
PROSIT Final Report for Publication

Deliverable D9



Promotion of Short Sea Shipping and
Inland Waterway Transport
by Use of Modern Telematics

A project in the Transport RTD Programme
of the European Commission, Directorate General for Transport

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Partnership

Nr	ACR	Organisation / Company	Country	Status
1	HVA	Ministry for Economics and Ports	D	C / SC
2	EDI	EDI Management Finland Ltd.	FIN	SC
3	TRADAV	Travemünder Datenverbund GmbH	D	SC
4	NTUA	National Technical University of Athens	GR	SC
5	FNET	ForthNet The hellenic Telematic Comp.	GR	P
6	CLS	Collecte Localisation Satellite SA	F	P
7	RMSD	Rhein-, Maas- und See GmbH	D	U
8	RMSG	RMS Goole Ltd.	GB	U
9	CUXP	CUXPORT GmbH	D	U
10	DFDS	DFDS Transport GmbH	D	U
11	SAIMAA	Oy Saimaa Terminals Ltd.	FIN	U
12	MUST	Lappenranta Port of Mustola	FIN	U
13	FMA	Finnish Maritime Administration	FIN	U
14	INTERC	Oy Inter carriers Ltd.	FIN	U
15	EWT	EWT Schiffahrtgesellschaft GmbH	D	U
16	SCS	Sarlis Container Services Ltd.	GR	U
17	PPA	Port of Piräus Authority	GR	U
18	CONSIG	Consignaciones Maritimas	E	U
19	LHG	Lübecker Hafengesellschaft GmbH	D	U
20	FRAFI	Frachtkontor Finnland GmbH	D	U
21	TRE	Trans Russia Express GmbH	D	U
22	ACOS	Allround Container Service GmbH	D	U

1 Executive Summary

PROSIT (Promotion of Short Sea Shipping and Inland Waterway Transport by Use of modern telematics) used extensively the results of the well-know R&D project BOPCOM (Baltic Open Port Communication), whilst developing and validating them further. PROSIT was initiated by the fact that several results from BOPCOM strongly indicated further development and research work in the field of interconnectivity.

Essential conclusions from the BOPCOM project were identified as follows:

- Still lacking IT application and integration in the daily operation of companies that operate in shipping and transportation business,
- Still a severe percentage of operations in transportation administration and disposition was and is carried out manually,
- Integration of systems and paperless transport transactions were considered as major challenges for PROSIT,
- Powerful, universal and reliable electronic decision support tools were not available but strongly requested by the market.

Taking these conclusions into account, one can state the following starting situation for PROSIT:

Whilst BOPCOM was a clear success with regard to the development of a new versatile system for interconnecting heterogeneous EDP (Electronic Data Processing) systems, the application of advanced IT as a logical next step could not be met within the framework of BOPCOM. In parallel to the development of Internet use and its tremendous growth, PROSIT aimed at the development of e-commerce solutions within the framework of existing and forthcoming internet technologies.

Basically said, PROSIT aimed at developing the three most important aspects of IT in transportation:

1. Integration of different application systems
2. Development of intelligent applications for decision support
3. Creating cargo and equipment visibility by applied IT

As to 1: Integration of different application systems was achieved by the usage of the BOPCOM developed toolbox. This toolbox was applied in certain pre-specified scenarios.

As to 2: Development and application of intelligent decision supporting software named “ProShip” was performed in several pre-specified scenarios as well.

As to 3: Visibility of cargo and equipment in terms of dates and planning is a crucial thing, when integrated and seamless intermodal transport is intended. Within PROSIT, the interconnection between a satellite communication system and the IM (Interconnectivity Management) was performed.

As PROSIT commenced in 1998, Internet usage in companies daily business became more and more common within transportation and shipping.

Now, some years later e-mail is one of the most common media to communicate within the transport and shipping community. Nearly every company participating in PROSIT is now operating an own homepage.

Meanwhile, dynamic and power of the development have increased. The Internet makes it possible to network, communicate and conduct business without any regards to frontiers, borders or other hampering business restrictions. Moreover, it can be clearly stated that the Internet will change the patterns of conducting business (business processes) seriously.

By stating these facts, one can clearly identify terms like e-commerce and e-logistics as main identified goals by the large companies in transportation and shipping. By contributing valuable solutions as well easy-to-use but low-cost applications to the participating SME's in PROSIT, their business has been improved and / or extended.

PROSIT modules - the BOPCOM developed Application Interconnectivity Management (AIM) and the electronic decision support tool ProShip - have been demonstrated and validated in four basic scenarios.

The AIM and ProShip applications that have been tested will be further improved and refined by the participating users with the aim to continue utilising them in the future, since it was fully recognised that the use of advanced IT solutions contribute to smoothen business operations and enhance business opportunities.

2 Objectives of the PROSIT project

The starting point for PROSIT is the meanwhile well-known fact, that demand for transport is increasing in general. This is esp. the case for intra European trade (caused by the common market) but of course in world-wide trade as well. Unfortunately, growing transport demand in Europe is mainly benefiting the trucking companies. Though traffic bottlenecks and increased pollution of the environment will be one of the most severe problems within the next years, the trend towards road transport is still unbroken.

Moreover, an enormous number of transports could be avoided if shippers and transport operators would improve their co-operation. A trend towards improved co-operation can though be discovered, but it is still much to less to speak about a massive change within the transportation business. Reasons for this development can be found within several areas, a severe one can definitely be seen in hampered and slow information exchange and IT application integration.

It is quite obvious that the starting point for an improved development in this field would be the improved exchange of information, enabling acting parties in the market to react and cope with rapidly changing situations.

Taking these basic assumptions into account; PROSIT aims at development and demonstration for reducing traffic demand in combination with improved acceptance of short sea shipping and inland waterway transport. Thus PROSIT will demonstrate usage of modern telematics in order

- to support an "intermodal brokerage" for linking and tuning the demand and supply side in transport including short sea shipping and inland waterway transport,
- to focus on organisational aspects in order to improve the quality and reliability of short sea shipping/inland waterway transport and its integration into intermodal transport chains,
- to establish an after sales service for monitoring the transport, reporting deviations, activating fallback solutions etc., that means
- to guarantee the quality and reliability required for the acceptance of short sea shipping and inland waterway transport in the market.

Referring the overall objectives of PROSIT mentioned before, specific and measurable objectives are

- successful operating of procedures and software (on logical, technical and organisational level) supporting
- co-operative planning and control along transport chain, aiming at improving efficiency and quality of SSS and inland waterway

transport in intermodal chains (using Application Interconnectivity Management Software)

- brokerage between demand and supply side (using ProShip Software)
- improvement of interconnectivity and interoperability
- improvement of planning and control of freight transport and employment of resources
- the removal of bottlenecks or other obstacles that hamper logistical efficiency and quality
- improvement of brokerage between industry/trade on the one side and transport providers (including SSS and inland waterway transport) on the other side.

3 Approaches used to achieve PROSIT objectives

PROSIT started with the determination of user requirements that were gained by conducting structured interviews with users represented in the consortia. As outcome of these interviews, a thorough definition of functions for developments within PROSIT was obtained. Results of this project phase are described in the deliverable D2 “Report on User Requirements”.

PROSIT contained a strong migrational part which was referring to further deployment and distribution of AIM in the transport and shipping industry. Basically, the AIM concept was developed during the BOPCOM project. By nature of a research project, necessary refinement and conceptual tuning were left undone during BOPCOM. Concerning this on the one side and the rapid development within the information technology on the other side, further development works on the AIM concept and single tools was left to be performed.

After completion of this task, deliverable D3 “Specification of AIM” describes the current stage of development of the AIM concept.

Already during and after this user requirement survey, a concept for the common system architecture for the demand and supply matching software was developed. PROSIT aimed at developing a generic software basis here, the ProShip module, which then was to be adapted in each of the scenarios by the providers and scenario co-ordinators in a further stage of development. The specification and basic design of the system was described in the deliverable D4 “Specification of ProShip Software”.

Based on the aforementioned work steps and their corresponding deliverables D3 and D4, the development of the applications started. A thorough description and detailed instructions for use and maintenance of the AIM tools was described within deliverable D5 “Specification of AIM”. This deliverable also contains a full set of manuals that enabled providers and scenario co-ordinators to install, adapt and maintain AIM installations as well as their components on-site.

The generic ProShip application is described in the deliverable D6, which contains a detailed description of the generic data model and the corresponding graphical user interfaces as well as instructions for application set-up, usage and maintenance.

During the lifetime of PROSIT, four successful installations and pilot testing of ProShip could be recorded. Furthermore, six installations and pilot testing of AIM components could be recorded. Additional, a major successful test and pilot usage was performed as to the interconnection and visualisation of cargo positions and vessel movements within PROSIT.

4 Scientific and technical description of the project

4.1 Basic Philosophy

PROSIT is a roof for two basic approaches, on the one hand to migrate applications and tools that were developed in earlier R&D projects and on the other hand to support decision making processes in order to foster usage of short sea shipping and inland waterway transport.

By doing so, PROSIT is following two main action lines:

1. Creating a communication infrastructure by improved interconnectivity
2. Developing new and innovative application modules in order to support intermodal transport, modal shift and to ensure improved quality management of transport processes

4.2 Consortium Structure and Composition

In order to carry out the basic philosophy, a proven construction was found to increase efficiency and sustainability of PROSIT. All partners represented in PROSIT were allocated various statuses and grouped in four scenarios where they were assigned to scenario co-ordinating units. These assignments secured efficiency and reliability during the project realisation.

The four user categories were:

User category 1: User (without an own EDP system) participating in communication by use of an IM (Interconnectivity Manager) user interface with access to an IM of a partner

User category 2: User with an own EDP system will be interconnected to partners who have an IM installed

User category 3: User with an own EDP system who installs an IM for interconnecting its EDP systems to systems of partners

User category 4: User who installs the new software supporting the "brokerage and control"

Following table indicates the corresponding structure of partners within PROSIT.

User	User cat. 1	User cat. 2	User cat. 3	User cat. 4
Rhine/North Sea				
HVA			X	X
RMSD			X	
RMSG		X		
CUXP			X	
DFDS		X		
EWT		X		
Finland/Rhine				
EDI			X	
SAIMAA			X	X
MUST	X			
FMA		X		
INTERC		X		
EWT		X		
Mediterranean				
SCS			X	X
PPA		X		
CONSIGMAR	X			
Baltic Sea				
LHG			X	
FRAFI				X
TRE			X	

Table 4.1: Assignment of users to categories and scenarios

4.3 Interconnectivity Management

4.3.1 Prerequisites

Basically the IM is a set of tools which enables a PROSIT user to set up an EDI connection to one or several communication partner(s). The IM's general functionality can be described as processing incoming 'messages' in a user defined and message specific way and generating an output message which is sent to a defined receiver (see next chapter for details on the IM).

To enable the definition of the message processing is an intrinsic functionality of the different IM components and supported by user interfaces. This means that the IM supports the technical set up of interconnectivity by replacing old fashioned interface programming through the configuration of tools. However, the essence of interconnectivity remains unchanged: it still means a careful handling of data on the character level which causes a considerable preparatory effort in advance. These preparations are easily underestimated!

Several prerequisites on the technical as well as the logical/organisational level must be met by a potential user before an IM or any of its components can be installed and a message processing can be defined. These prerequisites are described in the following two subsections. For details about the IM, its components and their function please refer to the following section.

Because of the toolbox character of the IM the exact extent of internal preparation for a user will depend on the communication problem and the IM components used. The following description does not distinguish different possible combinations of the tools but assumes the installation of a fully-fledged IM including automated EDI, internal processing within the communication DB and data access via the IM Client.

4.3.2 Hardware Platform and Software Environment for the Installation of Components

The IM consists of up to 4 components which are

1. the Open System Interconnection Software (OSIS)
2. the Message Gateway (MeGa)
3. the Communication Database
4. the IM Client (or data viewer)

The Components 1 -3 can in principle be installed on a single computer as well as inside a LAN.

The currently supported hardware platforms and operating systems for OSIS, MeGa and the IM Client are listed below.

HVA

For the communication DB, only an SQL script for the creation of the DB is provided. A SQL Database Management System, like e.g. MS SQL Server, ORACLE or SYBASE must be provided by the user. In addition to that it is necessary to provide an ODBC driver for the DBMS to enable the communication between MeGa and the Communication DB.

A Communications Database also implies the need for some minimum requirements regarding the equipment in order to ensure a reasonable performance.

For that, a system with a Pentium II with 233 MHz and 64 MB RAM (or comparable for non-Intel systems) is considered as a minimum recommendation.

IM Component	Hardware Platform	Operating System
OSIS	Intel based PCs, DEC alpha with Windows NT (Intel emulation) IBM RISC 6000 AIX HP 9000 UX SUN Solaris DEC alpha OSF1 DEC5000 ULTRIX SNI RM SINIX SNI MX3000 SINIX	UNIX or Windows NT
MeGa	any platform for that a PERL interpreter is available (e.g. Intel based PC (Pentium) or Sun).	UNIX or Windows NT
IM Client	any platform which supports a Java virtual machine for Java 1.1.5 and higher	any OS for which an implementation of jdk 1.1.5 and higher exists

Table 4-2: Hardware platforms and Operating Systems supported by the IM components

4.3.3 Communication Prerequisites

OSIS is the responsible IM component for automated EDI. Currently, OSIS supports, i.e. can do an automated file transfer by using the following protocols:

- TCP/IP
- (via telebox)
- telebox
- Oftp

- Lu6.2
- several SAP specific protocols

The basic protocol software, however, like e.g. an ftp client and/or hardware components (e.g. for ISDN dial-in and routing) are not part of OSIS or any other IM component and must be provided by the user. I. e. a user must provide the technical means (software and hardware) to use one of the protocols listed above.

The IM Client is essentially a customised JAVA application which provides masks for data input and data viewing. It communicates directly with the communication DB via the Internet. Such a connection must be provided by any user of category 1 who wants to use the IM client

4.3.4 Logical / Organisational Prerequisites

The basic logical and organisational requirements to set up an interconnection between different partners are the following:

1. Definition of the messages/data to be exchanged
2. Definition of the mapping rules
3. Definition/preparation of code conversions
4. Decision about status monitoring and message receipts
5. Specification of the properties/functionality's of the GUI for the IM Client.
6. Tests

The different issues are described in more detail in the following

In addition to these explicit definable requirements it should be realised, that interconnectivity may have a certain impact on the organisation of the internal work flow. For example, some manual tasks might be replaced by much more efficient automated procedures and thus become superfluous. Contrary to that demands the presence of a communication database for additional maintenance, e.g. for master data and codes. This becomes especially serious, if a communication DB exists side by side with an older in-house DB: some effort will be necessary to keep the different data sets consistent.

Additional information about interchange agreements for the special case of EDIFACT can be found for example in the United Nations Trade Data Interchange Directory.

4.3.5 Message Definition

Real world interconnectivity is usually a demanding business, dealing with data on a character level. A detailed and specific message definition is therefore the very basic requirement for any interconnectivity. This applies for **both ends** of the communication line, i.e. the incoming and outgoing message. These definitions are usually needed on several levels

1. What kind of messages are exchanged (i.e. a booking, a container prenotification, etc.)

2. Definition of the formats, e.g.
 - In-house formats of fixed length records
 - EDIFACT
 - SAP-IDOC
3. Definition of the message structure (repetitions, mandatory/conditional records) on the 'record' level, e.g.
 - EDIFACT: Branching Diagram
 - SAP-IDOC: Type and Release Number
4. Definition of the records on the field level: this includes field sequence, field size, and field type (alphanumeric/numeric/binary like numeric data in a COBOL computational format). In case of EDIFACT, this definition is given by the EDIFACT version to be used (plus additional changes within the specific interchange agreement).

4.3.6 Mapping Rules

Format descriptions describe how the incoming and outgoing data look like, but this is by no means sufficient. To generate an outgoing message it is necessary to specify on a field level the mapping of each the incoming data fields onto the outgoing data fields, including logical rules, code changes, creation of defaults, etc. This may also include a more detailed description of the content of some data fields as specified in the original format description if some additional data evaluation/conversion is necessary.

The following list shows schematically some typical examples which may occur in a mapping description and must be carefully specified in detail.

It must be noted, that this list is not meant to be complete, though!

1. Simple mapping of fields:

source record N, Field x □ target record M, Field y

2. Distribution of a field:

source record N, field a □ target record M, Fields r,s
 target record O, Field t
 target record P, Field r

3. Conditional Assignments:

source record N, field a □ target record M, Field r; but only,
 if the content of the source field b in
 source record L is equal to 'CN';
 skip mapping otherwise

4. Structural changes of fields:

date format MM-DD-CCYY hh:mm:ss □ CCYYMMDDhhmm

5. Creation of defaults (may be conditional too):

fill target field x in target record M with 'AG'

6. Code conversions:

map source record N, Field x □ target record M, Field y and change the content as specified in the following list:

1	□	21
2	□	22
3	□	23
7	□	RR
10	□	ZMK

7. Change of units:

map source record N, Field x, the content of which is given in tons □ target record M, Field y the content of which must be given in kg, i.e divide by 1000.

For the ease of handling the mapping rules should in practice be provided as a list, using a less verbal and more formal description as in the above example.

4.3.7 Codes

Electronic data exchange relies heavily on codes. In contrast to data provided in an unstructured free text form they allow an automated data processing. Quite often, however, different partners use different codes, which is usually a difficult practical problem. Code conversion itself can be done by the IM. The code lists and the conversion table however, must be provided by the user.

Code lists and code conversion also typically include some internal and external organisational effort and agreements with the communication partner.

First, codes which are useful for the receiver are quite often without any interest for the sender (e.g. ship call sign do not mean anything for truckers, but much to a port community system). They are not needed for his daily business and they are not contained in his database. With regard to the costs of maintenance he might even not be interested in them at all. Or he might not be able to get hold of them. Thus, getting hold of codes and/or setting up a code conversion list can already be a cumbersome task.

Second, it is important to make a decision about the location, where a code conversion takes place. This depends crucially on the frequency of updates and changes and in addition on the size of a conversion list. Short and simple conversion lists as in the example of the previous

subsection can easily be handled and maintained within the IM. Code conversion lists which are related to important daily business and which are updated with a high frequency are not necessarily well located in a system interface like the IM.

4.3.8 Status Monitoring and Receipts

Regarding the function of the IM as an interface to a communication partner it is important to decide about the status monitoring and the handling of acknowledgement/receipts:

- Which possible message states (e.g. states reporting processing errors on whatever reason within the IM, reporting that a message has been successfully been sent to a receiver) shall be monitored?
- Which acknowledgements/receipts (if any) will be sent back by the receiver (e.g. message received, message accepted, message rejected, etc.)?
- How will these feedback's originating from the IM itself or from a message receiver be handled within the existing application software and within the existing internal workflow procedures?

These questions touch internal organisational issues as well as practical implementation issues of the IM.

4.3.9 IM Client Specification

The IM Client is a graphical user interface which will be developed (using the Java class library JDBT of the ISL) under consideration of the specific user needs. These needs depend obviously on two issues:

1. the message types to be exchanged and their content as specified in the format description, mapping rules, etc.: this specifies the data fields which must be accessible through the IM Client.
2. The business function of the exchanged messages (including status reports and receipts), their logical structure, interrelations, and their function: this defines the content, structure, interrelation and function of the different masks of the user screens (e.g. which entries are defaults/editable; which data can be selected from a combo box; checking of consistency and completeness of message entries before submission to IM).

4.3.10 Interconnectivity Tests

Non-trivial interconnectivity problems always need a very careful testing phase which proves, that the typical situations are handled as they are supposed to. Obviously this must be done in two steps.

First, during the configuration a permanent testing is necessary to ensure that the basic structural and logical mapping requirements are met. Thus, a certain amount of test data must be provided at the very beginning.

Second, a real-world test of an IM configuration is necessary for a more thorough checking of several different data combinations which are relevant for typical and/or sensitive problems. These tests must also include testing the physical connection and the correct processing of status reports and receipts provided by the message receiver within the application system of the user. Thus a certain organisation effort is necessary in order to ensure that all participating parties are available for the surely necessary error corrections.

4.4 The Interconnectivity Manager: Generic specification for the scenario average

The goal of this and the following section is to derive the technical and functional specifications for the Interconnectivity Manager from the user requirements. In accordance with the Technical Annex the method of structural analysis is used to visualise and analyse the user requirements. A brief outline of this method can be found in appendix A.

4.4.1 General Description

The Interconnectivity Manager represents a new approach to the ubiquitous EDI problem. It can be described as a tool box which allows the selection and adaptation of specific components in agreement with the precise needs of a user. The IM toolbox contains four components each of which is responsible for a certain tasks.

A fully fledged IM implementation which includes an internal communication database for the handling of the logical content of messages offers an integrated solution which not only supports automated EDI between different EDP systems but also enables external users without appropriate EDP system to participate in and to gain benefits from electronic data interchange. The IM thus represents an intelligent EDI-node which enables electronic communication between several internal and external communication partners with and without an own EDP System.

