMGD).

7.1. Traffic Information Exchange focusing on the specific needs (Testbed Mediterranean Area)

7.1.1. Rome

The Rome demonstration aimed at the physical connection of the operating VTS's in La Maddalena, a mobile VTS controlling the Bonifacio strait, and Livorno to the Operating Centre of the Italian Coast Guard , where the traffic data were displayed in real-time on the NISAT, which acted as the infrastructure supporting the network.

In this specific demonstration the reporting system was mainly dedicated to the Search and Rescue (SAR) activity.

Results:

- Physical connection with the peripheral site and presentation of real-time tracks in the Coastguard Centre
- Visualisation of traffic and port situation data on an internet web page (Italian Ministry of Transport)
- Transmission of data to the Coast Guard Operating Centre
- Ship's identifiers and positions
- Ship's cargo details
- Alarm situations

[2] Actually, the information came from the Port of Oslo, but was introduced manually into the system by the Norwegian partner ECC located in Stavanger, which was the partner responsible for the overall project developments.

Benefits

- Supporting local navigation
- Assignments of berths
- Encompassing Search and Rescue
- Improved Contingency Planning
- Civil protection
- Monitoring of dangerous goods
- Support to the port rescue planning
- Environment protection

7.1.2. Naples

In the Mediterranean area, there is no established network connecting parties and actors in data exchange. The current means to receive and provide information are radio or telephone. The exchange of data in the VTMIS-NET demonstration consisted of e-mail messages via Internet using standard protocol (TCP/IP, POP3, SMTP).). 'The standard GSM network was used as the interface between mobile and static users.'

Information exchanged in the Naples demonstration

- Meteo–marine data for route planning before leaving the port and during navigation
- Traffic situation data in the port area shortly before arrival
  Mooring assignment
- Data exchange between several actors involved in the transport chain

  - ship information
  - passenger information
  - list of passengers, vehicles
  - seat assignment
  - luggage

Benefits

- Improved route planning
- Improved traffic organisation and monitoring
- Possibility to link smaller ports without VTS equipment into the information chain via mobile system

- Aimed future developments:
  - Integration of GPS for accurate positioning
  - Integration of vocal and visual MMI
  - Using computer for providing vocal warnings and commands

7.2. AIS / ECDIS oriented demos – Testbed Baltic Area

The proper use of AIS contributes to and enhances the safety of life at sea, the safety and efficiency of navigation and the protection of the marine environment.

According to SOLAS chapter V, Regulation 19

"*AIS shall-:*

- *provide automatically to appropriately equipped shore stations, other ships and aircraft information, including the ship's identity, type, position, course, speed, navigational status and other safety-related information;*
- *receive automatically such information from similarly fitted ships;*
- *monitor and track ships; and*
- *exchange data with shore-based facilities.*"

Thus AIS will become an important supplement to existing navigational systems including radar. In general data received via AIS will enhance the quality of the information available to the OOW. AIS is an important tool to

- enhance situational awareness of the traffic situation to all users, and
- to optimize traffic flow

without involving significant additional activities.

In particular, the purpose of AIS is

- to identify vessels,
- to assist target tracking,
- to simplify information exchange

to provide additional information to assist collision avoidance

7.2.1. St. Petersburg

The first VTS in Russia was installed in Petrodvorets (St.Petersburg suburb) in 1960 to serve the open part of an approach channel extending up to 27 miles and 100 metres in width. The system was put into service in 1993. The VTS of St. Petersburg includes 5 local VTS centres (including that in St. Petersburg) for tactical supervision and acts as the co-ordination centre for strategic planning, based on the information from all centres, as well as for the survey and organisation of the traffic along the fairways and the traffic separation schemes.

The main elements in the VTS of St. Petersburg are:

- Shore-based Radar Chain, consisting of the "RASKAT" VTS centre and three remote radar sites
- Pilot vessel "St Petersburg" anchored in the vicinity of the Entrance light boy

Established features using AIS in the VTMIS-NET demonstration

- Symbols of ships equipped with the AIS transponders displayed on the screen Interfacing of the transponder with gyrocompass and transmission of headings to other ships through radio link produces adequacy of symbol orientation on the screen of the display system to actual positions of ships.