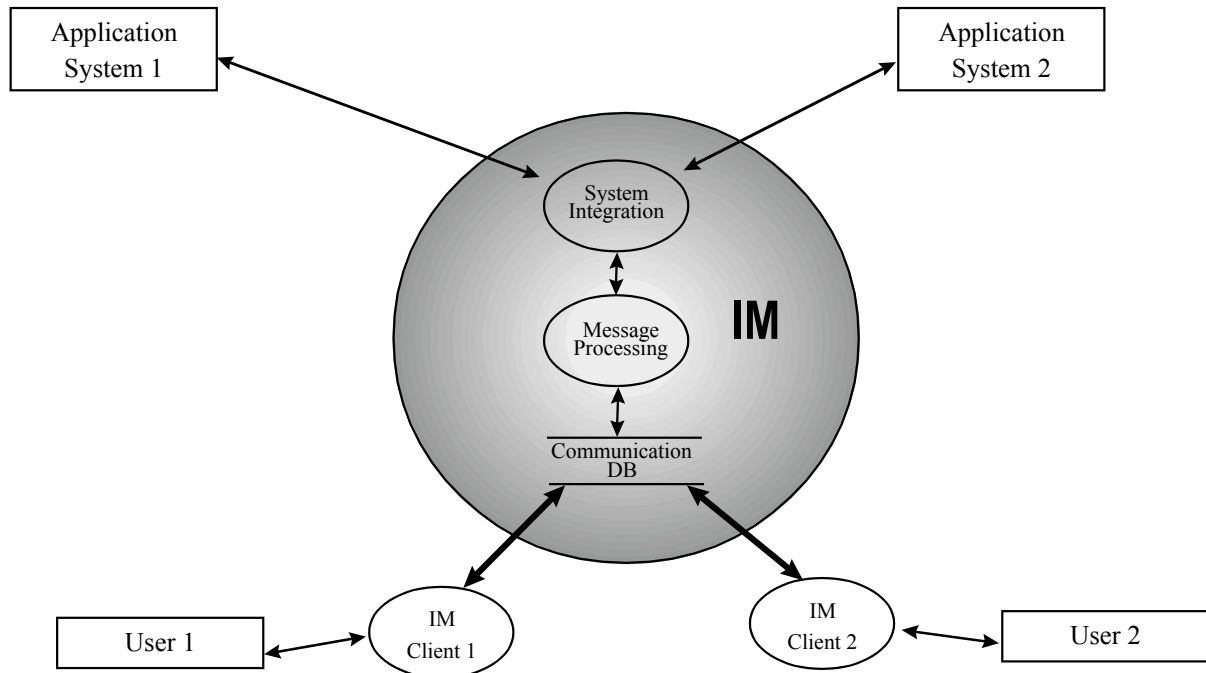


Figure 4-1: Schematic of the IM and its communication environment

The IM can thus be considered as an EDI interface with a remote-access-application-functionality as add-on. This application functionality with the remote access capability to the communication database is realised by IM Clients which belong logically to the IM but which are located at the users desktops. The ability to be accessed from remote IM Clients allows the IM also to act as a central communication node to the external world. A single IM Client can be used to reduce the number of different terminals with connections to different partners.

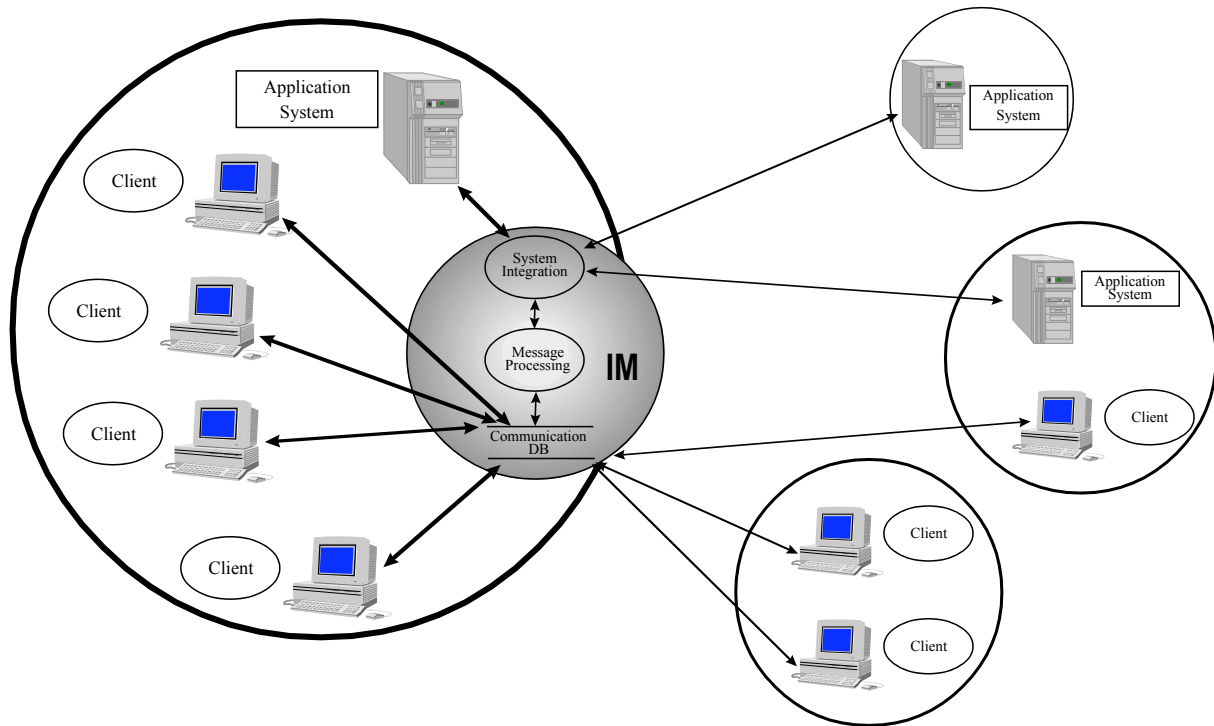


Figure 4-2: The IM as communication node for different internal and external partners

With regard to its architecture, three different kinds of EDI operations can be distinguished:

1. *direct* communication between different EDP systems
2. *on-line* communication between human user
3. *mixed* communication between human user and EDP systems

4.4.2 Generic IM Components

The IM represents a modular toolbox approach to connectivity with four generic components. Each of these generic IM components is responsible for a certain task. However, each of these components is sufficiently independent on the others to allow arbitrary combinations in order to satisfy nearly every user specific requirement. An IM implementation does therefore not necessarily need all of them.

Component	Function	Product	Provider	Service
System integration	data import and export from and to application systems (internal or external)	OSIS ("Open Systems Interconnection Software")	LS	configuration for different message types, application interfaces and transmission protocols
Message processing	format conversion between flat files and data base tables	MeGa ("Message Gateway")	ISL	configuration for different message types
Communications data base	Intermediate storage of messages	SQL script for table creation (DBMS itself not included)	ISL	configuration of the structure for the communications data base
IM Client	message in- and output for users with no internal application system	class library with generic objects for data base access and screen layout	ISL	development of input/output screens for different message types

Table 4-3: IM Components and their functionality

The following is a detailed description of the generic IM components, their basic function and their possible tasks within the IM in general. However, the description is restricted to their function within the IM only. Some of them may exist independently and offer a much broader range of functions than indicated in the following.

4.4.3 System Integration

The system integration is the heart of the IM. It links the Interconnectivity Manager to the user's application system. It is responsible for the physical entry of data into the in-house system of the user - either automatically or triggered by the IM Client function after manual manipulation of the data. Depending on the actual selected IM components it may also realise a connection to the communication Database via the Message Processing and will thus allow to forward incoming data to the Communication DB or to retrieve data from it. Data retrieval may be triggered automatically by an incoming external message which demands for certain actions, manually by a user via the IM Client or scheduled at predefined times.

The concrete realisation of the system integration is strongly dependent on the application system. It may be

- data oriented, that means, it accesses the application data either directly from a file or via the DBMS or
- software oriented, that means, it uses functions of the application software (for example remote procedure calls) to access the application data.

Within the IM the System integration serves to the automated electronic communication with the environment.

Technically, the System Integration is realised by the commercial product OSIS (Open System Interconnection Software),. some features of which are listed in the following:

- Support of EDIFACT and several subsets like, e.g., EANCON and ODETTE

- Support of several communication protocols, like TCP/IP, Oftp, telebox, LU6.2 and SAP specific protocols
- Status information about data processing and success/error in data transmission to receiver
- internal archiving of data
- security against accidental system shut down through defined recovery procedures
- Access to SYBASE, ORACLE, MS SQL and ADABAS databases
- supported Platforms: UNIX and Windows NT
- SAP R/3[®] certified software
- Configuration of dataflow instead of low level programming

4.4.4 Message Processing

The message processing knows how to transfer message data into data base tables and, vice versa, how to fill messages with the content of data base tables. Reading a configuration file for the message to be processed, the message content will be split into the different tables, the keys will be set, links to already existing table entries will be set, etc.

Consequently, the message processing is a bridging software between the two worlds of flat files and of data base tables.

Within the IM the Message Processing provides the link between System Integration and the communication Database. In addition it is responsible for the maintenance of the consistency of the data inside the Communication Database and an in-house Database.

Technically the Message Processing is realised by the software **MeGa**, which is implemented in the programming language PERL. MeGa can be configured to process different kinds of ASCII files by simply setting parameters. Thus, users do not need any special programming knowledge. A user manual describes the way of operation and configuration. MeGa can be individually configured to the needs of the users, i.e. the structure of the internal database and messages to be exchanged.

4.4.5 Communication Database

The communications data base was developed according to a generalised data model for the transport business. The corresponding datamodel and object-relational database structure was developed within the BOPCOM project. Due to its underlying generic, transport oriented approach it should theoretically be possible to store in it any kind of message that is exchanged between transport companies, their customers and authorities.

Its main purpose is to store messages temporarily on their way from the sender to the receiver - that means in general, no longer than a week. After the task the message refers to (a transport, a storage, a transshipment) is executed, it may be deleted by one of the involved parties.

However, the Communication DB also includes an archiving facility with the same structure as the working part of the Communication DB itself. Deleted message therefore do not necessarily completely disappear but may be moved to an archive instead. This archive may be used for statistics and control in case of any disagreements or communication problems between the communication partners.

The incorporation of the communications data base into the IM makes an important difference to other mailbox-like message exchange systems: In such systems messages are handled independently from each other. In contrast to that are messages which refer to the same object marked as to belonging together within the communications data base - for example a container booking sent from a forwarder to a shipping agent and a dangerous cargo message for the same container sent from the consignor to the port authority. Thus interrelations and cross-referencing between different message is possible.

This property may also be used for checking the content of new messages or completing them by using the data already known from earlier messages or from a stock of base data, which is permanently present in the communications data base (for example dangerous cargo classifications, time tables, addresses, etc.).

Technically, the Communication DB is provided as an SQL script which sets up the Database structure. The Database Management System and the data itself must be provided by the user.

4.4.6 IM Client

The IM Client is the graphical user interface of the Interconnectivity Manager and serves two purposes:

- to enable the application integration (see below) and
- to be used for message in/output (see also below).

The software is the same for both purposes. The main task of the IM client is to support communication by enabling the user to send and retrieve messages and to display their content. This requires the access to the communications data base of an IM via a local network connection if the IM is running in-house or via a wide area network connection if the IM is running at a communications partner or at a service provider.

In addition the IM Client may also be used to display data from the user's in-house application system and to offer special functions to process them.

This supports the application integration function of the IM and requires access to the user's application data via a local area network connection.

If the access of the IM client to the application system is not possible directly, the IM client may use the system integration to export data from the application system.

The message in/output: is a functionality of the IM client that is used by users without appropriate application systems. With the IM client as a kind of a database viewer they will be enabled to enter data into the communications data base as well as to retrieve data from the communications data base for a specific application. Furthermore, it is planned also to

maintain the IM using this kind of access. **The application integration:** is a functionality of the IM client that guarantees that incoming data from the IM will be pre-processed manually before being entered into the in-house system in order to keep the in-house data consistent. As an example it might be necessary to complete incoming information with data which are necessary for the in-house system but not contained in the incoming message. To this end it might be necessary for the IM client to display not only information from the communications data base but also application data from the in-house database. The application integration also adds an additional security layer to the system: it can be used to prevent data from being automatically integrated into the in-house system without control.

It is obvious, that the function and the appearance of the IM Client can by no means specified in any generic way: it is completely dependent on the precise user requirements, the logical content and the interdependency of the data. Therefore the IM Client is provided as of a JAVA class library (Java Data Base Tool, JDBT). JDBT provides basic graphical objects to set up a GUI and access methods to the Communication Database. Because of the known structure of the Communication Database and the availability of the powerful JDBT library the set-up of a real IM-Client can be achieved easily with some simple and straightforward JAVA programming.

A different possibility to implement an IM Client is to use HTML forms in combination with CGI-scripts, located on a WWW-Server or the Active Server Page technique with ADO/ODBC. The additional constraint arising from this architecture is that the Communication Data Base must be installed on the same WWW server. The latter architecture is currently used by EDI Management, which installed an own WWW server.

4.5 Generic IM Function: Abstract IM Context Diagram

From an abstract point of view the Interconnectivity Manager is a processing unit which communicates with a message sender and a message receiver only. The corresponding context diagram is shown in Figure 4-3. The distinction between sender and receiver is introduced to describe the role of an outside communication partner. They can be physically identical however.

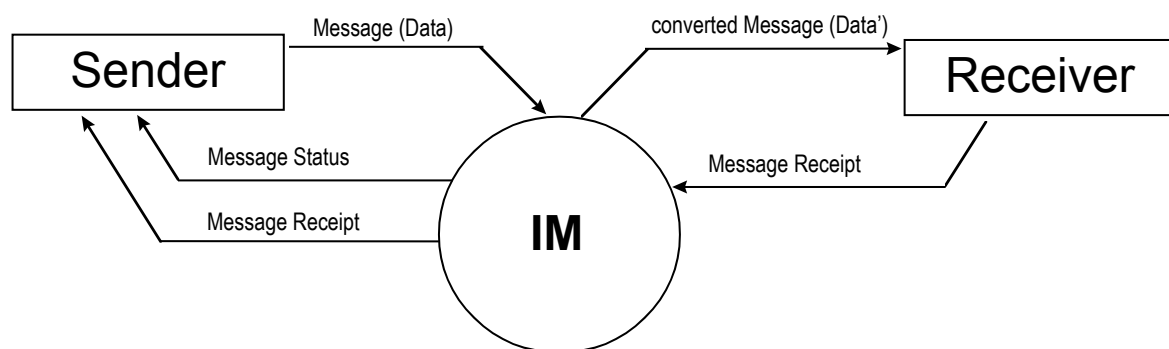


Figure 4-3: Abstract context diagram of the Interconnectivity Manager

An additional distinction of sender and receiver by the communication channel, i.e. a communication with an EDP system and/or a human user through a data viewer (IM client) effects the internal message processing within the IM only. Thus, such a distinction is definitely useful for analysing the internal data flows within the IM. With regard to the general functionality it incorporates artificial and useless complications though

The standard EDI situation assumes message exchange between two different communication partners and demands mainly for structural conversion between different data formats, code changes and a bridging functionality between different communication protocols. In addition to that the IM, being a complete application system on its own including an internal Communications Data Base and Client access allows communication between a user and the IM. Thus, a message M sent to the IM might be a request for data stored in the internal communication database. The corresponding message M' sent by the IM might be the requested information.

The main function of the IM can be described as receiving a **message M** from a sender, doing some internal conversion/data processing on it and sending it as a **converted message M'** to a receiver.

The internal data processing may include conversion between different data structures or formats (e.g. in-house data structure \square EDIFACT or vice versa), temporary storage within the internal communication database or retrieval of internally stored data. In addition it might include a change between different communication protocols (e.g. TCP/IP \square X.400).

To enable message exchange between sending and receiving communication partners is the basic and mandatory functionality of the IM.

Additional dataflows to be exchanged with the environment can be

status reports which inform a sender about the current status of the processing of a message (e.g. processing in progress, message sent, error occurred during message processing, etc.)

and the exchange of

receipts which are provided by the message recipient (e.g. message received, accepted, rejected, etc.).

It is clear, however, that status and receipts are conditional elements of the communication only. Their presence is not essential to the interconnectivity as such but depends on the specific user requirements. Correspondingly, they will only be included into a EDI scenario if they are needed by the user.

4.6 Generic Technical IM Requirements: survey of the user needs

The IM components as a general purpose tool were already developed within the BOPCom project. In addition to that it is the goal of PROSIT to go beyond mere demonstrators and

realise real IM implementations in a working environment. For that it is necessary to specify the generic IM requirements in more detail as it was done in BOPCom.

This specification is based on the results of WP1 (User Requirements) where user in different scenarios were carefully interviewed. The technical and functional specification of a useful generic IM must be able to satisfy at least some minimum requirements which can be defined as a common intersection of the obtained results.

The PROSIT project has a large number of users with a wide geographical distribution. The interviews with these users were performed by different persons belonging to different PROSIT partners. This ensures that the obtained information are sufficiently unbiased to provide a reliable basis for such a generic specification of an IM within a transport oriented maritime environment.

Within PROSIT, an IM shall be installed at users of category 3 (C-3), which, by definition of C-3 have an existing in-house EDP system available. These users are therefore pivotal to any analysis of such a minimum set of demands.

From a generic point of view the central questions to the C-3 users are:

1. What is the existing or planned IT environment where an IM should be installed, i.e. hardware, software and OS?
2. What kind of users (with and/or without own EDP system) are involved in the concrete EDI scenarios
3. What kind of connectivity (data transfer protocol) is available or how is the interconnectivity supposed to be realised?
4. Is the IM an independent stand-alone software or must it be integrated into a more complex environment as represent by the presence of existing in-house applications and databases?

The data achieved from the user requirement survey can be summarised as follows:

1. Windows NT is the most common OS, followed by UNIX which is generally regarded as more stable and reliable.
2. TCP/IP is the most common interconnection protocol
3. Communication is needed with C-2 users (own EDP system) as well as with C-1 users (no EDP system)
4. Interconnectivity is typically realised in a complex environment with existing in-house applications and in-house databases.

Therefore, the following conclusions can be drawn with regard to the minimum technical requirements that must be met by a generic interconnectivity manager:

- T1** The generic IM must at least work in a Windows NT environment and should also be functional in a UNIX environment
- T2** The generic IM must support TCP/IP as interconnectivity protocol
- T3** The generic IM must support fully automated EDI between EDP systems, including direct EDI communication of different applications systems without human interference on the data level .
- T4** The generic IM must allow users without appropriate IT environment to participate in the EDI process
- T5** The generic IM must be functional in a complex environment with applications and in-house databases, i.e. must be able to ensure data consistency between data stored in the Communications DB and an existing in-house DB.

The first and second item refer to pure technical issues and are in perfect agreement with the technical requirements for the existing IM components as they were outlined in section 5.1. All the IM components match these requirements already in their currently available form. With the exception of the port of Saimaa which has out-sourced its IT services and therefore is probably not interested to install the IM at its own premises, all C-3 users satisfy at least these hardware and operating system requirements. The practical installation of the existing components should therefore be possible at all places that have to be considered within PROSIT. These technical issues will thus not be discussed further.

In summary it can be stated that on technical level the found user needs do agree very well with the proposed architecture of the IM. Support of automated EDI and automated system integration and the support of unequipped user with an IM Client are both needed. However, an additional requirement also becomes obvious: the necessity to maintain data consistency. In principle this should not cause any serious problems though, because the MeGa tool as a generic database access tool was developed to care of such tasks.

4.7 Generic IM Function: Extended IM Context Diagram

Although the abstract context diagram (c. f. Figure 4-3) shows the essential terminators it is useful to use a more refined context diagram in order to take into account the generic user needs regarding the participation of C-1 user without appropriate EDP system via an IM Client and the maintenance of data consistency with an in-house DB.

In addition it allows to distinguish different communication possibilities such as direct, online and mixed operations as they were described in section 6.1

The extended context diagram contains five logical terminators which are connected to the IM:

1. a sending EDP system
2. a receiving EDP system
3. a sending user (called "data provider")
4. a receiving user (called "viewer")
5. an in-house data base

Technically, the users are realised by IM Clients.

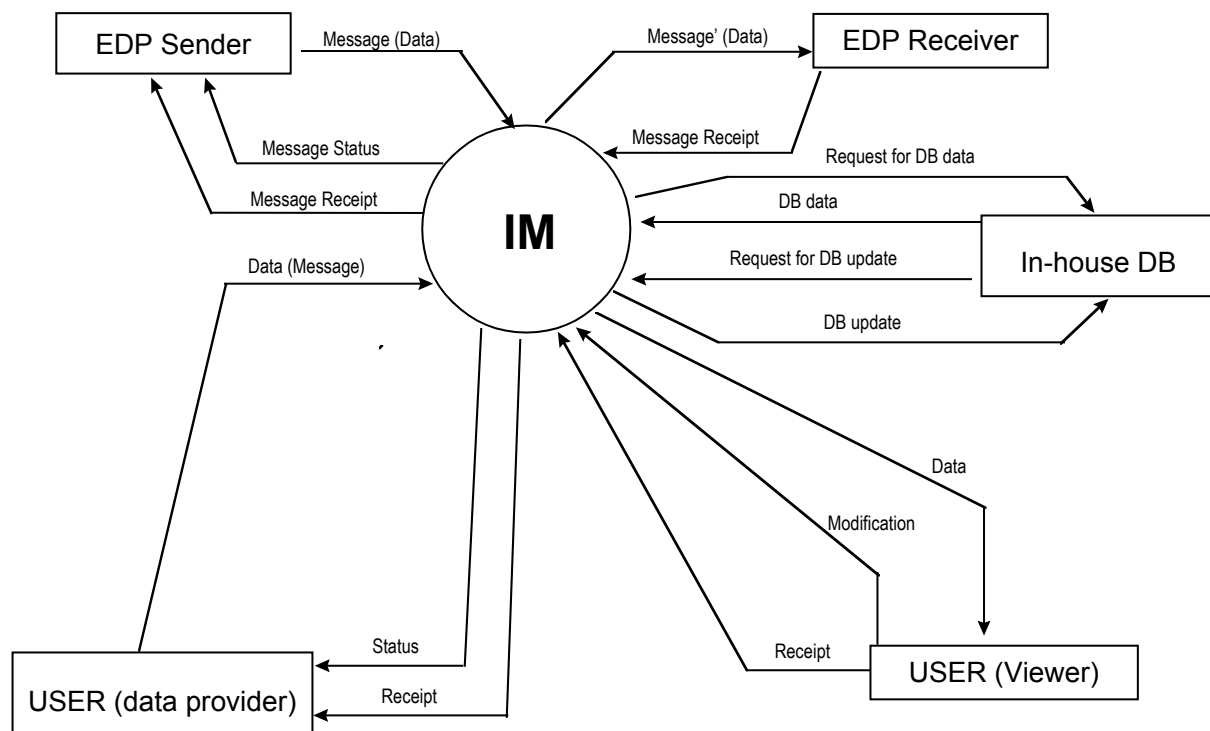


Figure 4-4: Extended context diagram of the IM including external EDP systems, IM Clients (User) and an in-house data base

The message to be exchanged between the terminators and the IM are basically identical to the one already discussed within the frame of the abstract context diagram. Additional new Data flows are the following:

Modification: takes into account, that the IM Client is more than a mere passive data viewer. In addition it can be used to modify or complete data.

Request for Data: e.g. to incorporate master data into a new message or into a data view or to update some information hold within the communication DB.

DB data: data provided by an in-house DB following a request for data.

Request for DB update: e.g. to maintain the content of some in-house archives, etc.

DB update: Data provided to the in-house DB following a request for DB update or automated DB update following a certain schedule.

Which data flows in a specific system really occur does depend completely on the specific demands, i.e. on the detailed system specifications and interchange agreements (e.g. about receipts to be exchanged or not, participation of external users with IM Clients, etc.)

It is clear, that a complete data flow may be quite involved and rely on the participation of several different of these terminators, e.g. a message prepared by an EDP System can be viewed and manually modified by a user using information coming from the in-house DB, etc.

4.8 Generic IM Function: Data Flow Diagram

The data flows between the different IM components and between the IM components and the terminators are shown in Figure 4-5. For simplicity data, status and receipt information flows between the IM components are represented by single arrows.

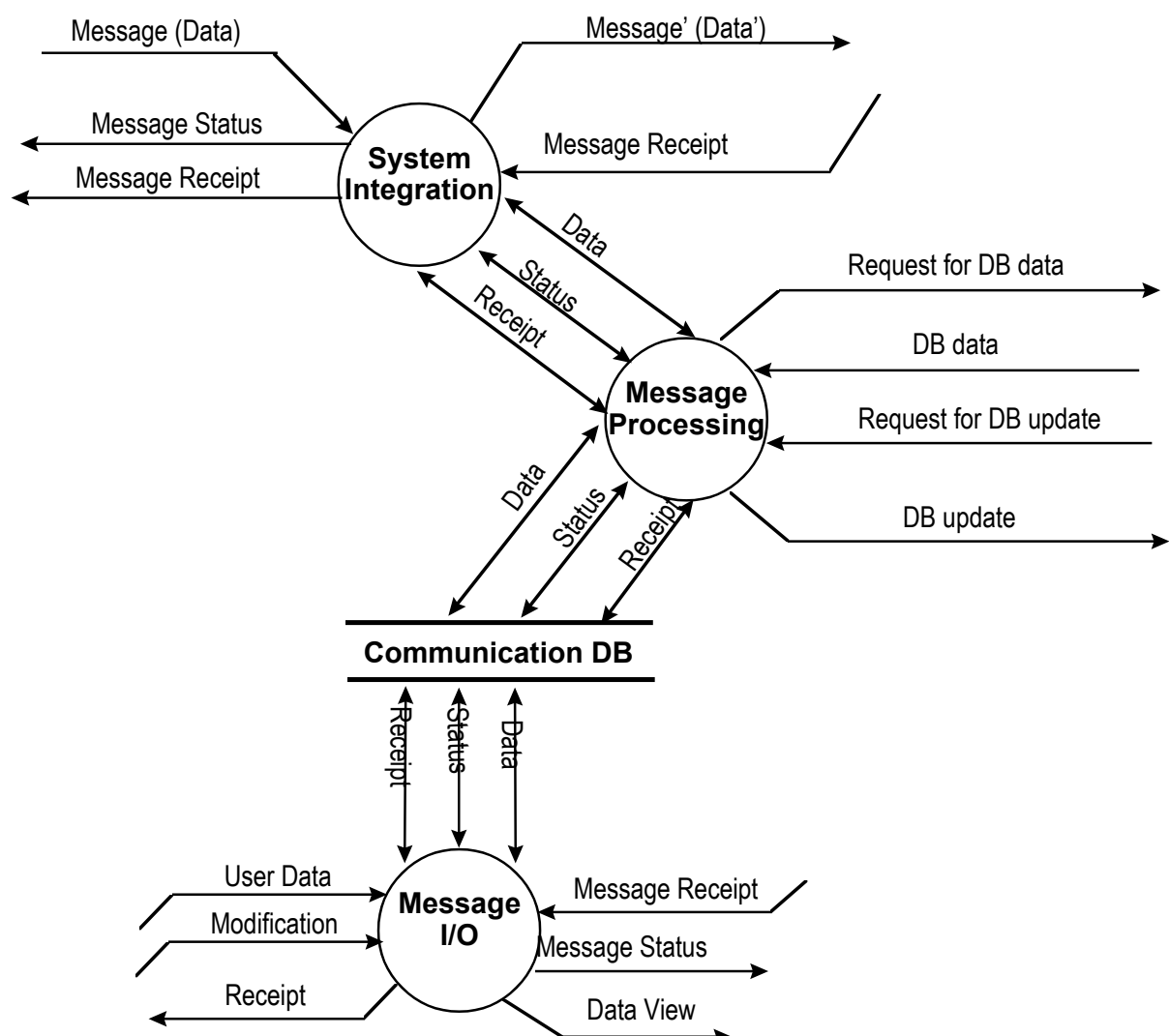


Figure 4-5: Generic data flow diagram of the IM including all the terminators shown in Figure 4-4.

Communication with the external terminators is done using the components System integration (OSIS), Message Processing (MeGa) and Message I/O (IM Client). The Communication Data Base is either accessed directly by the IM Client or using the MeGa tool.

Internally, only Data, Status information and Receipts are transmitted. This distinction is purely logical though, representing the function of the data flow. However, the System Integration and the Message Processing both need the intelligence to decide about processing and the direction of a specific dataflow.

To support all the dataflows shown in Figure 4-5 is the basic requirement for the generic IM. In addition to the generic technical requirements listed in section 4.6 therefore additional generic functional requirements are defined by the data flow diagram in Figure 4-5. These are the following:

- F1** The *System Integration* must support the exchange of file based data between different communication partners, acting as sender and receiver respectively. This message exchange includes the conversion between data formats with different structures and codes.
- F2** The *System Integration* must be able to generate status information with regard to the status of the message processing (data successfully processed and send to receiver; error occurred during data processing)
- F3** The *System Integration* must be able to process and forward data dynamically (i.e. to use information contained in the data themselves to decide on how to process the data and to whom to send them)
- F4** The *Message Processing* must support the communication between a database (e.g. the Communication Data Base) and file-oriented software (like the System Integration) as well as the communication between two different data bases with different structures.
- F5** The *Message Processing* must be able to process and forward data dynamically (i.e. to use information contained in the data themselves to decide on how to process the data and to whom to send them)
- F6** The structure of the *Communications DB* must be able to hold data and data structures (relations) which are consistent with
 - (i) the content and structure of message exchanged with external and internal communication partners
 - (ii) the structure of data maintained in an separate in-house data base (i.e. it must be possible to map relevant data and relations from the in-house database onto the Communication Data Base)
- F7** The *IM Client* must enable a user to access the data available in the Communication Data Base, including status information and the content of receipts.
- F8** The *IM Client* must enable a user to modify data in the Communication DB and to trigger further processing of the data by setting signal within the Communication DB which activate the Message processing.

A more detailed description is not possible on this level. The actually needed dataflows are given through the definition of the communication demands for a given EDI scenario. These

specification are part of the logical prerequisites as they were outlined in section 5. For example, it must be specified, if receipts and status information are to be exchanged, if consistency with an in-house DB must be maintained, if EDP systems and/or users via IM Client are participating, etc.

4.9 Functional Description of ProShip

4.9.1 Overview

On top of the scientific and technical basis and available products (software, as described more detailed in the PROSIT Technical Annex) the ProShip software will be developed. ProShip supports the co-operation between the customer (industry and trade) and the transport operation on the one side and between multi transport operators and individual supply partners on the other. ProShip can be used by shippers as well as by transport industry. It can be implemented on the premises of an individual enterprise or of an independent service.

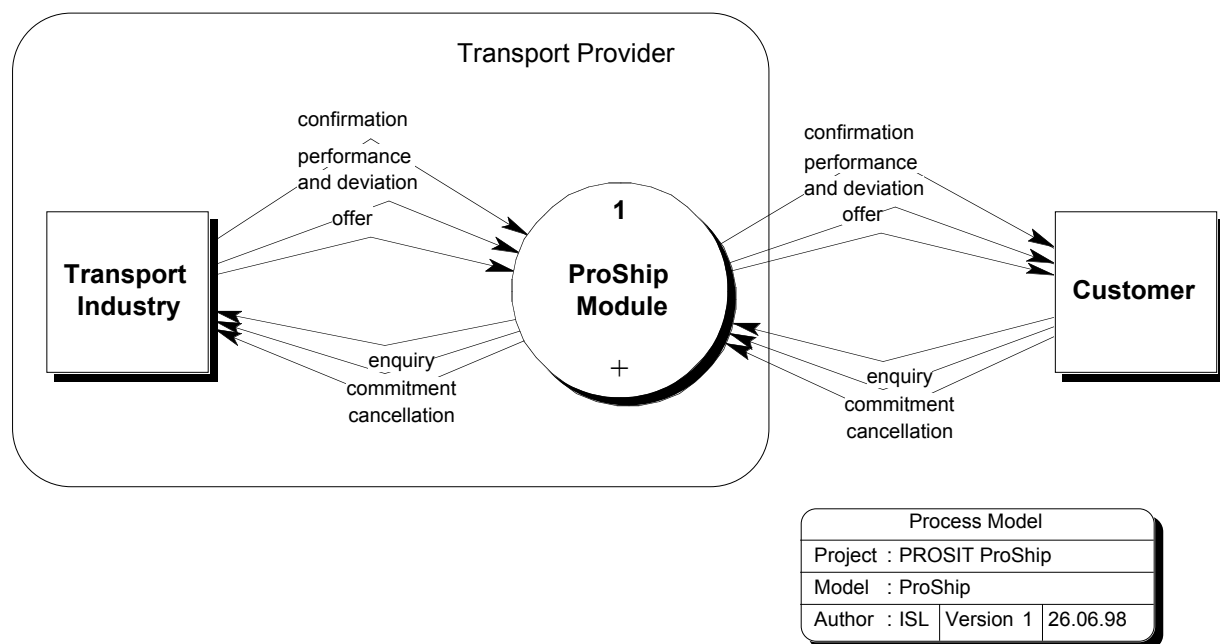


Figure 4-6 Information exchange via the ProShip software module

The main functions and interactions concerning ProShip are shown in Fig. 4.1. ProShip module and the external information exchange) and Figure 4-7 (the co-operation of ProShip with Application Interconnectivity Management (AIM)).

On the interface between demand and supply side information like enquiries and relating offers, commitments on orders and confirmations as well as information on deviations between the planning and the performance are provided and exchanged electronically.

The ProShip Software is designed to achieve two main objectives:

- On the one hand the brokerage between the demand and supply side is supported, concerning the evaluation and precalculations of alternatives and the administration of receiving commitments, orders etc. This encloses calculations and optimisation along the whole transport chain including multi modal transport.
- On the other hand ProShip helps to overcome „communication gaps“ which can be found not only between different transport modes or transport operators. ProShip will improve quality and reliability of transports by using modern telematics. One example for this is the comparison between agreed and planned transport and „reality“. The information on performance and deviations will be controlled and (if desired) automatically transferred to the customer.

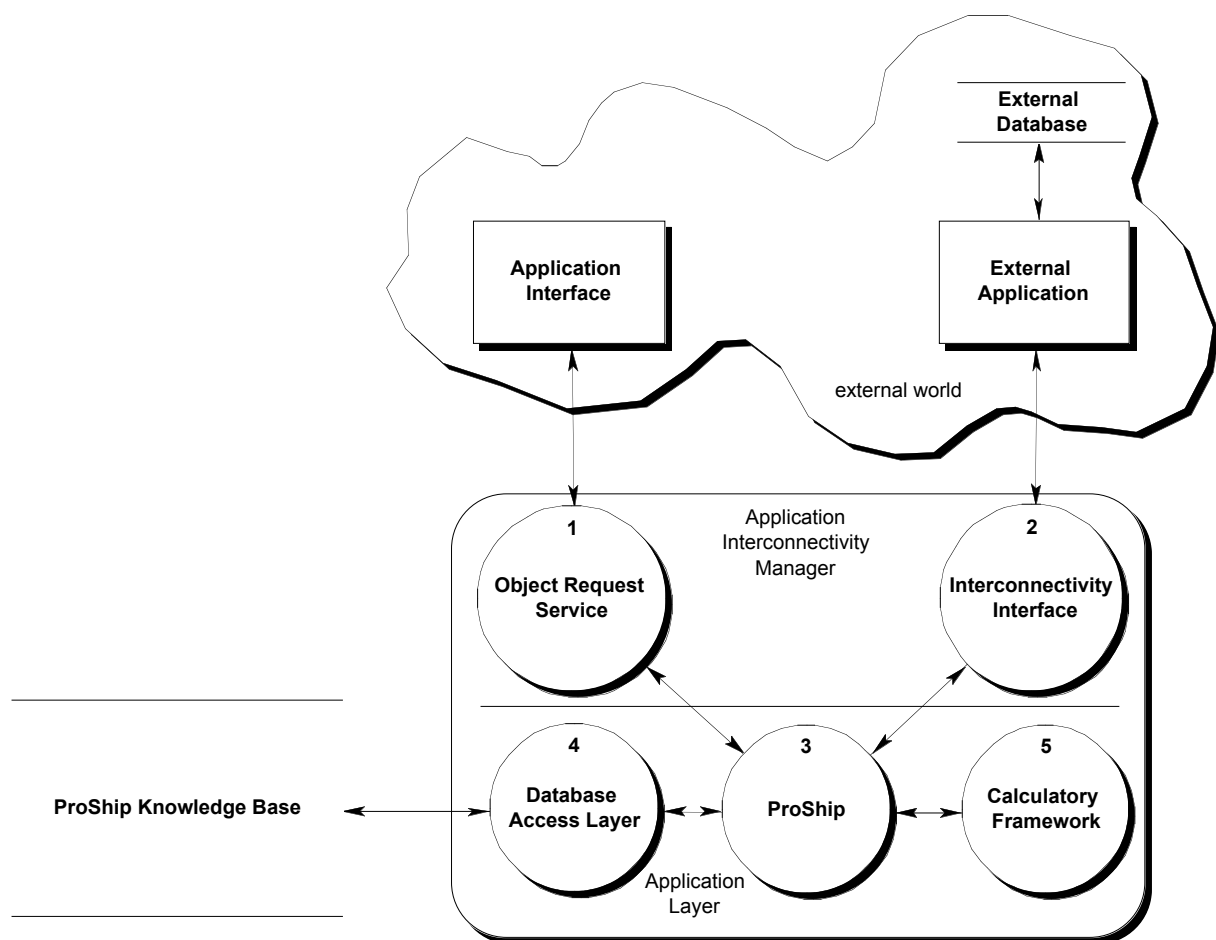


Figure 4-7: Information exchange between ProShip software and customers or industry via the application interconnectivity manager

Fig. 4-7 gives an overview of the different ProShip functionality's. The ProShip Knowledge Base (an SQL database) is accessed only through the ProShip classes designed for that purpose. They are represented by the Database Access Layer symbol. The ProShip Calculatory Framework symbol stands for the core functionality's of ProShip. They will be

described at first on a functional level, which merges the results from the user requirements phase, in the following subsection 4.9.2. The next steps towards an object oriented ProShip toolbox will then be described detailed in subsection 4.9.3.

4.9.2 Generic Functionality's of the ProShip Software

This section merges the results derived from the user requirements survey in the different scenarios from a generic point of view. More detailed specifications and the introduction of the object oriented toolbox will follow in section 4.9.3.

The ProShip Software will incorporate two main parts. One part will support the brokerage between the demand and supply side, concerning the evaluation of precalculations of alternatives and the administration of receiving commitments or orders. This includes functionality's for optimisation calculations of price, distance, time, reliability and maybe other transport aspects.

The second part is aiming at the improvement of quality and reliability of transports. The orders agreed and planned will be compared with the information on the performance and deviations will be controlled and (if desired) automatically transferred to the customer.

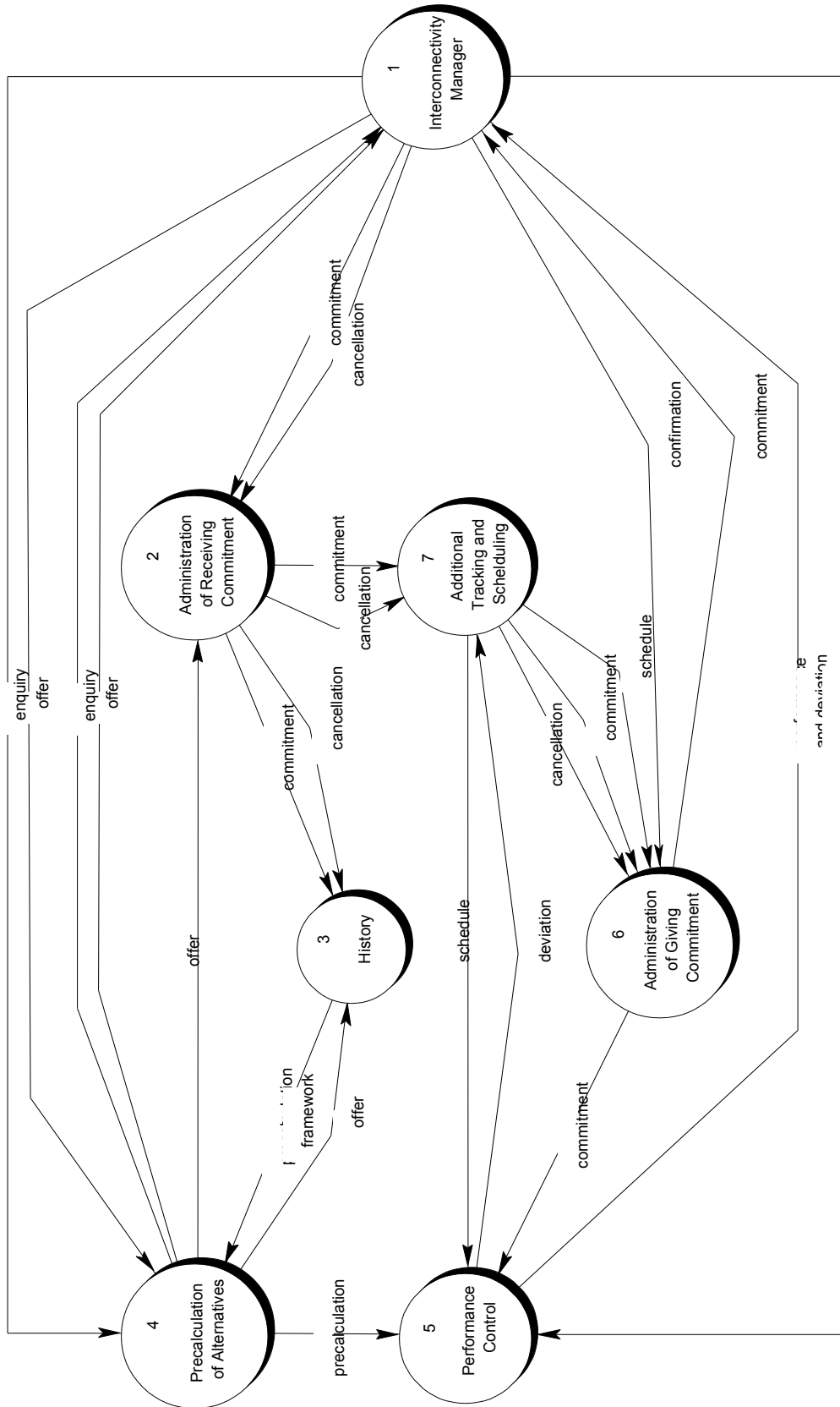


Figure 4-8: The internal functionality of the ProShip software

4.9.3 Generic ProShip Components

This section explains all processes, data flows and terminators. It can be used as a basis for further specification in scenario context.

Terminators

Customer

Partner in transport chain who wants to transport cargo (e.g. industry).

Transport Industry

Partner in transport chain who wants to perform the transport.

Processes

additional tracking planning/scheduling

The additional tracking planning/scheduling covers all planning actions and actions that have to be taken due to deviations in the transport process. This includes rescheduling by minimising schedule delays, notifications to customers etc.

administration for giving commitments

This task has to work with the transportation schedule and incoming notifications and confirmations from the transport industry. On this base commitments to transport industry have to be made and to be sent to the central control task.

administration of receiving commitments

This process does the administration for all incoming commitments from customers and finally passes the information on to history administration and the additional tracking planning/scheduling task.

history administration

The history administration keeps track of all offers and commitments for mainly extracting information for a precalculatory framework. The main goal is to form a wide basis of information aiming at a reasonable reliability in precalculations.

Performance control

The control process is a central task where information about planning and performance of all transports comes together. The main goal is to extract the necessary information about emerging deviations and to hand over this information to the additional tracking planning/scheduling process.

precalculation of alternatives

As a reaction to enquiries from customers offers for transport services have to be made. The final offer bases on the calculation of different alternatives, taking into account customer's preferences, e.g. priority on low price, fastest alternative etc.

4.9.4 Generic ProShip Data Flows

commitment from customer

The customer orders a transport service, as a follow up (in most cases) to his enquiries.

commitment to transport industry

As a reaction to a customer's order commitments are sent out to transport industry containing detailed specifications of what to transport under which conditions.

confirmation, notification to customer

Messages containing either confirmations of ongoing transport services or notifications about deviations, e.g. delays in delivery etc. to the customer.

confirmation, notification of transport industry

Messages containing either confirmations of ongoing transport services or notifications about deviations, e.g. delays in delivery etc. from transport industry.

deviation

ProShip-internal message from control process to planning / scheduling task.

enquiry from customer

The customer asks for transport services. He also names all terms of transport that he needs, as special conditions, priorities (e.g. low price, fast transport etc.) .

enquiry to transport industry

As a reaction to customer's enquiries the ProShip-precaculation task asks for offers from transport industry. This information has effect on the offer to the customer.

offer

ProShip -internal data flow to history administration.

offer for precaculation

This data flow originates from the "offer from transport industry" data flow and contains similar information as the "offer to customer". It is an internal message for being able to compare customer's bookings ("commitments from customers") to later commitments.

offer from transport industry

This is the transport industries reaction on customer enquiries received by the precaculation task.

offer to customer

Offer to customer containing the optimal solutions for the transport enquiry chosen by the "precaculation" task.

performance to customer

Performance date of the transport underway are submitted to the customer.

performance from transport industry

Performance date of the transport underway are submitted by the transport industry.

precaculation

ProShip -internal flow to inform the "control" process.

precaculation for customer

ProShip-internal flow to inform the "control" process.

precaculation framework

Derived from the history administration this data flow contains some "average" or "expectation" values for precaculatory purposes.

schedule

ProShip -internal flow from “additional tracking planning / scheduling” process to the commitments administration.

scheduling

ProShip -internal flow from “additional tracking planning / scheduling” process to the “control” process.