Benefits

- Improved use of AIS application
- Improved Port traffic management

7.2.2. Warnemünde

Introduction

This demonstration was based on the experiences of the BAFEGIS project (Baltic Ferry Guidance and Information System) and succeeded in continued use for TRIPCO (Traffic Information and Permanent Route Control) in VTMIS-NET to result in a permanent long range tracking system on the route from Trelleborg to Warnemuende.

Used technologies :

- AIS (Automatic Identification System) transponders
- ECDIS (Electronic Chart Display and Information Systems).

Results

- Permanent long range tracking and monitoring of two ferries : Delphin, Mecklenburg-Vorpommern Warnemuende (Germany) and Trelleborg (Sweden) outside the normal VTS area,

- Recording of data transmitted by AIS outside the VTS area (latitude, longitude, speed over ground, course over ground) and of additional information not available by radar (heading, rate of turn and navigation mode);

- Investigations to compare AIS data from vessels and radar data from shore in case of different speeds and applications (HSC's and conventional ships);

- Development of an outline for an effective information and data exchange between a VTS centre and further facilities.

Benefits

- ECDIS update via telephone line
- Supplement of a further landmark for navigation into the electronic chart displa
- extension of the monitoring area through AIS and two repeater stations

7.2.3. Oeresund

Main objectives

Co-operation between two adjacent VTS's

Surveillance over one area with high traffic density

Results

- transmission of 'flagged' identified radar tracks via the AIS shore stations, both in Flint and in Drogden VTS centres;
- transmission of identified radar tracks between the two VTS centres over an ISDN data connection;
- reception of the radar tracks transmitted by the AIS shore stations and of the AIS messages originating from ships by an AIS installed at the demonstration vessel (as well as at other vessels equipped with AIS);
- visualisation of the messages received aboard the demonstration vessel at a standard VTS work station with adapted software;
- distribution of the information obtained by AIS shore stations, to a VTS centre and other users, such as MRCC, Swedish Coast Guard and SMA Icebreaker Operation Centre, over an existing general purpose data network;
- mobile access to the AIS network;

Benefits

Cross-waterway WAN connection gives the possibilities for

- permitting exchange of all identified targets between FLINT and DROGDEN VTS stations
- with pre-identification of the targets
- sharing of workload
- enabling a complete traffic image of the entire area in both VTS stations
- improving accident prevention

7.2.4. Kiel Canal

The following items were demonstrated:

- Automatic tracking of ships using AIS with integral DGPS positioning in the Western part of the canal;

- Up-to-date VTS workstation with special tools for traffic monitoring and forward planning in a canal environment, providing full integration of AIS, as described below;

- Transmission of traffic relevant messages from shore to ship using AIS as the transport medium;

- Visualisation of the ship's own position and that of other ships fitted with an AIS on an onboard 'pilot' lap-top;

- Display of traffic-relevant messages on the pilot's lap-top in textual and graphical form (graphical forms refers to a screen image of the traffic lights installed along the Kiel Canal);

- Return of acknowledgements for 'message read' from ship to shore;

Benefits:

- Traffic image of whole channel
- Improved Traffic planning
- Way-time – diagram

7.3. VTMIS-NETWORK - Testbed North Sea Area

7.3.1. Spin

SPIN is the Port Community System for the Port of Southampton. Major users are :

- shipping lines
- clearance agents using Southampton Container Terminal.

The system also provides onward links to other ports, inland container bases and transit sheds and to the UK National Customs systems (CHIEF, COASTS and INTRASTAT)

Current Working Environment

- Multi mode ICL VME mainframe computer
- Users connected over the CNSNet2000 Intranet (ICL I-CAB protocol carried over TCP/IP)
- Direct links to major customers supporting a range of protocols, mainly IBM SNA and X25.

Current Information Exchange

Apart from the interactive transactions and reports produced by the Legacy system there are also links to :

- The UK Customs clearance system – CHIEF.
- The UK Customs maritime anti- smuggling system – COASTS.
- Shipping lines and Agents to collect manifest information – utilising a variety of EDIFACT and proprietary message formats.
- The container terminals in London and Southampton.
- Inland container depots and transit sheds

Demonstration Scenario

The SPIN enhancements were demonstrated over the CNIS port backbone infrastructure covering the whole Solent area.