4.9.5 Generic ProShip Specification

ProShip will be delivered as a toolbox that allows the providers in the scenarios to realise a specific ProShip application. The applications for each scenario are very different so the ProShip toolbox has to support its functionality in a very flexible way.

Flexibility does not mean that the toolbox is configurable and after configuration you get a ready to run application, but it means that the functionality of ProShip is divided into many small pieces and the providers are able to put this pieces together in the way they needed. For example one provider may find bookings by the partner dates while another provider wants to find bookings on their destination port. So ProShip supports the providers with functionality's to search for partners, ports and bookings in multiple ways. The ProShip toolbox gives some restrictions like what data contains a booking, or what data is needed to store a booking, but it's very flexible in the way combining the functionality of the small pieces. The providers in the scenarios are responsible for the realisation of the application using the ProShip toolbox and they also have to add the scenario specific functionality's if necessary.

The ProShip application creates and manipulates data, which must be stored. Therefore the ProShip toolbox encloses a SQL database, that is provided in form of database scripts for certain SQL servers like the Microsoft SQLServer. It's not possible to provide scripts for every SQL server, because many servers have their own dialect of the ANSI SQL syntax.

The functionality's of the ProShip toolbox will be realised in an object oriented way. That means the toolbox provides its functionality's as a bunch of classes and their methods. Object oriented developing is a very good technique to realise the toolbox, because:

- modern specification methods which are mostly object oriented can be used.
- it is very simple to use an interface definition language, like OMG IDL, to specify the interface of the ProShip toolbox. With such interface description it's also obvious to use Corba which is an upcoming standard in object oriented communication.
- the design of the toolbox supports information hiding. So it allows the information representation to be changed without other extensive system modifications.
- the providers in the scenarios can derive their own classes from the toolbox classes and add their individual needs for each class.

To adapt ProShip to the scenario specific needs the providers have to make a detailed specification of the ProShip application for their scenario. So they need to know all differences between the needed functionality and the supported functionality of the ProShip toolbox, before they start to realise the application. If any functionality is missing in the toolbox, the providers can add this functionality by derivation a new class of the corresponding toolbox class. Otherwise they have to build the user interfaces for the application that calls the toolbox class methods or the derived classes and their methods in the right order.

The picture below shows the assembly of a ProShip application. The ProShip toolbox with the underlying SQL database is shown in a grey box. The classes that provide the functionality of the toolbox are divided in two areas:

- the database access layer, which is responsible for storing, loading and manipulating the data that is created by ProShip application.
- the calculatory framework, which is needed for calculation and analysis of the data delivered by objects of the database access layer.

Above the toolbox is the adaptation of the toolbox classes to realise a specific ProShip application. While the ProShip toolbox is generic, here one can find the scenario depending differences of the realised ProShip application. At the top of the application is the ProShip interface that is mostly an interactive user interface, but could also be a gateway to another application.

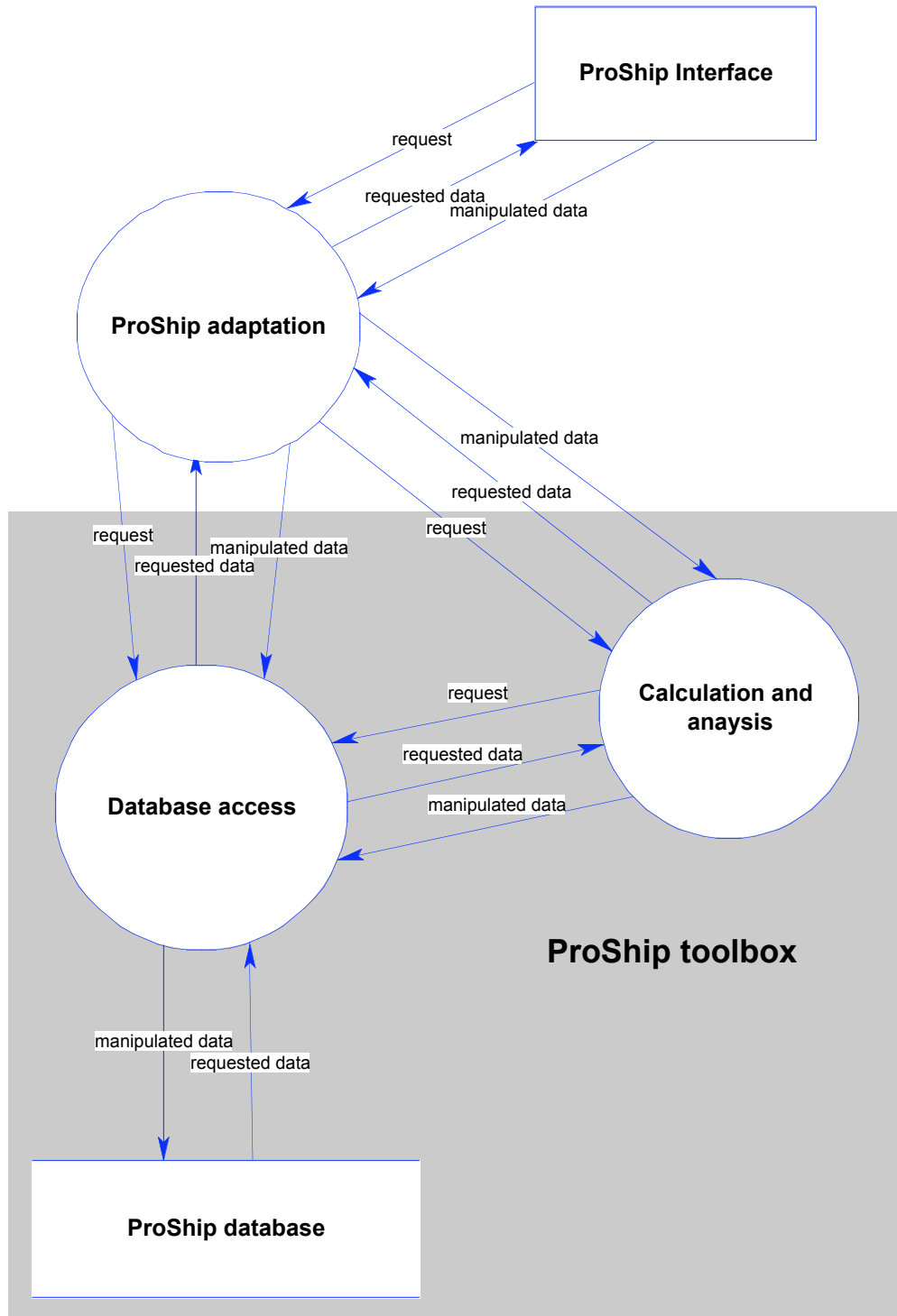


Figure 4-9: Structure of ProShip Application

4.9.6 The database access layer

The database access layer supplies all functions to store, load and manipulate data in the ProShip database. The providers do not have to write SQL commands, because the database

access is realised by appropriate methods in corresponding classes. The encapsulation of the direct database access through equivalent classes provides secure data exchange, because the access can be controlled depending on the user rights and state. For example a customer is not allowed to see offers that are given to other partners.

All database related classes will be derived from one parent class which provides basic database access functionality's like:

- open query
- close query
- save data set
- delete data set
- get first data set
- get next data set
- get previous data set
- get last data set
- get result set count
- ...

Derivation from one class has the advantage, that each child class has the same methods to store, load and manipulate data in the ProShip database. The classes supply an easy handling of the related data, e.g. the functionality for insert and update and the generation of a unique key are implemented in the „save” method. So the providers in the scenarios do not have to care about the data management, they can abstract from the realisation and concentrate on the problem.

The child classes add their specific functionality to realise specific needs and to implement the dependencies between the classes. For example a class „booking” implements methods to find all bookings for a given „partner” and to get other booking relevant data like the port of loading (pol) or the port of discharge (pod). The dependencies between booking, partner and ports will be realised by reference identifiers (short „refid”) which are unique keys implemented as integer values. Another possibility to realise dependencies between the objects is that each class provides methods that instantiate the depending objects. For example a class „booking“ can have a method „get_port_of_discharge“ which gives an object of the class „port“ back, representing the port of discharge.

The dependencies between the classes correspond with the references in the underlying database, but not every table in the database will be depicted in an equivalent class. Some classes will access two or more tables, e.g. to support analysis, history or validation. These classes must be identified on the needs in each scenario, because not every join can be supported by the ProShip toolbox by default. That's why the specification of the ProShip toolbox must be done in close co-operation with the providers in the scenarios.

The following example gives an impression about the implementation of the classes in the database access layer. In this example the prototypes for the classes „partner”, „booking”, „bookingposition” and „port” are shown. Their parent class „database_access” realises the common functionality’s and handle the user dependent access on the data.

```
class database_access
{
public:
    void open_database (char* database,
                        user,
                        password);
    void close_database (void);
    void open_query (void);
    void close_query (void);
    void save_data_set (void);
    void delete_data_set (void);
    virtual void search_data_set (void);
    void get_first_data_set (void);
    void get_next_data_set (void);
    void get_previous_data_set (void);
    void get_last_data_set (void);
    int get_result_set_count (void);
    ...
private:
    int primery_key;
    void set_sql_commands (char* select,
                           insert,
                           update,
                           delete);
    void set_primery_key (int primery_key);
    int get_pimery_key (void);
    int generate_unique_key (void);
    ...
}
```

```
}

class partner : public database_access
{
public:
    // method for the initialization of the instance variables
    void initials (void);
    // implementation of the search method
    void search (void);
    // methods to access the partner data
    void get_name (char* name);
    void get_street (char* street);
    void get_zipcode (char* zipcode);
    void get_city (char* city);
    void get_country (char* country);
    void get_telephone (char* telephone);
    void get_facsimile (char* facsimile);
    ...
    void set_name (char* name);
    void set_street (char* street);
    void set_zipcode (char* zipcode);
    void set_city (char* city);
    void set_country (char* country);
    void set_telephone (char* telephone);
    void set_facsimile (char* facsimile);
    ...
    // methods to access the reference identifiers
    void set_partner_refid (int refid);
    int get_partner_refid (void);
    ...
private:
    ...
```

```
}

class booking : public database_access
{
public:
    // method for the initialization of the instance variables
    void initialize (void);
    // implementation of the search method
    void search (void);
    // methods to access the booking data
    void get_reference (char* reference);
    void get_booking_date (date booking_date);
    void get_ship_date (date ship_date);
    ...
    void set_reference (char* reference);
    void set_booking_date (date booking_date);
    void set_ship_date (date ship_date);
    ...
    // methods to access the reference identifiers
    void set_booking_refid (int refid);
    int get_booking_refid (void);
    void set_partner_refid (int refid);
    int get_partner_refid (void);
    void set_port_of_loading_refid (int refid);
    int get_port_of_loading_refid (void);
    void set_port_of_discharge_refid (int refid);
    int get_port_of_discharge_refid (void);
    ...
private:
    ...
}
```

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```
class bookingposition : public database_access
{
public:
    // method for the initialization of the instance variables
    void initialize (void);
    // implementation of the search method
    void search (void);
    // methods to access the bookingposition data
    void get_number (int number);
    void get_name (char* name);
    void get_volume (float volume);
    void get_rate (float rate);
    ...
    void set_number (int number);
    void set_name (char* name);
    void set_volume (float volume);
    void set_rate (float rate);
    ...
    // methods to access the reference identifiers
    void set_bookingposition_refid (int refid);
    int get_bookingposition_refid (void);
    void set_booking_refid (int refid);
    int set_booking_refid (void);
    ...
private:
    ...
}
```

```
class port : public database_access
{
public:
    // method for the initialization of the instance variables
```

```
void initialize (void);
// implementation of the search method
void search (void);
// methods to access the port data
void get_code (char* code);
void get_name (char* name);
void get_country (char* country);
void get_x_koordinate (int x_koordinate);
void get_y_koordinate (int y_koordinate);
...
void set_code (char* code);
void set_name (char* name);
void set_country (char* country);
void set_x_koordinate (int x_koordinate);
void set_y_koordinate (int y_koordinate);
...
// methods to access the reference identifiers
void set_port_refid (int refid);
int get_port_refid (void);
...
private:
...
}
```

Beside these classes there are many other classes like „voyage“, „voyageposition“, „transport_vehicle“, „unit“, „person“, „tarif“ and „currency“, which are also child’s of the class „database_access“. But with the few classes above it’s possible to specify a small application for demonstrating the toolbox. The example may solve the following problem:

1. A partner with name „demo partner“ located in „berlin“ should be found.
2. The telephone number of the partner should be changed.
3. All bookings for the partner should be found which have their port of loading in „bremerhaven“.

To do the first exercise an instance of the class „partner“ must be created. After this the known data can be set by the corresponding methods before using the „search“ method to find the requested partner data. After the data is found the second practice will be done by setting new data and saving it with the adequate methods. For the last task it's necessary to find the port of loading. So an instance of the class „port“ is needed, where the known data can be set and the entry can be searched. If the port is found, an instance of the class „booking“ must also be created where the partner reference and the port reference can be set. The last step is to search for all bookings, that match the references, using the „search“ method. An implementation of the described solution can be seen below.

program demonstrator

```
{
...
// declaration
partner obj_partner;
booking obj_booking;
port obj_port;
...
// initialization
obj_partner.initialise;
obj_port.initialise;
obj_booking.initialise;
...
// 1st step - the partner should be found
obj_partner.set_name("demo partner");
obj_partner.set_city("berlin");
obj_partner.seach;
if obj_partner.get_result_set_count == 1
{
// 2nd step - exactly one partner is found, now the telephone number
// should be changed and stored in the database
obj_partner.set_telephone("0123-456789");
obj_partner.save;
// Now the port of bremerhaven must be found
```

```
obj_port.set_name ("bremerhaven");
obj_port.search;
if obj_port.get_result_set_count == 1
{
// 3rd step - all bookings for the partner and the port
// should be found
obj_booking.set_partner_refid (obj_partner.get_partner_refid);
obj_booking.set_port_of_loading_refid (obj_port.get_port_refid);
obj_booking.search;
...
};
...
};
...
};
```

This is a very simple example and does not pay tribute to the capabilities of ProShip and its toolbox, but it's a good example to show the usage of the toolbox.

In difference to the example the class methods to access the instance data may group the data, e.g. the "partner" class can have a method "get_address" which has the parameter "name", "street", "zipcode", "city" and "country". An other method "get_communication" can group the data for "telephone", "fax" and "email". The group specification will be done in close cooperation with the providers in the scenarios. So it's possible to design the ProShip toolbox on the customer needs.

The whole database access layer will include about fourteen classes and more, that are all derived from the class „database_access". The figure below shows the well known classes in their hierarchical context. There will also be some additional classes that are used to realise the class methods, e.g. a „list" class. These classes are often recognised during the development process and are mostly not necessary for the providers in the scenarios. A full description of the classes in the ProShip toolbox and their methods will be delivered to the providers at the end of the development phase.

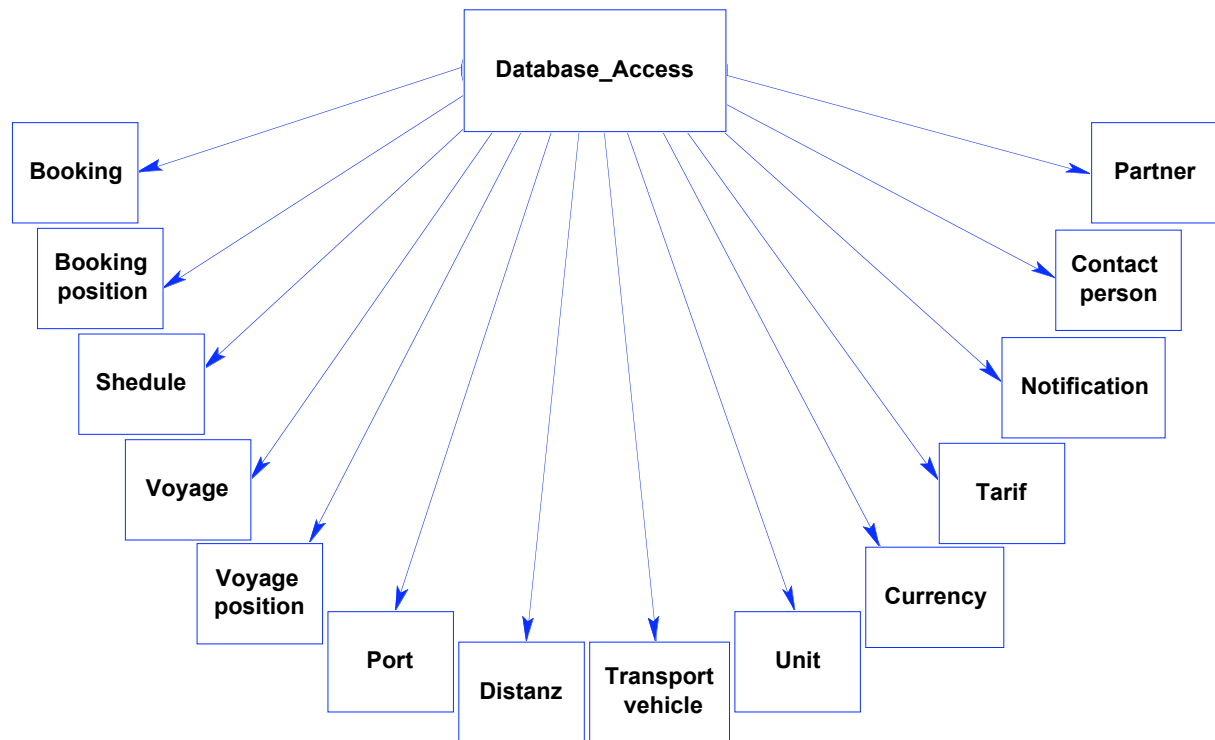


Figure 4-10: Classes of the ProShip Toolbox

4.9.7 The calculatory framework

The calculatory framework provides some classes which are independent from the underlying database. These classes are needed for calculation and analysis of the data, delivered by objects of the database access layer.

Most of the necessary classes and methods have to be identified in close co-operation with the providers in the scenarios, but there are also some classes that are needed to realise the idea of ProShip. As described ProShip consists of the six modules „Precalculation of Alternatives“, „Administration of Receiving Commitment“, „Administration of Giving Commitment“, „Performance Control“, „Additional Tracking and Scheduling“ and the „History“. All these modules have to be supported with adequate classes and methods, that allow calculating and analysis. Some of the needed classes were identified and shown in the following list:

- booking history: A class „booking_history“ gives information about historical bookings. So one can see what enquiries were asked, what offers were made and what were the finally commitments. The class has some methods to compare the enquiries with the related offers and commitments. This class can be used in the modules „History“ and „Administration of Giving Commitment“ to view the booking behaviour of the partner or get some other information from historical bookings.
- voyage history: A class „voyage_history“ gives some information about voyages for performance control. So it is possible to see if a voyage was performed right in time or if

any deviation occurred. This class has also some methods to prove the quality and reliability of each voyage, depending on its historical processing. That's why the class is especially needed for the modules „History“ and „Performance Control“ to support further planing.

- transport optimisation: A class „transport_optimisation“ allows to optimise an requested transport on certain parameters. So this class has some methods to find a best way, may be the shortest, the fastest or the cheapest way. This class also allows to find a route built on different transport vehicles, like vessel, truck or train. The class is necessary to support the module „Precalculation of Alternatives“, to get alternative transport ways.
- expensive and earnings calculation: A class „price_calculation“ is designed to calculate the prices of a voyage, e.g. used in the precalculation of alternatives. The methods of this class allow the calculation across different currencies and supports also the „Euro“. The class will support to calculate the expenditure and the benefit of a voyage. So this class can be used in combination with the class „transport_optimisation“ to get the price of a voyage or it can be used in the module „Additional Tracking and Scheduling“ to view the benefit of a voyage.

The usage of these classes depend on the respective scenarios, because one ProShip application can be realised to support only the customers, who should not see the benefit of a voyage. Another application may be realised to support the transport industry who want to see their benefit.

In general the definition and specification of the classes provided in the ProShip toolbox is an assignment that must be done in co-operation to the scenario providers. So the next step in the development phase is to identify all needed classes with their methods and to discuss them with the respective service providers.

4.9.8 Analysis of the ProShip Data Model

Based on the experiences made in BOPCom, the generic database model for the communications database developed there was analysed as a first approach to the ProShip data base. Figure 4-11 shows the main entities used there.

The BOPCom data model was designed in a rather generic way: it was reduced to basic entities like resource, partner, document, etc. which find correspondent objects nearly everywhere in transport business. Remaining entities are then derived from those parent entities by adding children entities (or objects, to speak in an object oriented way). One example for this is the basic entity document, which precedes its children's booking, avis, confirmation etc.

This is very advantageous if changes to the data model have to be made, because they normally lead to the generation of a new child entity without effecting the rest of the data model. One disadvantage may be that for search statements sometimes a large number of database tables has to be searched, leading to performance losses. The ProShip data model bases on the experiences made in BOPCom. Starting from the generic model the ProShip data

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model concentrates on the entities needed as compiled from the user requirements survey. Also the depth level of succeeding child entities was limited due to performance reasons. The result is the data model shown below.

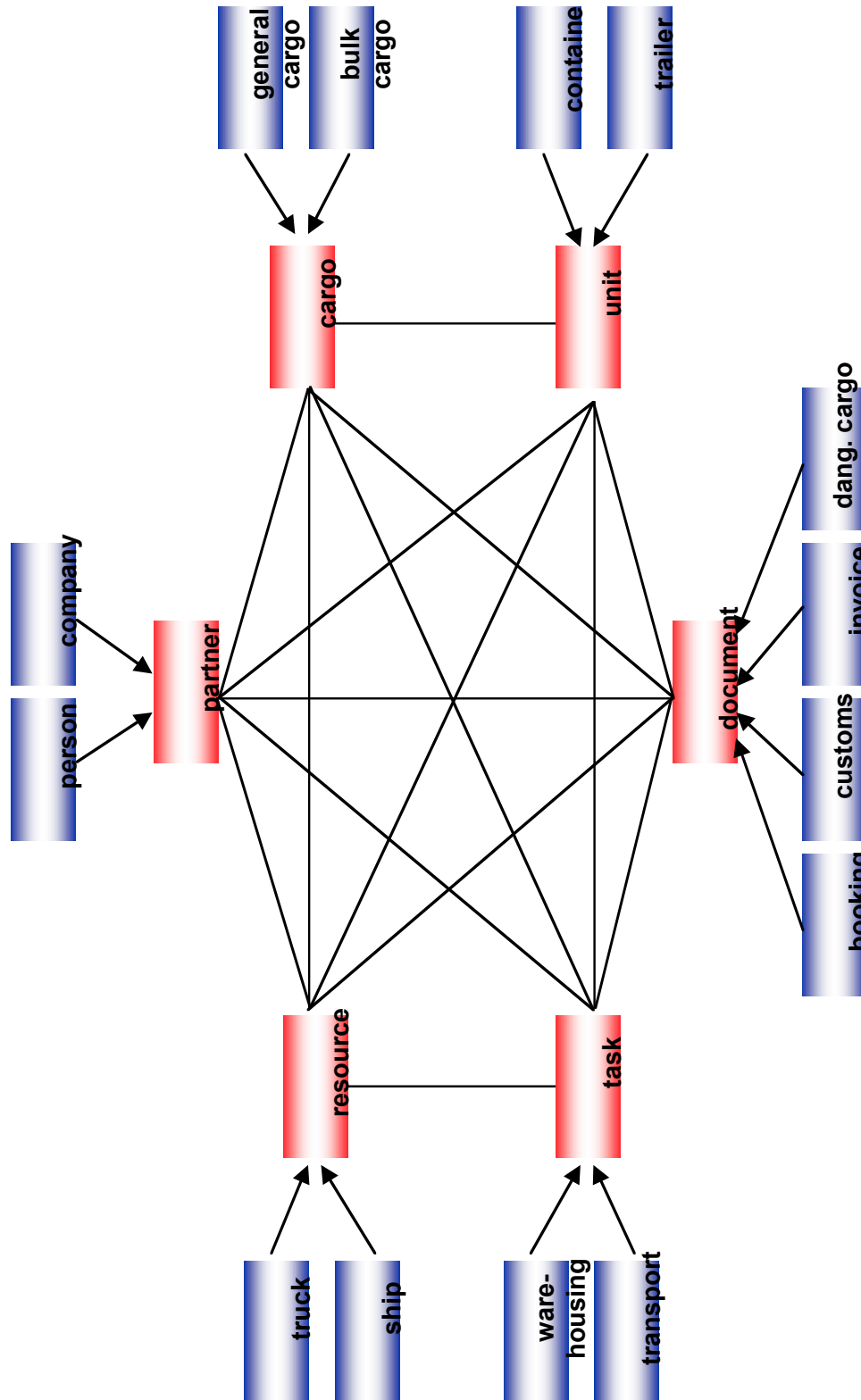


Figure 4-11: Main Entities of the BOPCom Communications Data Base

4.10 Applications

As already mentioned in previous parts of this report, PPROSIT contains a migrational and a development part within the project. The migrational part of PROSIT is ref. to application and installation of the IM Interconnectivity Management within the various scenarios, the development part is ref. to the development of a toolset that enables to conduct and support business and acc. decisions electronically, dynamic and interactive.

PROSIT has developed its main results on three fields of applications:

1. IM Interconnectivity Management Installation
2. ProShip / Satellite communication and Visualisation
3. ProShip – Integrated Shipping Software Development

4.11 IM Interconnectivity Management Installation

The IM toolbox was installed in the following partners premises. IM toolbox installations are described acc. to the scenarios.

Rhine-north Sea Scenario

Here, IM is utilised for EDI purposes and for tracking and tracing usage.

EDI is executed between the Cuxhaven terminal operator CUXPORT and their customer, the Danish shipping line DFDS. This connection was implemented by using the EDIFACT message IFCSUM. This message has been mapped and implemented in the scenario with the resp. partners.

EDI is also executed between the German SSS and Sea River operator RMS in Duisburg and their UK counterpart, RMSG in Goole. Here loading data, stock reports and manifests are transferred between the two locations. This connection has been implemented by usage of a message standard self-developed by RMS.

Additional, the IM toolbox is used for transferring data from the French satellite system provider CLS to the Satellite tracking module within PROSIT. This application is concerning the partners RMS in Duisburg, RMSD in Goole/UK and Pohl Shipping in Hamburg.

Finland-Rhine Scenario

Within this scenario, the IM toolbox has been applied in several specific business scenarios. Those are mainly similar to the Rhine / North-Sea Scenario. Reason for mentioning them here as well is that these tools are accessed by multiple users and integrated into various business scenarios. The implementations are concerning satellite tracking and tracing modules that are

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used by partners in Finland, esp. with reference to trade between Southeast Finland and Central Europe.

Mediterranean Scenario

Major outcome of the med. scenario is a foundation for an integrated shipping management application, that is internet based (accessible via the web) and open for additional components, users and developments. This development was performed with a toolbox, which mainly is a result of the PROSIT project.

Baltic Scenario

Within the Baltic scenario, several partners have benefited from the IM deployment. By means of IM it became possible to interconnect the German car manufacturer Volkswagen and the PROSIT partner LHG (Lübeck Port Operator). Meanwhile, LHG is receiving 35 messages a day. The data transfer was enabled based on a standard EDIFACT message. Within this specific application, EDI also reduced the number of misprints and failures due to manual mistaking, significantly.

4.12 ProShip / Satellite communication and Visualisation

Basic attempt of PROSIT was to generate an improved, modified way of conducting business within the Short Sea and Inland Shipping operations in order to attract more cargo to waterborne transportation modes. To achieve this goal, several business processes have to be modified and renewed. Entirely, this is of course a long lasting process, that a R&D project can not manage at all. But R&D can moreover show, that business processes and models can be changed and modified in generic areas, where they can serve as example for other areas of business. The following figure shows this basic attempt of the PROSIT project, as well as all the possible scenarios for applying advanced IT technologies in each business case.

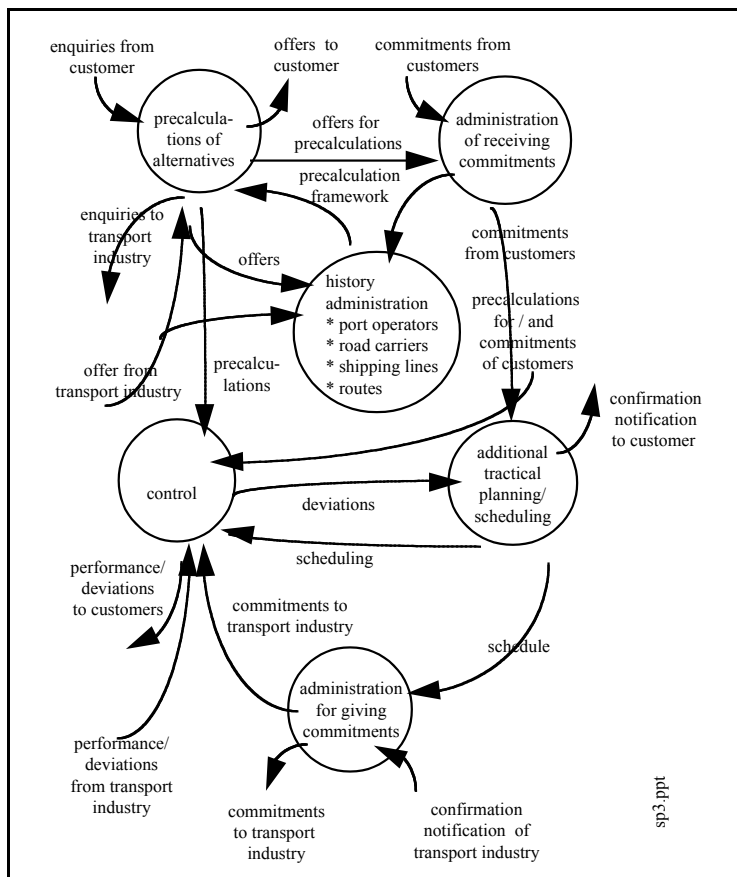


Fig. 4-12: The internal functionality of the brokerage and control software

Taking these opportunities into account, it seemed quite logical to develop certain fields where PROSIT modules could be applied. Consequently, it was decided to proceed with the following standard business scenarios within the single business scenarios of PROSIT:

4.12.1 Shipping Price Request (Rhine North Sea Scenario)

Price Requests are THE central part of all maritime transportation companies business, quoting rates and negotiating prices and tariffs is the most focal point within shipping. Consequently, a price requesting module was developed within the Rhine-North Sea Scenario.

4.12.2 Business Negotiations (Med. Scenario)

As mentioned before, requesting tariffs and negotiating prices is the central point of interest for all companies in shipping. Nearly as vital as querying prices and tariffs is the process of booking (this ensures the shipping company that their capacity is sold) and the process of confirming the booking (this ensures the customer that his cargo will be shipped). In order to mirror this entire process, an application was developed to be applied within the med. scenario. As the application is web based, all customers can access the system via the internet and conduct business with the shipping company.

4.12.3 Empty Capacity Cargo Matching (Finland Rhine Scenario)

A continuous problem in shipping (and this is esp. Short Sea Shipping and Inland Waterway Transport) is the non-optimised usage of the existing capacity. While airline have started to sell stand-by tickets on the one hand and to overbook their flights on the other hand in order to cope with this problem, such an approach can not be used within shipping due to the nature of the goods transported and the exchangeability of the service. The problem of non sufficient used capacity is esp. concerning vessels employed in liner trade, where a fixed schedule is to be kept. Attracting customers to Short Sea Shipping is on the other hand to a very large extent tied to offering customers a regular schedule.

In order to proceed with this specific problem of Short Sea Shipping, a module was developed that is able to exchange and match cargo and empty capacity acc. to a variety of criteria's. Again, this application is internet based and is by that allowing the customers and ship operators to access it from wherever an internet connection is available.

4.12.4 Quality Control (Rhine North Sea / Finland Rhine)

One of the major obstacles for Short Sea and Inland Waterway operators is the circumstance that cargo transported by waterborne transport modes is suffering from complete „disappearing“ while the transport is being executed. Once cargo has departed from a shippers plant or place towards its destination, the traceability and predictability of the cargo becomes important. The more freight volumes are increasing, the more it becomes important to monitor the cargo and its status on its way. The demand for such services is increasing continuously and will certainly gain influence on shippers transport mode and service supplier decision in the near future. Consequently, a central approach within PROSIT was devoted to the satellite based tracking and tracing of cargo in order to gain information about the estimated time of arrival (ETA) and current status of the transport.

Within PROSIT, the cargo tracking problem was approached by tracking the vessel as this was the most appropriate way of solving this problem in the beginning.

4.12.5 Dangerous Cargo Management

Within the maritime transport, handling dangerous cargo is becoming increasingly important. As Short Sea Shipping within European Maritime Transport very often concerns RoRo or containerised traffic, the handling of dangerous cargo becomes additional relevant as transfer time is very short and any emergency requires immediate action from the relevant authorities. Needless to say that this situation requires a state of the art provision with adequate information in real time.

Not too many national authorities have yet developed the skills necessary to meet these requirements. It does not require very much imaginative skills to figure out what might happen, if a real disaster happens due to insufficient information available on dangerous cargo loaded on a vessel.

In order to overcome this threat, PROSIT developed an advanced information system for announcing, notifying, verifying as well as administrating information on dangerous cargo in the Port of Lübeck.

4.13 Application Samples

4.13.1 Shipping Price Request (E-tariff)

4.13.1.1 Principle

The Shipping Price Request starts with the basic step of identifying rates and tariffs, that are taking place in almost every transportation transaction. One of the major problems for intermodal transport is (beside the necessary additional transshipment action) that a comparison between different tariffs for certain modes most often is impossible due to different structures of underlying information. Aim of this module was to combine several tariff structures in order to make various modes comparable. For the time being this goal has been achieved as to the modes of truck and rail services, an integration of barging is the next step planned.

E-tariff is again designed and developed as web application where users can log in and by giving ZIP codes determine transportation alternatives and their resp. costs. In PROSIT, E-tariff has been developed for a container carrier that is mainly focussed on hinterland transport of containers using all modes (truck, rail and barges). The system is consequently open to be used for all possible transportation areas as well. Major concerns with enabling internet based rate requests are always referring to security aspects and related questions. In order to overcome these concerns, E-tariff was realised with a dedicated security concept. Based on a LINUX server / Apache Web server concept, a firewall (Packet filters and screening tools) and a Cisco Router (Supplies Internet Connectivity) the system is accessed especially by those customers that generate high volumes of requests and queries.

4.13.1.2 Screen Examples

(Please note: Some applications do apply in German language as most of the customers and users prefer german as main working language. Those applications concerned can of course easily be transferred to any other language)

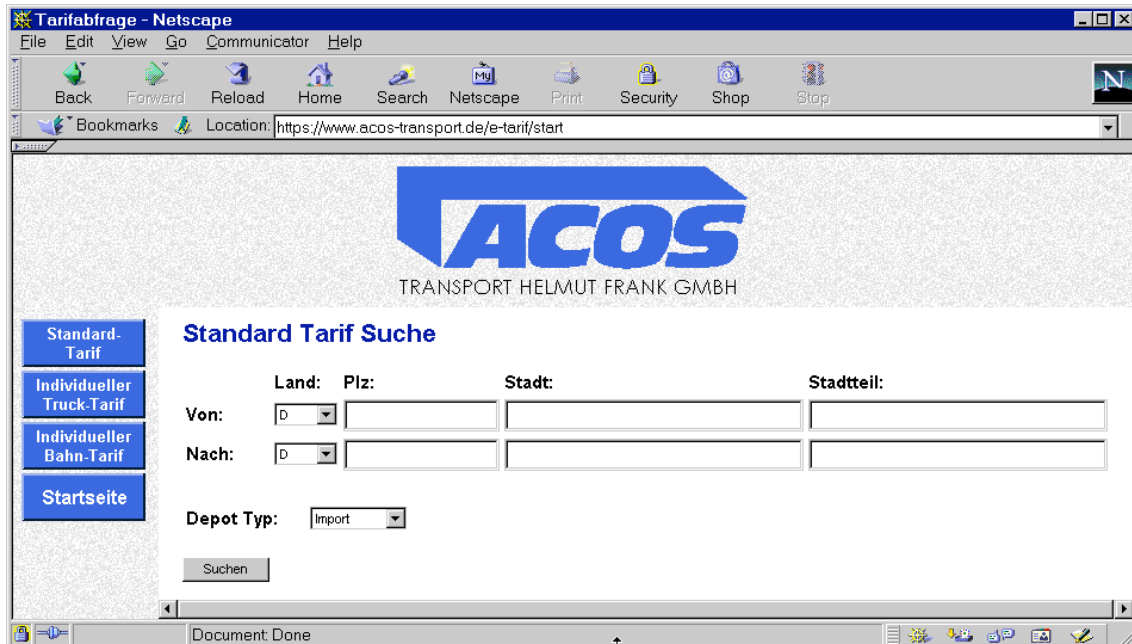


Fig. 4-13: Opening Screen for querying Tariffs

Standard-Tarif

Standard query mask for a container transportation from A to B

Individueller Truck-Tarif

Tariff for a container transport starting from A via one (or various) specific locations by truck

Individueller Bahn-Tarif

Tariff for a container transport from A to B by standard rail service

Startseite

Home page

Land:	Plz:	Stadt:	Stadtteil:
Von: <input type="text" value="D"/>	<input type="text" value="28197"/>	<input type="text" value="Bremen"/>	<input type="text" value="Neustädter Hafen"/>
Nach: <input type="text" value="D"/>	<input type="text" value="21129"/>	<input type="text" value="Hamburg"/>	<input type="text" value="Waltershof"/>
Depot Typ: <input type="text" value="Import"/>			
<input type="button" value="Suchen"/>			