CNS acted as the UK VTMIS-NET message switching centre and collecting and delivering information within the UK and performing any necessary conversion for the international section of the link providing a CORBA based interface to run a Java client on a user's PC, so that information may be keyed in stored in a database or transmitted to other AIM servers

WEB Access to the SPIN Legacy System

A Web Server add-on was demonstrated which allowed on the fly translation between the screens presented by the legacy system and HTML. This provided web access to the full functionality of the SPIN system.

Data Communication Technologies; Hardware and Software Equipment used

The SPIN demonstration used TCP/IP, HTML and Active Server Pages for communications and SQL / OBDC compliant databases and non-volatile Queue Server technology for the internal developments.

- NT server utilising Microsoft Internet Information Server technology.
- NT server utilising SQL Server.
- ICL VME mainframes.

Resulting Architecture of the Demonstrator

The demonstrator showed how improved access to the existing SPIN Port Community system can be provided, by piloting access to the information utilising the Web rather than existing ICL legacy protocols.

The aims were:

- Improving access to the system by providing a cheaper and simpler access method for low volume, remote users such as Importers, Exporters and Hauliers.
- By utilising the facilities of SQL server to provide an improved range of reporting options to bulk users such as Shipping Lines.

Benefits

- The port of London has expressed interest in participating in any future wider permanent exchange of information.

- Associated British Ports are looking for ways of disseminating the information held in its VTMIS. As an initial implementation information such as Notices to Mariners and Vessel

Arrival / Departure information will be made available over the web via the CNS SPIN (Southampton Port Information Network) portal www.cnsonline.net/spin/) The commercial details of this arrangement are still being finalised, however it is expected that these functions will be available towards the end of the VTMIS-NET project.

7.3.2. TRACS Transponder Demonstration.

The TRACS demonstration was aimed at showing how a broadcast transponder system could provide improved asset management for ports.

As communication between a vessel at sea and the VTS centre moves to a greater extent towards data based applications, the reliability of the network and data integrity become increasingly important issues. The TRACS network incorporates error correction software that ensures that corrupted data is not delivered.

Position reporting via VHF based data networks is now an established technology. It is implemented within DSC on VHF channel 70 and will be a key element of the Universal AIS when it is launched

However, the positional information is normally based upon GPS that has an accuracy of approximately 100m. With the need for ever greater positional accuracy (e.g. for dredging a main approach channel etc.) the improvements that can be achieved through the use of differential GPS services could provide a useful service to the port manager.

Demonstration scenario

- The TRACS network demonstrated the ability to broadcast RTCM correction information from a set of reference equipment at the shore base stations, such that the positional accuracy of the received position reports was improved to an accuracy of better than 5m.

- The TRACS network was able to demonstrate how any participating units on the data network could automatically relay the data from a particular vessel to the VTS centre if the line of communication for the originating vessel is blocked.

This automatic relaying capability was demonstrated very effectively by data from a vessel that was beyond VHF coverage range being received at the shore base station. Vessels were tracked on approach to Portsmouth harbour from the base station on Alderney (range approximately 140km).

7.3.3. ECDIS distribution - Testbed German Bight

ECDIS Traffic Image

The Traffic Display Subsystem used for the demonstrator enabled the generation of a manually initiated screen dump of the ECDIS traffic image.

This traffic image was distributed by internet and displayed or printed out by a standard web browser, to show the advantages of having this additional information during activities such as emergency operations.

Technical equipment:

- One Traffic Display Subsystem with the same functionality as used for the operator displays of the VTS centre, but with an additional CORBA interface software and some add-one software for automatic generation of the departure and arrival messages.

- One server to run the Application Interconnectivity Manager (AIM) including a data base from ISL providing the interface suitable to realise the data transfer conform to the CORBA structure. Graphical user access to the messages is enabled by a JAVA client installed on the same server hardware. When a site wants to send a message to another, it sends the message to the AIM server, that cares for the right format of the message, and distributes it to the relevant recipients

- One ISDN Router for interfacing with the VTMIS network.