Fig. 4-14: Standard tariff request

Truck Tarif					
Tripart	Entfernung	Depot	DC20 leicht	DC20 schwer	DC40 voll
One Way	121 KM	ACOS - Terminal Hamburg	<input type="text" value=""/>	<input type="text" value=""/>	<input type="text" value=""/>
Round Trip	242 KM		<input type="text" value=""/>	<input type="text" value=""/>	<input type="text" value=""/>
Zuschlag		Betrag			
Imcozuschlag		<input type="text" value=""/>			
Multistop		<input type="text" value=""/>			
T 1 Erstellung		<input type="text" value=""/>			
Wartezeiten (je angef. 1/2 Std.)		<input type="text" value=""/>			

Fig. 4-15: System response standard truck tariff

Bahn Tarif						
Tripart	Über	DC20 leer	DC20 leicht	DC20 schwer	DC40 leer	DC40 voll
One Way		0.0 DM	0.0 DM	0.0 DM	0.0 DM	0.0 DM
Round Trip		0.0 DM	0.0 DM	0.0 DM	0.0 DM	0.0 DM
Zuschlag		Betrag				
Wörth		<input type="text" value=""/>				

Fig. 4-16: System response standard rail tariff

The problem of administrating and collecting base data for the system is solved by a dedicated part within E-tariff.



Fig. 4-17. E-Tariff Data Administration Screen

4.13.2 Business Negotiations

4.13.2.1 Principle

Container transportation in the Mediterranean sea is the main content of the scenario. This operation involves, except from physical entities of the ship and the cargo, and another entity which is the container itself that raises the complexity of an administration system. Here, a simplified Mediterranean scenario is presented that describes part of Sarlis Container Services operation through a number of forms which includes, the consignee side who is in control of transporting the goods and makes the inquiry for services to Sarlis & Agelopoulos LTD (S&A) agency, the SCS shipping line responsible for the transport by sea, and the S&A who acts as the SCS agent in Piraeus.

Aim of the application developed here was to ease and facilitate communication processes taking place between shipping company and agent and consignor. These processes are very time consuming and moreover often transmitting redundant information.

Taking these requirements into account, only an internet based application seemed to be a suitable solution. Additional requirements were raised by the fact, that hardware and connectivity requirements should be very modest in order to ensure a reliable, stable and fast service of the requests that are expected. Considering these assumptions, a combination of Web application and e-mail supported communication tools was developed and implemented in PROSIT.

4.13.2.2 Screen Examples

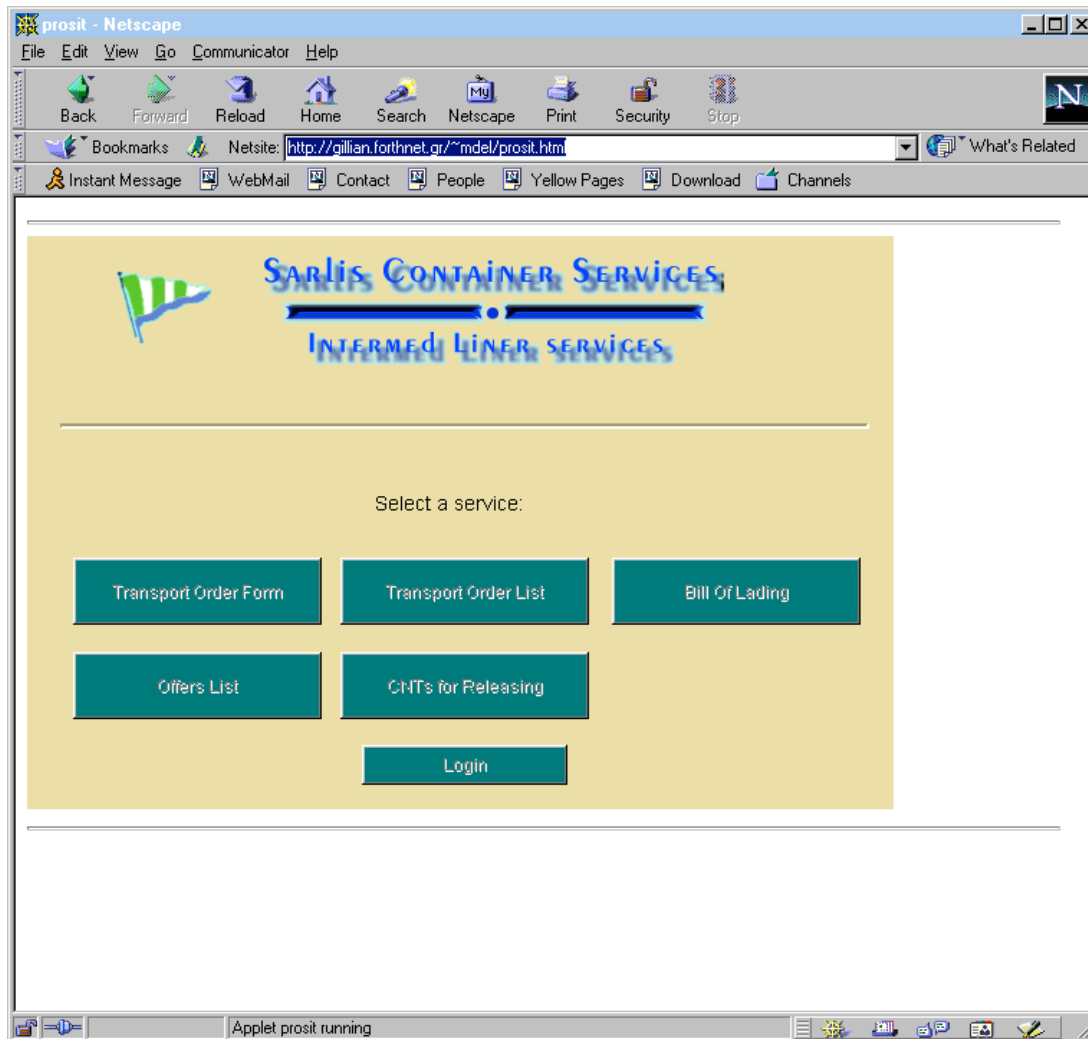


Fig 4-18: Main Menu

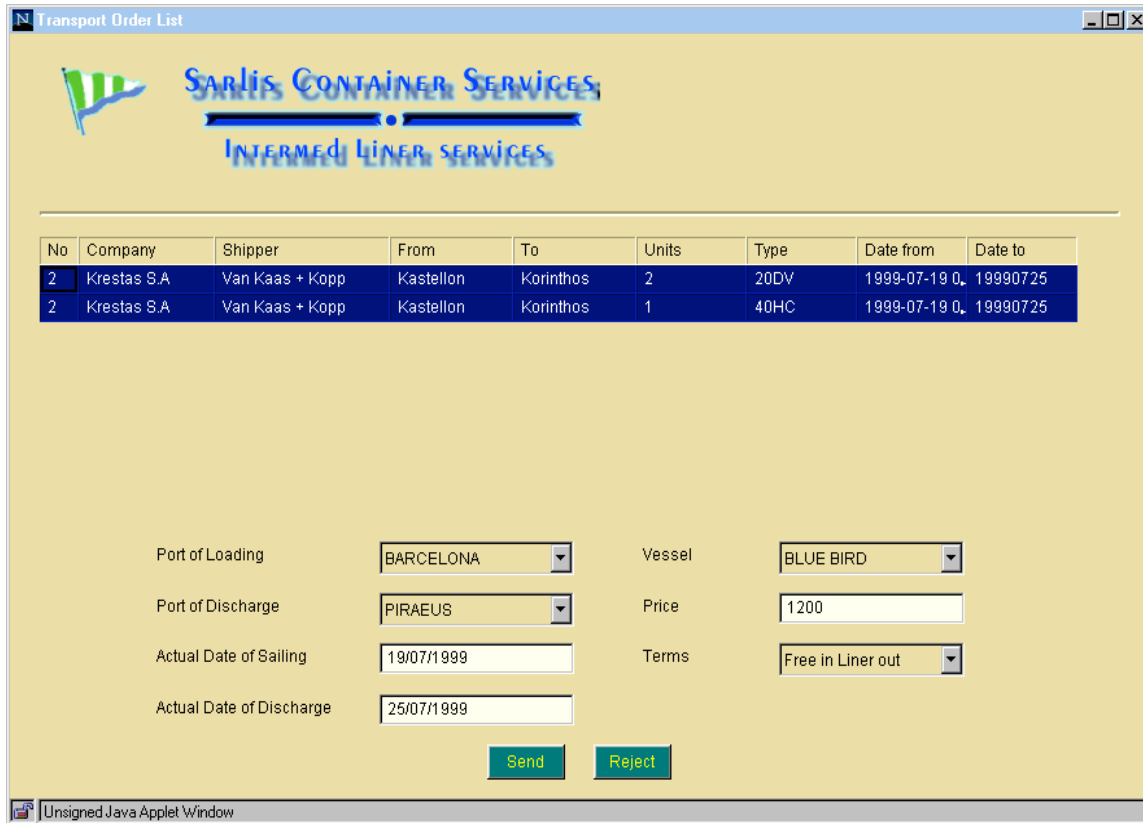


Fig. 4-19 : Editing the transport order and list and creating an offer



Fig. 4-20: Consignee accepting / rejecting an offer from agent

The previous screens have shown the business negotiation process until the deal is closed. Following screens will show how business is conducted further on within the system.



Fig. 4-21: Shipper preparing Bill of Lading: selecting an offer by choosing its reference no.

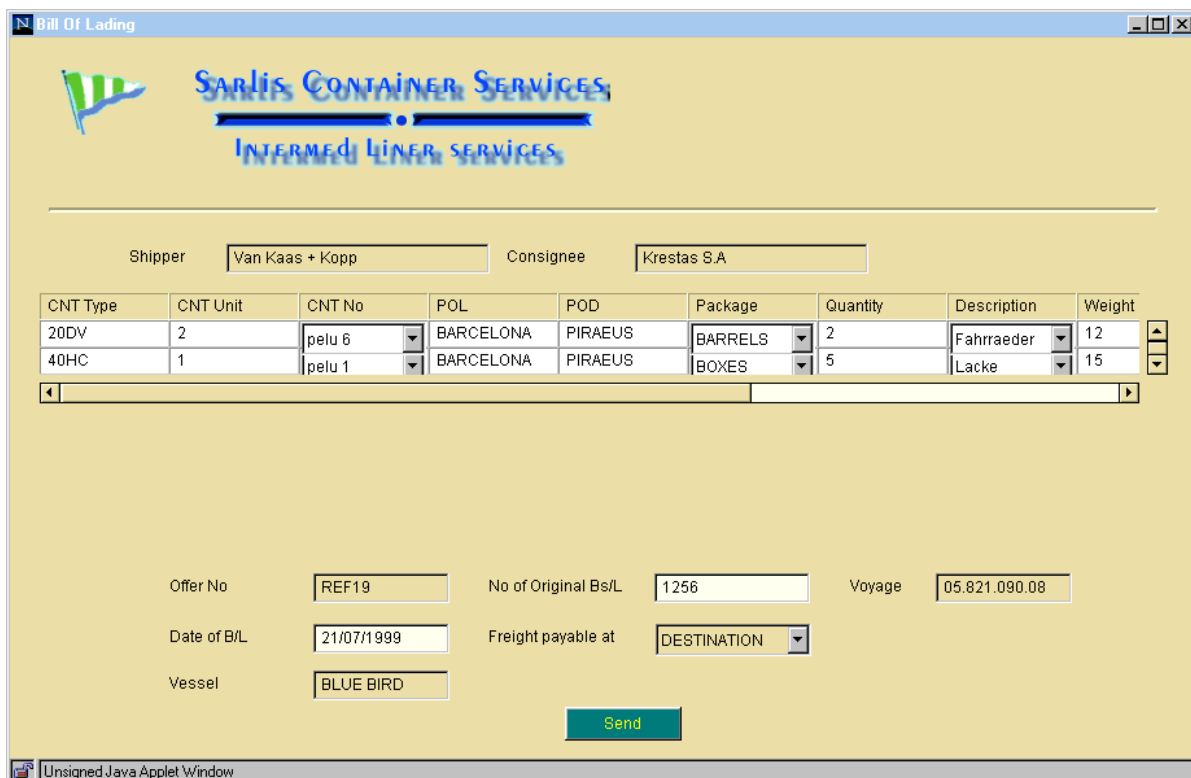


Fig. 4-22: Shipper preparing Bill of Lading (B/L): entering cargo details for sending B/L

After the B/L has been issued and printed by the system, containers that are ready to be released have to be administrated and steered within the system.

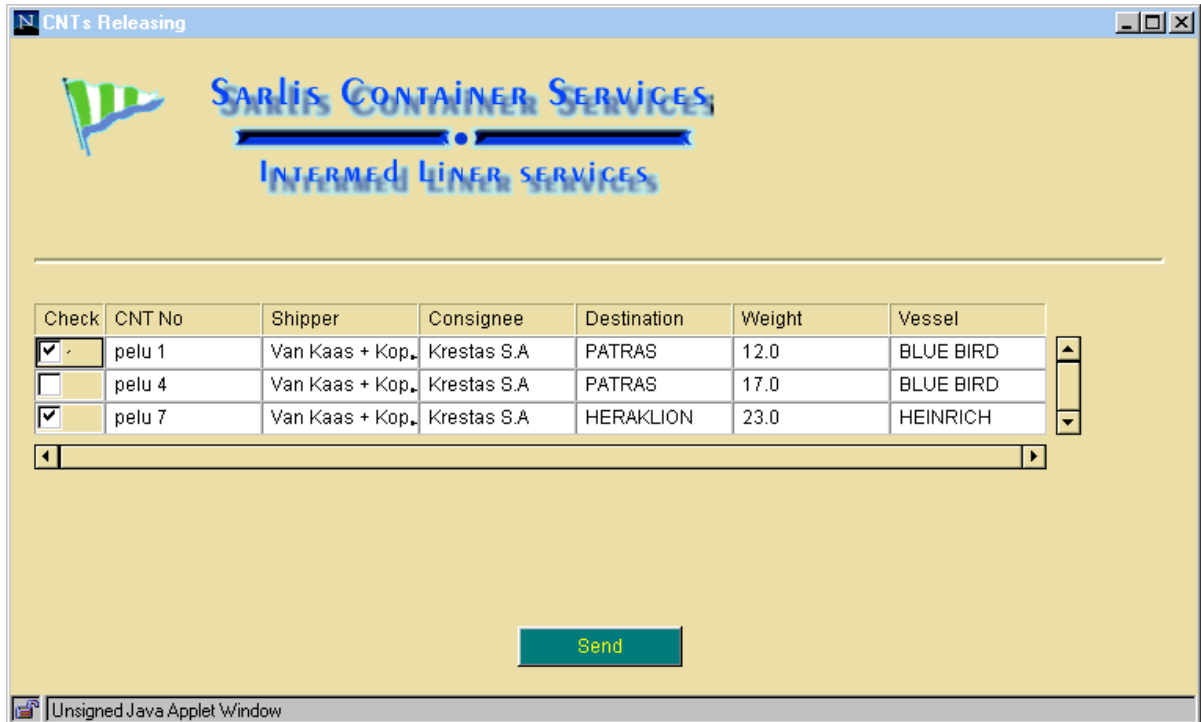


Fig. 4-23: Agent releasing containers

While the screens show one main part of this system, the other part is the communication taking place via e-mail.

The person who is responsible for the consignee’s requests logs into the system. He selects the first one in order to see the inquiries from the consignees and then he selects one request. He can select and reject an inquiry from a consignee who is notified by email for the rejection.

This email has the form:

Subject: Transport Rejection message

Dear Customer Krestas S.A
 There is a Transport rejection for you.
 Details:

Company	Shipper	From	To	Units	Type	Date from	Date to	
Krestas S.A	Van Kaas + Kopp	1999-07-19 00:00:00.0	Kastellon	19990725		Korinthos		2
Krestas S.A	Van Kaas + Kopp	1999-07-19 00:00:00.0	Kastellon	19990725		Korinthos		1

The consignee selects from the main menu the offer list and sees the offers done by his agents. He has to accept or reject an offer. Before that he must select one. If the consignee accept the offer, the agents, and the shipper (SCS) are informed by e-mail otherwise (if rejects) only the agent who made the offer is notified. The e-mail in case of acceptance for the agent looks like this one:

Subject: Offer Acceptance Message

Dear Agent G.A.P., there is an Offer Acceptance from Customer Krestas S.A with the Booking Reference: REF11.

Details:

Shipper	From	To	POL	POD	Vessel	Unit	Type	Price	Term	Pref
dt1	Actual	dt1	Pref	dt2	Actual	dt2				
Van Kaas + Kopp	kastellon	korinthos	BARCELONA	PIRAEUS	JESSICA					
1	20FR	230.0	Free in Liner	out	1999-07-19	00:00:00.0	1999-07-21			
Van Kaas + Kopp	kastellon	korinthos	BARCELONA	PIRAEUS	JESSICA					
2	40DV	230.0	Free in Liner	out	1999-07-19	00:00:00.0	1999-07-21			

When the consignee rejects the agent responsible for the offer gets the following message:

Subject: Offer Rejection Message

Dear Agent G.A.P., there is an Offer Rejection from Customer Krestas S.A with the Booking Reference: REF1.

Details:

Shipper	From	To	POL	POD	Vessel	Unit	Type	Price
Term	Pref	dt1	Actual	dt1	Pref	dt2	Actual	dt2
Van Kaas + Kopp	Barcelona	Heraclio	BARCELONA	PIRAEUS				
ENNO B	2	200T	1234.0	Full Liner	terms	1999-07-19		

For the shipper the corresponding notification for an offer acceptance is: (Notice that some fields that the shipper not interested in, as the price for the transport, are not announced to him)

Subject: Offer Acceptance Message

Dear Shipper Van Kaas + Kopp, there is an offer acceptance from Customer Krestas S.A (gfou@forthnet.gr) with the Booking Reference: REF8.

Please, log on to the System and check the Bill of Lading form

The scenario then involves the shipper (e.g SCS) who logs onto the system. Then, he selects an offer by using its reference number. The “Bill of Lading” (B/L) is ready for processing now and only the fields that should be filled in by the shipper are activated for security purposes. Finally, he submits the B/L, using the “send” button, so the agent, the shipper and the consignee is notified by e-mails that have the form:

Subject: Bill of Lading Message

Dear Agent G.A.P., there is a Bill of Lading for you
Details:

Shipper: Van Kaas + Kopp

CNT	Unit	CNT No	POL	POD	Package	Quantity	Description	
Weight	Freight	Seal	No From	To				
20DV	2	pelu	1	BARCELONA	PATRAS	PALLETES		4
Lacke	12	2	123	Barcelona	Peireas			
20TK	4	pelu	4	BARCELONA	PATRAS	BOXES		6
Heizoel	17	5	124	Barcelona	Peireas			

Offer No: REF2

Date of B/L: 19990721

Vessel: BLUE BIRD

No of Original Bs/L: 345

Freight Payable at: DESTINATION

Offer No: REF2

Voyage: 05.821.090.08

4.13.3 Empty Capacity Matching

4.13.3.1 Principle

The main content of this scenario is transportation of forest products (timber, paper, plywood) from the Lake Saimaa area via the Saimaa Canal to Central Europe with River-Sea vessels and smaller coaster tonnage. Main problem in transportation via the canal is beside of seasonal bottlenecks (Saimaa Canal is closed 4 months p. year) the fact that much cargo for waterborne transport can not be accessed and exploited at all. This leads to the circumstance that most of waterborne transport is concentrated on the major shippers (Forest and Paper Industry) while remaining cargo is being shipped via truck.

The application had to follow the business model which is applied within the shipping business. Considering this, confidentiality among the parties involved is a must. Thus the application had to be designed acc. to the requirements in Fig. 4-24.

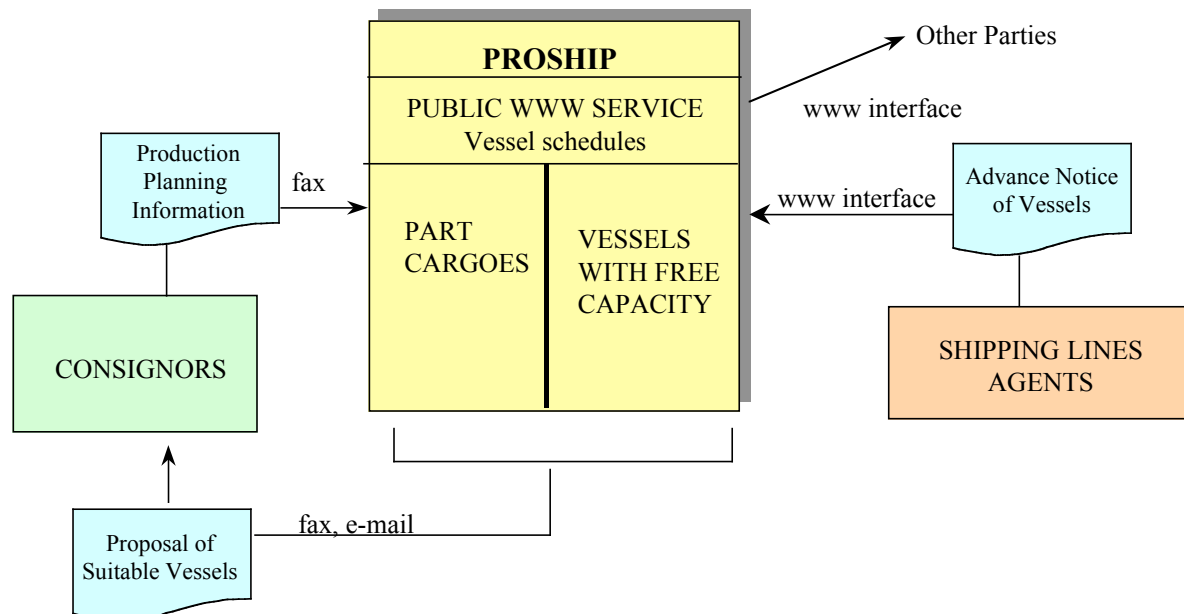
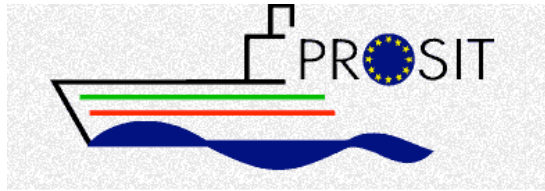


Fig. 4-24: Business Model within the Finland / Rhine Scenario

Requirements were met as shippers and shipping lines are acting in a kind of “closed shop”. Neither shippers nor shipping lines can “see” information other parties have inserted, only when a matching of cargo is managed from the system acc to predefined criteria, a notification on the opportunity is being transmitted (preferably via e-mail).

The application improves co-operation between shippers and shipping lines just by mirroring already existing behaviour patterns. Knowledge about voyages planned, a shipper can choose the voyage that best suits to his needs. Opposite, a shipping company can adjust their individual schedules to the amount and kind of inquiries.

4.13.3.2 Screen Examples



Welcome on the ProShip Homepage!
If you are an registered user please login.

User Name:	<input type="text" value="shipcomp"/>
Password:	<input type="password" value="****"/>
	<input type="button" value="Submit"/> <input type="button" value="Clear"/>

-
-
-
-
-

For testing purposes please use the following logons:

Shipping Company: user name = "shipcomp"
password = "test"

Shipper: user name = "shipper"
password = "test"

Fig. 4-25: Main Menu

Depending on the role of the user (shipper or shipping company), editing possibilities vary.

Vessel Information Search

Vessel name	<input type="text"/>
POL	<input type="text"/>
POD	<input type="text"/>
ETS from POL	<input type="text"/>
ETA to POD	<input type="text"/>
	<input type="button" value="Search"/> <input type="button" value="Clear"/>

Fig. 4-26: Vessel Information Search

Vessel Search

Vessel name	<input type="text"/>
Call sign	<input type="text"/>
Vessel type	LOLO <input type="button" value="v"/>
<input type="button" value="Search"/> <input type="button" value="Clear"/>	

Fig. 4-27: Vessel Research

The vessel related screens allow to edit, search and retrieve vessel specific information. If a shipping line is looking for part cargo, following screens is to be applied.

Part Cargo Search

POL	<input type="text"/>
POD	<input type="text"/>
Laydays	<input type="text"/> - <input type="text"/>
RFL date	<input type="text"/>
Valid until	<input type="text"/>
<input type="button" value="Search"/> <input type="button" value="Clear"/>	

Fig. 4-28: Part Cargo Search

The above search possibilities are completed with search functionality's for ports and partners (do not appear here).

4.13.4 Quality Control

One of the most serious concerns, customers have against waterborne transportation is in fact that their cargo disappears in a kind of „black hole“ with this mode of transport and surprisingly pops up again at the final destination. This seems quite anachronistic as topics like Supply Chain Management, International collaboration and shared working processes are taking place in a more and more networking economy. On the other hand, waterborne transport is far the cheapest, most reliable and environmentally friendly way of carrying cargo. Another key to ensure further success of waterborne transportation is therefore to be seen in transparent monitoring and supervising the transportation process. By means of satellite communication, this can be achieved at affordable costs and with more than sufficient results throughout the entire transportation chain.

4.13.4.1 Principle

Tracking vessels and visualising tracking information on a monitor is not an easy task, esp. when several parameters like cost restrictions, user friendliness and technical limitations as to reduced data transmission requirements have to be considered. Taking these restrictions into account, the following system was built and maintained during the project.

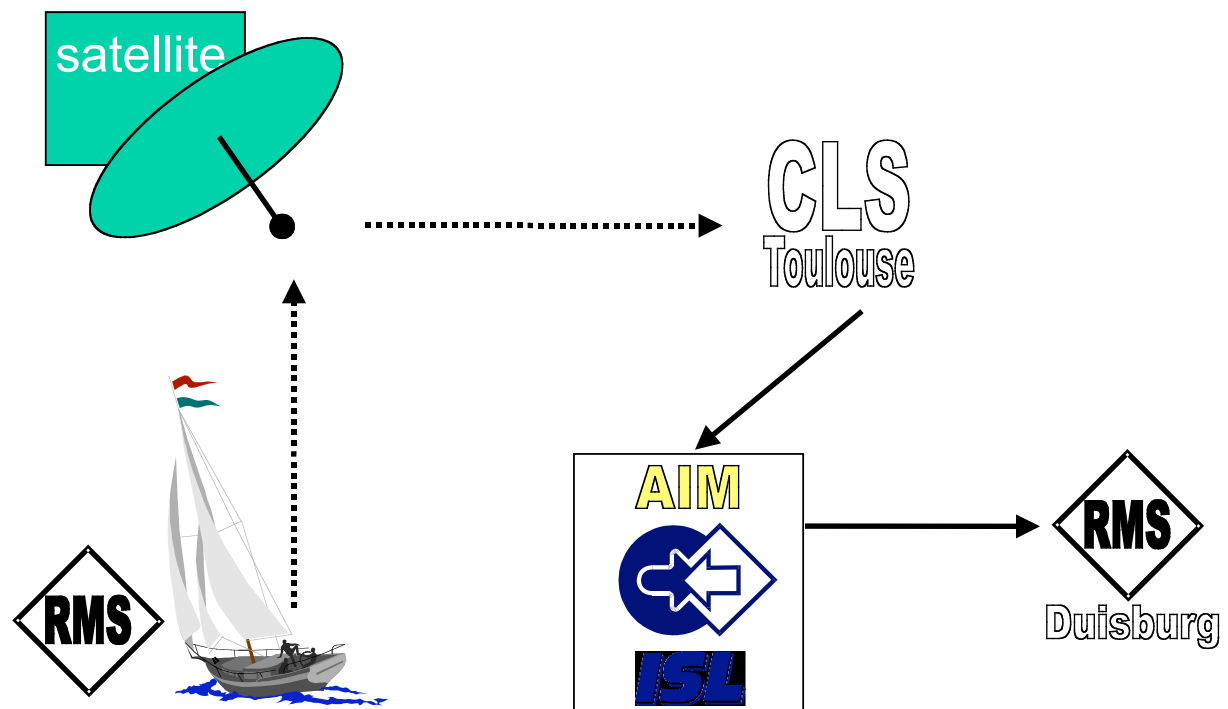


Fig. 4-29: Basic Principle of the ProShip Satellite Tracking System

The ProShip Satellite Tracking application makes vessel movements and current vessel positions visible. The purpose is to allow clients follow their cargo on its way at sea. During the project, five vessels were monitored in total.

4.13.4.2 Screen Examples

The application starts after successful login with the main window divided into a map area on the left showing Europe or parts of it and a configuration area on the right where you can define what the map shows:

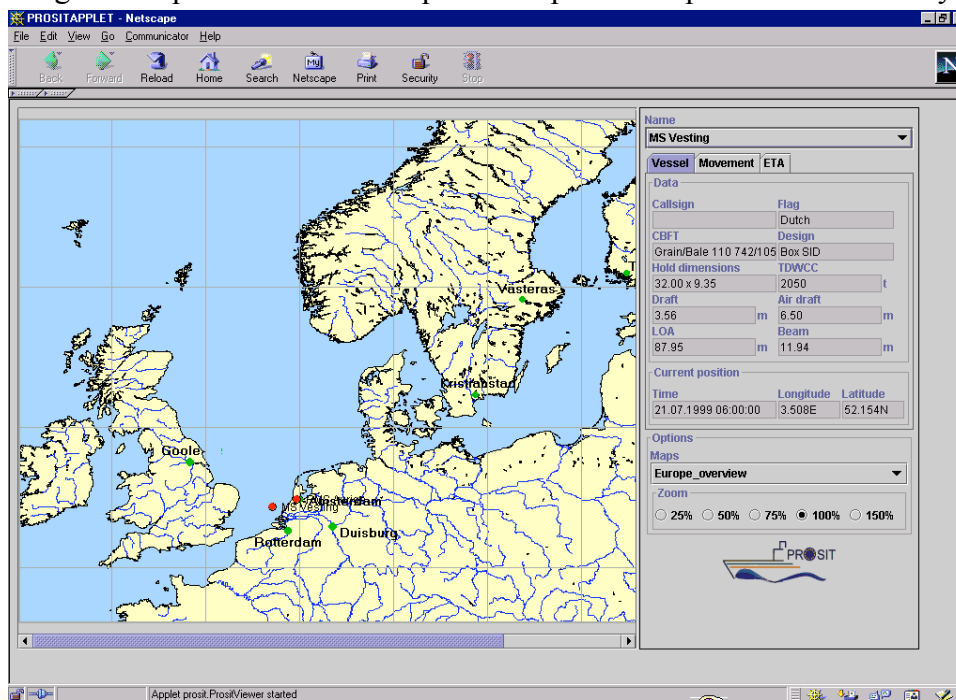
- current positions of vessels (the latest transmitted position)
- vessel movements in a certain time interval (e.g. within the last week)

Furthermore the configuration area can show the estimated time of arrival of a vessel at a specified port.

In the beginning the map area shows a map of Europe. Some ports are marked by a green point. The

current positions vessels marked red points the vessel name.

Usually next step change settings



of all are by and

the is to

the

configuration area to view the appropriate results in the map area.

Fig. 4-30: ProShip Satellite Tracking System Opening Screen

After the application has started up on the users side, several operations desired can be undertaken here in order to proceed with the system.

At first the user has to decide which vessel configuration he wants to set. The drop down box at the top includes the available vessels.

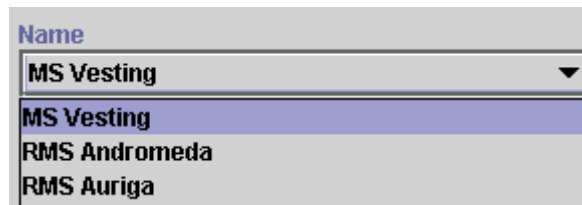


Fig. 4-31: Vessel Drop Down Box

A vessel is chosen by clicking on the desired vessel or pressing the up or down arrow keys when the field has focus. After selecting the vessel, data in the current tab sheet below the drop down box are adjusted to the vessel. The vessel tab (see above) shows vessel data and its current position.

The movement tab defines what can be seen in the map area for the current vessel.

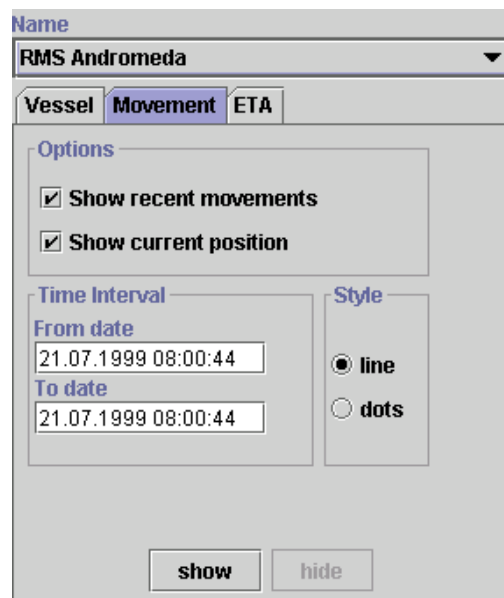


Fig. 4-32: Movement tab Screen

Finally in the ETA tab the estimated time of arrival in certain ports can be calculated. After choosing a port in the port drop down box, the estimated time is shown.

4.13.5 Dangerous Cargo Management

Treating Dangerous Cargo is one of the major problems in European Transport, especially in waterborne transport. Several regulatory acts have been issued to treat this problem and to cope with it. However, a number of problems arising for the transport operator himself has come from the fact that administrative procedures are quite complicated and moreover difficult to handle in daily operations. This is the starting point for the specific scenario described here. Aim of this scenario is not only to administrate the dangerous cargo but to monitor and allocate the cargo and the relevant information as well immediately in case of emergency.

4.13.5.1 Principle

According to the regulations following the Dangerous Cargo Legislation, several parties have to be informed about the specific shipment that is undertaken. The basic principle of the system is illustrated by the figure below.

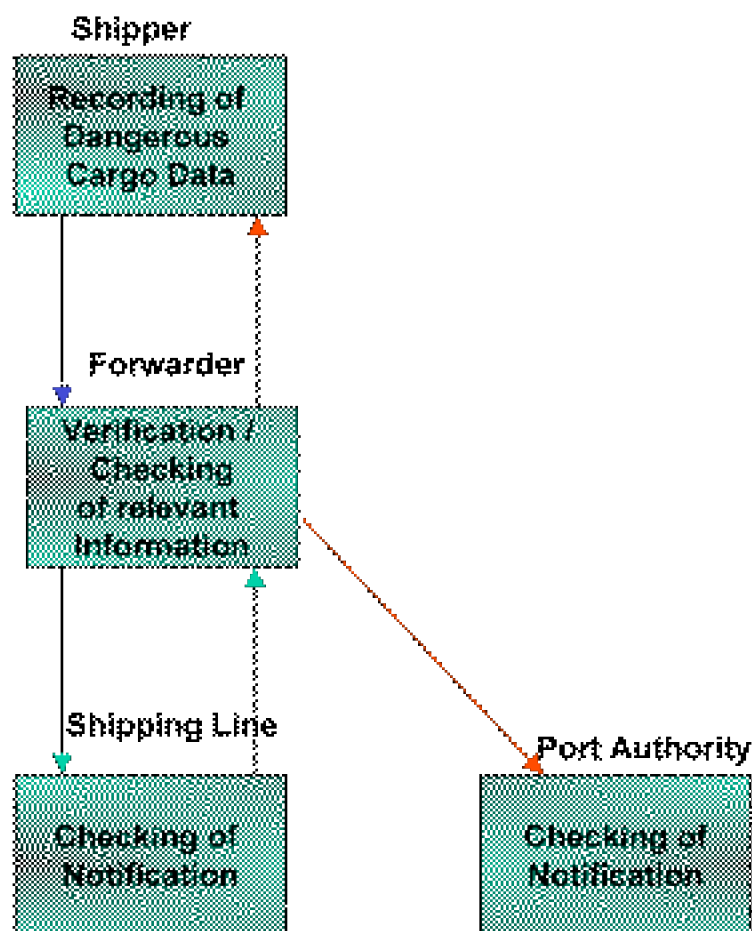


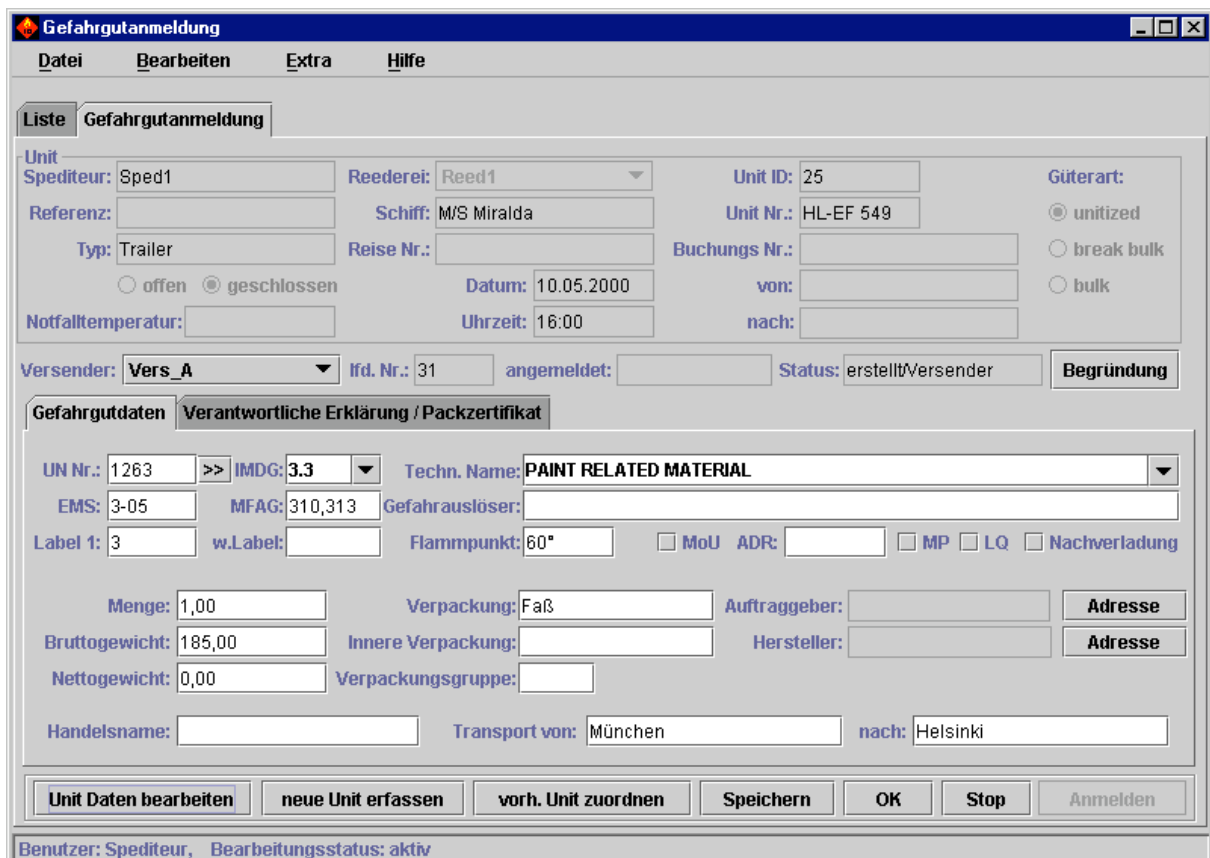
Fig. 4-33: Basic Principle for the Lübeck Dangerous Cargo Management

The procedure taking place here is as follows:

1. The shipper on site or a forwarder records the dangerous cargo data and key them in the data base.
2. The forwarding company checks data recorded and verifies against ADR / IMDG rules.
3. After this check, data is transmitted to the Shipping line and checked again.
4. Next to this check, data is transmitted as notification to the port authority and as receipt to the shipper of the cargo.

Most of the communication on the way is performed electronically by adapted messages. For the time being, the system is disposing over one central IMDG database (operated by TRADAV). Five organisations with approx. 15 users are currently connected to the system via Internet or dial-up connections.

4.13.5.2 Screen Examples



The screenshot shows a software window titled "Gefahrgutanmeldung" with a menu bar (Datei, Bearbeiten, Extra, Hilfe) and a toolbar (Liste, Gefahrgutanmeldung). The main form is divided into several sections:

- Unit Information:** Spediteur: Sped1, Reederei: Reed1, Unit ID: 25, Güterart: unitized (selected), break bulk, bulk.
- Reference and Shipping:** Referenz: (empty), Schiff: M/S Miralda, Unit Nr.: HL-EF 549, Typ: Trailer, Reise Nr.: (empty), Buchungs Nr.: (empty), Datum: 10.05.2000, Uhrzeit: 16:00, Notfalltemperatur: (empty), von: (empty), nach: (empty).
- Sender and Status:** Versender: Vers_A, lfd. Nr.: 31, angemeldet: (empty), Status: erstelltVersender, Begründung: (empty).
- Gefahrgutdaten / Verantwortliche Erklärung / Packzertifikat:**
 - UN Nr.: 1263, IMDG: 3.3, Techn. Name: PAINT RELATED MATERIAL
 - EMS: 3-05, MFAG: 310,313, Gefahrauslöser: (empty)
 - Label 1: 3, w.Label: (empty), Flammpunkt: 60°, MoU ADR: (empty), MP, LQ, Nachverladung (checkboxes)
 - Menge: 1,00, Verpackung: Faß, Auftraggeber: (empty), Adresse: (empty)
 - Bruttogewicht: 185,00, Innere Verpackung: (empty), Hersteller: (empty), Adresse: (empty)
 - Nettogewicht: 0,00, Verpackungsgruppe: (empty)
 - Handelsname: (empty), Transport von: München, nach: Helsinki
- Buttons:** Unit Daten bearbeiten, neue Unit erfassen, vorh. Unit zuordnen, Speichern, OK, Stop, Anmelden
- Status Bar:** Benutzer: Spediteur, Bearbeitungsstatus: aktiv

Fig. 4-34: Dangerous Cargo Notification (Cargo Details)

Gefahrgutanmeldung

Datei Bearbeiten Extra Hilfe

Liste Gefahrgutanmeldung

Unit

Spediteur: Sped1 Reederei: Reed1 Unit ID: 25 Güterart: unitized

Referenz: Schiff: M/S Miralda Unit Nr.: HL-EF 549 break bulk

Typ: Trailer Reise Nr.: Buchungs Nr.: bulk

offen geschlossen Datum: 10.05.2000 von: nach:

Notfalltemperatur: Uhrzeit: 16:00

Versender: Vers_A lfd. Nr.: 31 angemeldet: Status: erstellt/Versender Begründung

Gefahrgutdaten Verantwortliche Erklärung / Packzertifikat

Verantwortliche Erklärung

Verantwortliche Erklärung liegt unterschrieben vor Firma / Name: _____