- One LAN Switch to connect the demonstrator equipment to the VTS system LAN due to security reasons.

Benefits

Improved resource allocation for SAR

7.3.4. Data Exchanges (ETA and HAZMAT Notification)

Two major scenarios were demonstrated within the North Sea Demonstartor

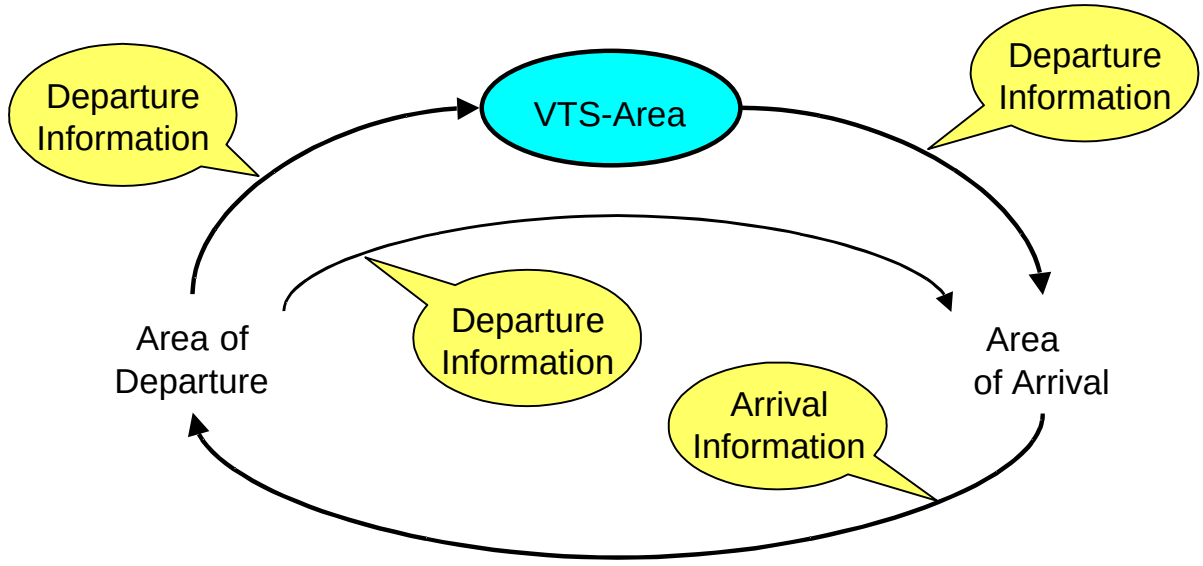
- scenario exchanging **Departure / Arrival Information** messages;
- scenario exchanging **Dangerous Goods Information** messages.

For this scenario a data dictionary was drafted aiming at the common exchange format.

Departure / Arrival Information Scenario

This scenario validated the added value offered by an automatic provision of ATA and provisional ETA at the departure of the ship to the area of arrival. This information can serve for a better logistical preparation in the arrival area, and also for the SAR activity (better knowledge of the maritime traffic in the neighbouring areas).

The overall scenario is depicted in the following diagram.