Hiermit erkläre ich, daß der Inhalt dieser Sendung mit den (dem) richtigen technischen Namen vollständig und genau bezeichnet ist. Die Güter sind nach den geltenden internationalen und nationalen Vorschriften klassifiziert, gepackt, beschriftet und gekennzeichnet / plakatiert und befinden sich in jeder Hinsicht in einem für die Beförderung geeigneten Zustand.

Packzertifikat

Packzertifikat liegt unterschrieben vor Firma / Name: _____

Es wird erklärt, daß der Container / das Fahrzeug gemäß Nr. 12.3.7 oder 17.7.7 der Allgemeinen Einleitung zum IMDG-Code beladen wurde.

Bemerkung: _____

Unit Daten bearbeiten neue Unit erfassen vorh. Unit zuordnen Speichern OK Stop Anmelden

Benutzer: Spediteur, Bearbeitungsstatus: aktiv

Fig. 4-35: Dangerous Cargo Notification (Liability Statement)

Gefahrgutanmeldung

Liste **Gefahrgutanmeldung**

Datum:
 Unit ID:
 Unit Nr.:
 Versender:
 Reederei:
 Schiffsname:

alle
 erstellt / Versender
 vorgeprüft / Spediteur
 modifiziert / Spediteur
 geprüft / Reederei
 angemeldet / Hafenamnt

geprüft / Hafenamnt
 abgelehnt / Spediteur
 abgelehnt / Reederei
 abgelehnt / Hafenamnt
 storniert / Spediteur
 gespeichert / Spediteur

lfd. Nr.	Versender	Unit ID	Unit Nr.	IMDG	UN	ADR	techn. Name	Status
20	Sped1	20		2.2	1020		REFRIGERANT GAS R 1...	vorgeprüft/Spediteur
37	Sped1	20		3.1	1234		METHYLAL	vorgeprüft/Spediteur
38	Vers_A	20		3.2	1235		METHYLAMINE, AQUEO...	vorgeprüft/Spediteur
21	Sped1	21		3.3	1130		CAMPHOR OIL	vorgeprüft/Spediteur
32	Vers_A	21		3.2	1170	1234	ETHYL ALCOHOL	vorgeprüft/Spediteur
31	Vers_A	25	HL-EF 549	3.3	1263		PAINT RELATED MATE...	erstellt/Versender
33	Sped1	26	HL-OK 538	3.2	1170		ETHYL ALCOHOL	geprüft/Hafenamnt
34	Sped1	27	hl-x 11	3.2	1129		BUTYRALDEHYDE	vorgeprüft/Spediteur
35	Vers_A	28	hl1	3.3	1233		METHYLAMYL ACETATE	vorgeprüft/Spediteur
36	Vers_C	29		3.1	1234		METHYLAL	vorgeprüft/Spediteur
39	Vers_C	31		6.1	1239		METHYL CHLOROMET...	vorgeprüft/Spediteur
40	Vers_A	32	hl-5	3.2	1111		AMYL MERCAPTANS	vorgeprüft/Spediteur
41	Vers Y	33	hl-f55	3.1	1234		METHYLAL	vorgeprüft/Spediteur
42	Vers_A	34		3.1	1234		METHYLAL	gespeichert/Spedit

Benutzer: Spediteur

Fig. 36: Dangerous Cargo Notifications (Forwarders List)

5 Market Perspectives

5.1 Market Description

The objective of the Market Analysis is to give an overview of the potential market targeted by the PROSIT products and services, potential customers as well as potential competitors. Furthermore, a second objective is to identify the actual needs and requirements of the participants in the intermodal chain.

According to these objectives and by use of the knowledge gained by the market analysis, the conclusions have been summarized as follows:

By establishing EDI between partners in intermodal transport (including the waterborne mode) concerning, all information required could be more efficiently transmitted for supporting cooperation between SSS, inland waterway transport and the partners involved in door-to-door transport. Existing EDP systems of partners in intermodal transport can be easily interconnected with a low cost solution and partners without applicable EDP systems can be interconnected via an IM user interface (by use, among others, of Internet) to the IM of partners. Also information concerning identification and location of freight and equipment can be provided. Partners responsible for the quality and reliability of the door-to-door transport will be enabled for controlling the performance of the freight flow. On the basis of the information exchange provided by interconnectivity and interoperability, the information on the performance of freight transport can be compared with the data planned and deviations can be reported to the customers automatically.

A new way of matching the demand and supply side, including SSS and inland waterway transport in door-to-door transports, should be established. The procedure may be in the hands of industry and trade, or forwarders and multi transport operators or even it may be used by individual operators (e.g. port operator) in order to improve their chance to be elected as an appropriate alternative of various possibilities. An important assumption for the success of the new kind of brokerage is the easy exchange of actual and short termed information between the demand and supply side, concerning the requirements and planning of distribution on the one side as well as the possible transport alternatives and the performance in reality on the other side.

The market analysis is based on the four Prosit model scenarios that represent different market segments in geographical, organisational and operational terms. Participants of these demonstrative scenarios have been consulted and the results of these interviews have enabled a first overview of targeted customers general needs. Coming back to the initial segmentation and taking into account the realised interviews, we identified the key elements that allow identifying the core targets Prosit applications.

This document presents the above-mentioned 4 model scenarios and defines solutions for a potential commercialisation of Prosit products, in order to maximise end-users appropriation. It establishes a basis to determinate who could be the potential buyers of Prosit services once

commercialised and how Prosit technical solutions could be adapted to existing market structures.

5.2 Market Structure

5.2.1 Customers profile

The potential customers of the PROSIT products are the main actors of the intermodal transport chain, i.e. the Shipping companies, their agents, Rail/Road operators, Forwarding companies, port and maritime authorities and port service companies.

Forwarding Companies

These companies organize and optimise the transportation of goods, i.e. from the communication with the customer to the transfer, storage and delivery of goods.

Shipping companies & Rail/Road operators

Responsible for the transportation service, these companies could be ready to invest in IM and ProShip in order to improve the logistic efficiency. The main drawbacks would be the cost for the application and the cost and time for the training of employees.

Agents

The agent represents the organisation responsible for vessel, crew and cargo handling. An agent is considered to be the prime source of data on vessel journeys.

Warehouses

Responsible for the storage of goods between arrival and departure from the port, packing/unpacking of containers.

Port authorities

Port authority is responsible for the allocation of berths, supply, maintenance and repair of shore infrastructure, strategic planning for the port's development, quay scheduling, dangerous cargo supervising.

5.2.2 Generic and special needs of the customers

The basic common results from the user requirements survey concerning interconnectivity management demand a system architecture that provides the ability:

- to exchange information between different application systems
- to enable also users without appropriate application system to participate in electronic information exchange.

Each business requires the exchange of information with customers, business partners and authorities — but unfortunately most current application systems are not developed for direct contact to other application systems. Therefore, the usual way of exchanging business information reported in the user requirements survey is still “printing -> faxing -> re-keying” with all their disadvantages: slow transmission, no up-to-date information, time consuming re-keying, re-keying errors, ... etc.

One often reported remedial action against these disadvantages is that a company which operates an application system, installs a terminal connection to their communication partners. This solution of course provides no connection to other internal information sources. So time consuming re-keying etc. still have to be done and normally only the one partner to whose EDP-system the terminal is linked, takes advantage of such a solution.

A typical solution for big companies and their small business partners and customers is the “big brother’s” application system. Typical applications of this kind of non-EDI solutions are booking systems (consignor <-> transport operator) and ordering systems (supplier <-> final manufacturer).

This is easy to implement, fast and cheap for small business partners and customers but may cause problems for bigger companies, if they have to communicate with several different partners. Then, he has to operate different kinds of terminal software — may be, on different hardware and with different communication links and protocols.

Another typical EDI solution for communication partners, which are both equipped with application systems. Different application systems usually are speaking different “languages”, that means, that they store their data in different formats and manipulate them according to different algorithms. One possibility for enabling information exchange between application systems is therefore to translate both languages into one common standardised language - known as EDIFACT, ODETTE, ANSI X.12 etc.

For this EDI solution every communication partner needs a special converter software, which is able to translate between the in-house language and the standardised one.

This seems to be a clear and simple concept but it hasn’t gained a wide acceptance since several years because of

- the difficult implementation of the converter software and its access to the application data
- a lot of costs for consulting, for investments in hard- and software and for transmission
- low benefit expectations compared with the effort.

Especially for small companies and for companies with a low amount of information to be transmitted the entry level for this EDI solution is often too high, so that they prefer to continue with fax and telephone.

One important objective of PROSIT is — as already stated above — to develop and realise an innovative approach in order to enable the direct exchange of information between existing application systems and also to enable users without appropriate application systems to participate in electronic information exchange.

The ProShip Software incorporates two main parts. One part will support the brokerage between the demand and supply side, concerning the evaluation of precalculations of alternatives and the administration of receiving commitments or orders. This includes functionalities for optimisation calculations of price, distance, time, reliability and maybe other transport aspects.

The second part is aiming at the improvement of quality and reliability of transports. The orders agreed and planned will be compared with the information on the performance and deviations will be controlled and (if desired) automatically transferred to the customer

The user groups can be divided into two categories - with and without own application systems. The corresponding services are subsequently called „direct“ for users with own application systems and „online“ for users without own application systems:

„direct“ exports information from the application system A, stores it intermediately in the communications data base, retrieves information again from there and imports it into application system B

„online“ realises the information exchange between partners without application systems by offering them an easy to operate user interface (windows screens) which writes data to and reads data from the communications data base

Mixed operation between „direct“ and „online“ is also possible: Either

one partner sends a message via „online“ which is then imported into the other partner's application system via „direct“

or

one partner sends a message via export from his application system using „direct“ which is then presented to the other partner by „online“.

Concerning single users role and their positions in the various workpackages, the potential users have additionally been divided into the following user categories.

- User category 1: User (without an own EDP system) participating in communication by use of an IM (Interconnectivity Manager) user interface with access to an IM of a partner
- User category 2: User with an own EDP system will be interconnected to partners who have an IM installed
- User category 3: User with an own EDP system who installs an IM for interconnecting its EDP systems to systems of partners
- User category 4: User who installs the new software supporting the "brokerage and control"

5.3 Focus on market segments

Potential users of PROSIT products are shippers, shipping and forwarding companies, port and maritime authorities and port service companies. Their role has been investigated in a wide application area and structured to four scenarios with different main emphasis. Thus the scenarios were established according to various European regions and transport relations and various kind of cooperation and various structuring of organization regarding the use of the modern information technology.

Each scenario is built as a case for studying benefits of PROSIT results. Although the various scenarios vary from each other, common user requirements have been identified as well. The common user requirements are pointing out similarities between the various users needs.

In the scenario 1 and 2 intermodal transport chains including inland waterway transport and seagoing barges are involved on two relations with different direction for the main capacity employment (south bound and north bound). In the scenario 3 container traffic is the main emphasis. In the Baltic scenario the integration of hinterland transport and short sea shipping is the main focus.

Of course there is some overlapping between the scenarios regarding the relations for the freight flow as well as the various kind of cooperations. On the other hand also various kind of partners are taking the leading role for the establishing of an improved cooperation in the various scenarios, taken e.g. by a shipping line or an agent, by a port operator or by an independent service.

Further to their role of the above scenarios as a platform for demonstration and validation of the PROSIT results, they are also “marketing” scenarios with the purpose to identify the profile of potential users within the scope of Short Sea Shipping and Inland Waterways. A "marketing scenario" is a potential strategy for the commercialisation of PROSIT results in order to maximise end-users appropriation, as it is a valid application to an existing segment of the market.

5.3.1 Scenario 1 - Application on Ro/Ro transportation in North Sea

The goal is to optimise the whole operating work of transport by simplifying the exchange of information between the partners within the port and avoid the transfer of paper. For that reason there are only partners of user category 2 and 3 referring to the Interconnectivity Manager (IM) software.

Scenario 1 contains two main interconnections with five companies participating in total.

First interconnection, was between Rhein-, Maas- und See- Schifffahrtskontor GmbH (RMSD) in Duisburg/Germany and Rhein-, Maas- und See Schifffahrtskontor in Goole/United Kingdom (RMSG). The Rhein-, Maas- und See- Schifffahrtskontor GmbH (RMSD), located with its main office in Duisburg, is one of the leading companies in the European Coastal and in particular Sea-River Shipping Industry.

Their fleet of 117 modern vessels is offering shipping services in all European waters. In addition members of the RMS Group offer a variety of shipping related services which include Stevedoring, Clearing Agency, Bunkering Agency, Ship Sale & Purchase, Forwarding, Trucking, Warehousing, Brokering, Liner Agency and Ship Financing. The RMS-Group disposes of several participating all over Europe.

The steel industry forms an important part of the clientele of RMS in Germany and in the United Kingdom. For example one regular feature of the day-to-day business of RMS is the transportation of steel coils from e.g. Thyssen Stahl AG in Duisburg to their customers in the United Kingdom.

Regarding its business the interest of RMS lies in the establishment of a telematics architecture, which enables partners in an intermodal transport chain to exchange cargo and transport details from, and to each connected EDP system.

In the second interconnection, CUXPORT as port services company located in Cuxhaven / Germany provides large vessels with a WAYPORT-function: Container, general cargo, heavy lift and project cargo as well as complementary loads are loaded or discharged here. Cuxport was interested in solutions to improve its service by providing telematics interconnectivity as an user of category 3. As demonstration in PROSIT the In-house EDP-system of the shipping line DFDS TRANSPORT was interconnected (as user of category 2) to the IM of CUXPORT, supporting the service between Cuxhaven and Immingham / United Kingdom.

5.3.2 Scenario 2 - Finland / Rhine

Scenario 2 mainly focuses on forestry industry's shipments (paper; timber and plywood) from Finnish inland waterway ports located in the Saimaa Lake district to European inland waterway ports. The existing infrastructure is insufficient, so the use of IM established a logistic pipeline, which supports the transport process. The main partner was the port operator Oy Saimaa Terminals AB. Smaller Finnish inland waterway ports are generally equipped with limited human and financial resources. Modern IT could assist those ports and related industries in developing their business as part of the European logistics chain.

The priorities and requirements of the participants in this scenario were more general, and the testing of advanced IT solutions such as IM and ProShip meant an important step into the direction of increasing the waterway traffic at the lake Saimaa.

Demonstrators of PROSIT were implemented in developing a first pilot for a "Virtual Port Community System (VPCS)" for inland waterway ports. The VPCS collected manifests and forwarded them via EDI to the port of discharge. Regarding this exchange of information on cargo the VPCS took the function like a "user of category 2".