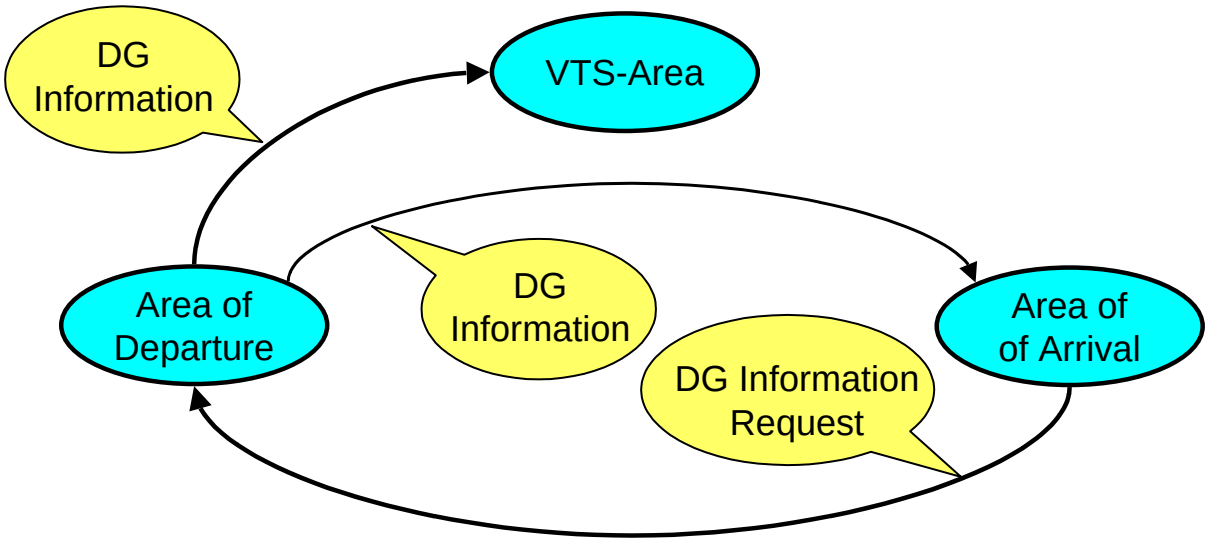
Departure / Arrival Information Scenario

1. When a ship leaves an area of departure, it triggers off an automatic **departure message** generation including detailed vessel information at departure time, this message being sent to interested parties, that can be the neighbouring VTS area or the area of arrival
2. Important pieces of information in this message are: Port of Departure, Port of Destination, Actual Time of Departure (ATD), Longitude/Latitude at ATD, Expected Time of Arrival (ETA), ETA time reference, Longitude/Latitude at ETA, course and speed over ground, actual draught, possible presence of dangerous goods onboard.

3. When the ship arrives at the area of arrival and if an acknowledgement was requested explicitly in the departure message, an automatic **arrival information message** is generated and sent back to the area of departure. This message contains especially the following information elements: Actual Time of Arrival (ATA), Longitude/Latitude at ATA.

Dangerous Goods Information Scenario

This scenario was mainly based on the exchange of information related to dangerous goods onboard a ship. The provision of the detailed information was not automatic, but provided on specific request and only to competent authorities.



Dangerous Goods Information Scenario

1. The first step consists in a manually initiated Dangerous Goods Information Request, sent by the area of arrival to the area of departure of a specific ship. This message requests detailed information related to the presence of dangerous goods (or waste) onboard a specific ship bound for the destination area.
2. On receipt of this request, a Dangerous Goods message is manually sent by the area of departure to the area of destination. This message either contains information on Dangerous Goods according to the HAZMAT directive, or announces the sending of an EDIFACT message (e.g. IFTDGN).

Considering the complexity of the different local systems in use in the NSCD, the heterogeneous environment faced and the R&D characteristic of the project, it was easier to implement for the interconnection with the other NSCD sites an interworking system based on CORBA, with E-mails based on the data dictionary agreed by all partners, so that each site could interchange messages with all others.

To achieve this, messages derived from the MOVIT project and an ISL product (the Application Interconnectivity Manager - AIM) have been used. A CORBA server has been set up in Germany (ISL premises) providing the interface suitable to realise the messages exchanges:

8. Validation

The approach within the VTMIS-NET validation has been demonstration site oriented. The methodological framework followed has been mainly concentrated on an Expert Rating Assessment of the various demonstrators based on the results obtained through a Questionnaire Procedure.

Three types of assessment are addressed: technical, operational and user acceptance.

Baltic Sea Area

Demonstrator overview	**Assessment**
AIS and ECDIS technologies as sources of information	Technical ➢ No serious deficiency regarding system interface, data access or in-compatibility. ➢ Some communication problems occurred caused by known VHF limitations.
	Operational ➢ Much more reliable, accurate, and in extension area data exchange. Improve the efficiency of information exchange. ➢ Safety in the vessels operation, include passenger and ro-ro ferries ➢ Allowed the minimisation of the workload of ship-shore personnel and minimal human errors. ➢ Limited network experience of authority, reservation in adopting VTMIS Net idea.
	User Acceptance ➢ The performance was considered sufficient ➢ The demonstrator was well accepted.

Mediterranean Area

Demonstrators Overview	**Assessment**
Show two different ways of integrating traffic and VTMIS data in a regional supporting system the added value: ➢ Better route planning and better port resource planning ➢ Search and Rescue Activity of Italian Coast Guards(ICG)	Technical ➢ Breakdown of the system ➢ No communication problems arose. ➢ Old lines used for voice communication lead to poor signal quality.
	Operational ➢ More accurate and efficient target positioning and reliable ship tracking- monitoring has been accomplished, from ICG's view. ➢ User interface was found extremely friendly, offers satisfactory maintenance cost. The on line „help desk" was well received as an added value by users. ➢ Visualization of traffic information considered very important for Search and Rescue Activity. Using the same information for other added value services supporting route planning or port resource planning. ➢ Workload of personnel was not affected by VTMIS Net in the ICG's view. Language specific problems must be solved.
	User Acceptance ➢ More accurate and efficient target positioning and reliable ship tracking- monitoring has been accomplished, from ICG's view. ➢ User interface was found extremely friendly, offers satisfactory maintenance cost. The on line „help desk" was well received as an added value by users. ➢ Visualization of traffic information considered very important for Search and Rescue Activity. Using the same information for other added value services supporting route planning or port resource planning. ➢ Workload of personnel was not affected by VTMIS Net in the ICG's view. Language specific problems must be solved.

North Sea Channel Area

Demonstrators Overview	Assessment
➢ Show added value derived from exchange of VTMIS data(main content: ETA and HAZMAT information) among several remote sites in five selected areas throughout Europe	Technical ➢ All the components worked reliably all the time and no communication problems or any other difficulties were observed**.** ➢ Further work will be based on standardisation of exchanged message format and improvement of vessel sailing module.
	Operational ➢ *UK Solent Area:* ➢ ETA information transmitted reliably, affects the better co-ordination of the port resource ➢ Does not provide very friendly interface and easy handling. Safety of vessel operations is not improved. ➢ SPIN: ➢ Extends the range of users who can access the system. Better functionality of the enquiry report. ➢ TRACS: ➢ Minimisation of the masters‘ over-load and reduction of on board workload. ➢ Extends coverage of VHF network whilst errors are minimised. Communication is more reliable, efficient. *German Bight*: ➢ Workload on board and ashore is reduced. Interface is very friendly. ➢ Competitiveness of the services is increased. Traffic image provide basis for critical decisions from different actors in different areas. Vessel data is more reliably and timely. ➢ Data from different sources can be cross checked. *Le Havre*: ➢ ETA transmissions are more reliable and timely. Information exchange is more efficient. Can add value to vessel and port management processes. ➢ Minimised human errors. User interface is friendly, but personnel should be trained

	User Acceptance ➢ By demonstration in UK Solent Area the users positions could be viewed as positive and emphasised the lack of a network for exchanging data. Within TRACS, The users were highly satisfied by performance of the demonstrator. Issues were also considered as sufficiently addressed. ➢ By demonstration in German Bight the general users´ impression was positive ➢ By Le Havre demonstration users trusted that the proposed solution satisfy the requirements of the port management authorities.

9. Conclusions

The increased reliability and efficiency of the information exchange between various sites' systems data bases has been achieved and confirmed by the participants in the demonstrations. It is apparent that the range of users who can access the system services is extensive. It also appears that the requirements of the port management authorities have been met. The perceived reduction ine workload of the VTS operators and ship-shore personnel is going to meet the same target. At the same time it is necessary to emphasise advantages of the services proposed, such as the increased competitiveness in different communication services.

Some problems remain. The personnel involved need to be trained to meet the requirements of any system in implemented. The communication shortcomings caused by known VHF limitations need to be overcome.

Summarised generic conclusions, drawn from experience within the VTMIS-NET project, are that the concept can :

- Improve the efficiency of VTS/VTMIS by improving communication between existing systems
- Improve dissemination of traffic information for traffic and transport operations management
- Provide access to vessels' data
- Provide access to cargo data, where required for safety reasons
- Reduce communication / reporting
- Improve contingency planning
- Disseminate marine pollution information
- Make use of traffic images, for example in SAR operations