But also the Proship software was implemented for a VPCS and adapted to part cargo exchange requirements. Especially part cargo exchange is an important moment for Finnish shippers and transport industry as well. Due to several reasons, currently most of the traffic is contracted on annual basis with the shippers. Part loads are not very common, so part cargo exchange may have a big influence on shipping companies' profitability.

Also the functionality of the brokerage and central software for evaluating alternatives routes was used and adapted to specific scenario requirements. The industry in the Lake Saimaa district needs several routing alternatives depending on several factors (Ice conditions in winter time, low water in European inland waterways).

The main benefits from the implementation of PROSIT results should be:

- more easily accessible information
- enabling spot trade for cargo transport especially for small (part) loads
- business development potential for the lake ports for collecting part loads instead of losing them to sea ports

One of the key enablers for more traffic to the Lake Saimaa would be active selling of import loads to Saimaa Ports in Central Europe.

The main part within the scenario 2 was taken by the port operator Oy Saimaa Terminals AB (as a user of category 3 and 4) and by EDI Management (as service with functionality as a user of category 3). Users of category 1 and 2 in the Finland/Rhine scenario were linked to the IM installed on premises of Saimaa Terminals and EDI Management

5.3.3 Scenario 3 - Mediterranean Sea

Kernel of the Mediterranean Sea Scenario was Sarlis Container Services S.A., SCS.

Sarlis Container Services acts as ship manager and liner operator. Container liner activities commenced in 1981, while the conventional service (which has been operated since 1951) was gradually phased out. Round 40% of the annual traffic concerns feeder activities for a number of lines on permanent or occasional basis on different routes. SCS partners are CGM, Cosco, Italia, Lloyd Triestino, D'Amico Soc.di navigazione, Ellerman, MISC, Mitsui, P&O, NYK, DMA, DSR and others. On Intermed traffic, SCS controls a considerable market share in the routes between Italy - Greece and the Near East, Spain - Greece and the Near East.

There are three basic characteristics that distinguish the transport of containerised cargo from that of other cargo types:

- in the case of containerised cargo a third physical entity is involved other than the ship and the cargo; the container itself, which requires a separate administration system
- the loading of containerships is a complex operation if container handling is to be kept to a minimum to reduce operating costs
- as most of the trade is performed on liner terms, the objective of „brokerage“ between demand and supply translates basically to coping satisfactorily with demand, often on very short notice, as well as to coping with higher than expected demand.

In this scenario SCS participated as a user of category 3 and 4. Its agent COSIGMAR, located in Valencia is interconnected as user of category 1 to the IM, which was installed on the premises of SCS.

5.3.4 Scenario 4 - Baltic Sea

In the Baltic Sea scenario the participants were Frachtkontor Finnland (FraFi) and Transrussia Express (TRE) as shipping agents and the Lübecker Hafengesellschaft (LHG) as a port operator. The main difference to participants in other scenarios is, that the customers can deal with the shipping agents directly without the necessity of any brokers. Both, FraFi and TRE own and operate ships by themselves.

Like Frachtkontor Finnland, Transrussia Express is a part of the shipping line Finncarriers / Poseidon. The main point to look at is that they have a large number of regular customers. These customers usually have fixed rates based on fixed routes, so the objective for FraFi is not necessarily to give new offers to new customers but to show their regular customers more information and alternatives based on the existing agreements.

FraFi not only handles trailers and containers but also wagons for transporting freight by rail. These are dealt by a part of FraFi, Railship Services (also part of Finncarriers / Poseidon).

These details are mentioned here for one reason only: Poseidon itself was interested to test the ProShip not only for Frachtkontor Finnland and Transrussia Express but also for their other services like Railship. Therefore their objective is a functionality, which will be sufficient for all.

The Lübecker Hafengesellschaft mbH (LHG) is the port operator of Port of Lübeck and Port of Travemünde. At 4 locations (a fifth location will be added in the near future) LHG provides up-to-day facilities and operations for all kind of transport. LHG is actively involved in marketing of goods via Lübeck to the Scandinavian and Baltic States as well as to Russia. LHG looks for a broad sector of the Hinterland including industries from France, Benelux and Southwest Germany.

LHG thereby is especially interested in bringing more transport to inland waterway via the Elbe-Lübeck-Channel as well as using rail instead of road transport. There is a need for interconnectivity to small and medium partners of the port. Because of this, LHG acted as a user of category 3 introducing and implementing the interconnectivity manager in house focusing on small and medium customers in the Hinterland of the Port of Lübeck.

Frachtkontor Finnland OHG (FRAFI) is the German transport agent of a German-Finnish joint shipping line Finncarriers Poseidon. FRAFI is doing marketing and sales for several regular shipping lines to Finland serving different destinations. While doing so, there are a lot of communication links to small and medium partners in transport and industry. FRAFI implements IM and ProShip. FRAFI acts as a user of categories 2 and 4.

Transrussia GbR (TRE) provides a regular shipping service from Kiel to St. Petersburg. At both ends of this link, Transrussia installed the interconnectivity manager for providing connectivity to their new customers as well on German/West-European side and the Russian Hinterland (acting on two sites as a user of category 3).

5.4 Market development

The Prosit products and services have been designed in order to enhance information exchange, to support the matching of supply and demand for transport services and to sustain the quality of services.

Such an objective was very ambitious and because it is corresponding to a real need for short sea shipping, the competition that the PROSIT services will have to support in the framework of its potential commercialisation is a very important one. It has to be noted that it is not an easy task to put the results of an R&D project such as PROSIT with the products of confirmed commercial companies. The following section however presents the current companies that could compete with the PROSIT services, in the case they are commercialised.

5.4.1 Most important players

The PROSIT services answer to the specific demands of brokerage between the demand and supply side, concerning the evaluation and precalculations of alternatives and the administration of receiving commitments, orders etc. Along these lines, various attempts have been recently emerged in order to offer the above services to shipping community. The most important in terms of size are the following:

- a) - Levelseas
- b) -SeaLogistics
- c) - ShipDesk

5.4.2 LevelSeas

LevelSeas is an internet based on-line exchange set to replace the traditional marketplace where ship owners, shipbrokers and cargo owners conduct business. It will provide comprehensive freight management services encompassing market intelligence, online chartering, pre and post fixture activities and risk management tools, including freight derivatives.

LevelSeas.com has the backing of BP Amoco, Cargill, shipbroker Clarksons and Royal Dutch/Shell Group who represent significant shipping volume and expertise - and will accelerate industry-wide adoption of the new marketplace.

Its objective is to provide greater market access, lower costs and greater efficiencies to a broad community of large and small industry players. LevelSeas.com will be positioned to cater to the freight needs of international businesses which rely on ocean transportation as a critical link in their global commodity supply chain.

Initially the company will be based in Europe, with offices located in key markets to reflect the international scope of the shipping industry. Launch of the new venture is scheduled for the third quarter of 2000.

5.4.3 SeaLogistics

SeaLogistics is an online shipping exchange providing comprehensive chartering services to the global petroleum industry. The company offers immediate access to the latest market information and a neutral platform for conducting seamless chartering transactions worldwide.

SeaLogistics' objective is to allow users to analyze the market, negotiate terms, fix vessels and track voyages real-time resulting in lower costs and increased efficiency. Behind this venture is OMI Corp.

5.4.4 ShipDesk

ShipDesk is an on-line chartering marketplace, providing total logistics support to Shipping Customers, Charterers, Owners, Operators, Brokers and Agents. The company intends to offer a secure and confidential total freighting environment, and to serve the requirements of all participants in the global maritime marketplace from underlying commodity trade through post-fixture and voyage completion. According to its objectives, the system is designed to be flexible, providing a fully customisable interface and integrating with client's existing systems. ShipDesk will provide tangible benefits to all parties through improved process efficiency; transaction cost savings, increased confidentiality and enhanced liquidity.

Partners in this venture are the Tufton Oceanic, a shipping investment house and OptiMark, Inc, a provider of trading solutions to electronic marketplaces.

The ShipDesk marketplace has not been fully developed yet, and is expected to be launched in Autumn 2000.

Comparison with PROSIT services

- Most of these plans will come into operation in the 3rd quarter of 2000, so they have not been tested yet.
- They are in principal aiming to serve ocean bulk transportation.

6 Conclusions and Perspectives

PROSIT started as a project that aimed at development of transportation chain management applications and migration of existing solutions for interconnecting systems. When PROSIT started up, the commercial power and dynamics of the Internet already were visible to a certain extent. Now, the Internet is on its way to become THE major change within the economy.

All the systems applied in PROSIT and related projects (in FP4 and in daily business as well) aim at electronic data communication and interchange between organisations and companies.

Meanwhile there is no doubt anymore about transportation industry facing major changes in the very near future. Increasing trade volumes (Container trade is accounting new records year after year), liberalisation, new consumer patterns (E-commerce), environmental policy and ongoing concentration processes in the business are all together forming an enormous pressure towards the transportation providers. Siderunning with these developments a steady increasing integration towards a truly networking economy can be monitored. The breakthrough of the Internet (mainly by its visualised part World Wide Web) is doing its own part to accelerate this process to a yet unknown extent. The developments sketched here very briefly are meeting an industry, that to a very large extent is determined by traditional structures and business patterns that are most often carried out and operated by SMEs.

The answer how to cope with changes and challenges arising from the various requirements sketched here, can to a large extent be found within the field of electronic supported communication.

However, it is essential to underline here that further work has to be performed here in the future. This is esp. concerning the so called “human factor” in its context with modern technologies and their application in daily business. Throughout the lifetime of PROSIT is has become visible that additional developments from the IT side still have to be performed (esp. in certain areas, where developments are not yet well settled).

PROSIT has proved by its applications and attempts that support and solution for certain problems within the targeted area of Short Sea Shipping and Inland Waterway Transport can be found by means of IT and electronic data communication. Intelligent application of these technologies improved the participating companies business, a fact that is proved by the circumstance that modules and tools developed under PROSIT will remain in further use.

Annex: Dissemination Activities

Date	Person	Activity	Location
10/3/98	Niels P. Jørgensen	PROSIT presentation at the „Bremen Ministry for ports and Transport“	Bremen
13/3/98	Pekka Koskinnen	PROSIT presentation at the „Turku School of Economics and Business Administration“	Turku, FIN
16/3/98	Pekka Koskinnen	PROSIT presentation at the „School of Economics and Business Administration“	Helsinki, FIN
15/6/98	Niels P. Jørgensen	PROSIT presentation at the „CCA-SSS“	Lisbon
22/6/98	Pekka Koskinnen	PROSIT presentation at the „Center for Maritime Studies“	Turku, FIN
26/6/98	Pekka Koskinnen	PROSIT presentation at the “School of Economics and Business Administration“	Helsinki, FIN
24/6/98	Niels P. Jørgensen	PROSIT presentation at the „Short Sea Promotion Centre“	Rotterdam
13-14/10/98	Niels P. Jørgensen	PROSIT presentation at the „MARCOM Conference 98“	Brest
09/11/98	Niels P. Jørgensen	PROSIT presentation at the „Austrian Federal Ministry of Transport“	Vienna
20/11/98	Niels P. Jørgensen	PROSIT presentation for „European SME Short Sea Operator“	Duisburg
20/11/98	Niels P. Jørgensen	PROSIT presentation at the „Port Agency Duisburg“	Duisburg
25/11/98	Niels P. Jørgensen	PROSIT presentation at the „PROSIT goes Satellite“ PR-Event	Duisburg
9/12/98	Niels P. Jørgensen	PROSIT presentation at the “Concerted Action of Short Sea Shipping“	Bruxelles
10/12/98	Pekka Koskinnen	PROSIT presentation at the „Center for Maritime Studies“	Turku, FIN
12/12/98	Pekka Koskinnen	PROSIT presentation at the “School of Economics and Business Administration“	Helsinki
11/1/99	Niels P. Jørgensen	PROSIT presentation to the „Austrian Federal Ministry of Transport“	Bremen

14-15/01/99	Niels P. Jørgensen	PROSIT presentation at the "Transport-Logistik-Internet 99"	Bremen
18/1/99	Niels P. Jørgensen	PROSIT presentation at „Finnish Shippers“	Lappeenranta, FIN
18/1/99	Pekka Koskinnen	PROSIT presentation at „Finnish Shippers“	Lappeenranta, FIN
15/3/99	Pekka Koskinnen	PROSIT presentation at the „Center for Maritime Studies“	Turku, FIN
22/3/99	Pekka Koskinnen	PROSIT presentation at the "School of Economics and Business Administration"	Helsinki
29-31/3/99	Niels P. Jørgensen	PROSIT presentation at the „Building Bridges Conference“	Bruxelles
20-22/5/99	Niels P. Jørgensen	PROSIT presentation at the „Concerted Action Short Sea Shipping and Maritime Industries Forum“	Cavala, GR
23-25/6/99	Niels P. Jørgensen	PROSIT presentation at the „Logistik Management 99“	Bremen
30/5-1/6/99	Niels P. Jørgensen	PROSIT presentation at the "2 nd Lake SAIMAA Conference"	Lappeenranta, FIN
30/5-1/6/99	Pekka Koskinnen	PROSIT presentation at the "2 nd Lake SAIMAA Conference"	Lappeenranta, FIN
08-12/06/99	Horst Pahl	PROSIT presentation and exhibition at the „Transport 99 Fair“	Munich
14/6/999	Pekka Koskinnen	PROSIT presentation at the "School of Economics and Business Administration"	Helsinki
15/6/99	Pekka Koskinnen	PROSIT presentation at the „Turku School of Economics and Business Administration“	Turku, FIN
16/06/99	Horst Pahl	PROSIT presentation at the „IST Congress“	Amsterdam
25-28/08/99	Horst Pahl	PROSIT presentation and exhibition at the "Transport Fair"	Rendsburg
16/9/99	Niels P. Jørgensen	PROSIT presentation at the „German Shipping Exhibition“	Duisburg
17/9/99	Niels P. Jørgensen	PROSIT presentation at the „Concerted Action of Short Sea Shipping“	Göteborg
23/9/99	Pekka Koskinnen	PROSIT presentation at the „Turku School of Economics and Business Administration“	Turku, FIN

		Administration“	
28/9/99	Pekka Koskinnen	PROSIT presentation at the “School of Economics and Business Administration“	Helsinki
12/10/99	Niels P. Jørgensen	PROSIT presentation at the „PTC Conference“	Bremen
08-11/11/99	Horst Pahl	PROSIT presentation at the “Transport Research Conference“	Lille
12/11/99	Horst Pahl	PROSIT presentation at the „European Day“	Lübeck
15-17/11/99	Horst Pahl	PROSIT presentation at the „E-Commerce Congress“	Barcelona
6/12/99	Pekka Koskinnen	PROSIT presentation at the “School of Economics and Business Administration“	Helsinki
17/12/99	Pekka Koskinnen	PROSIT presentation at the „Turku School of Economics and Business Administration“	Turku, FIN
24/2-1/3/00	Horst Pahl	PROSIT presentation and exhibition at the „CEBIT 2000“	Hannover
07/04/00	Horst Pahl	PROSIT presentation at the „Marilog 2000 Baltic Forum“	Hamburg
23-25/5/00	Horst Pahl	PROSIT presentation and exhibition at the „RoRo 2000“	Göteborg

PROSIT-Workshops

Date	Person	Activity	Location
24/6/98	Niels P. Jørgensen	1 st International Lake Saimaa Workshop	Lappeenranta, FIN
24/6/98	Pekka Koskinen	1 st International Lake Saimaa Workshop	Lappeenranta, FIN
27/12/98	Niels P. Jørgensen	International BopCom-Workshop	Lübeck
19/04/99	Horst Pahl	National TEN Telematics Workshop	Lübeck
10-12/05/99	Horst Pahl	International Bothnican Arc Workshop	Pieta, S
12-14/9/99	Niels P. Jørgensen	International Workshop „PROSIT – Further Steps and Measures“	Ivalo, F

	Jørgensen	Further Steps and Measures“	
12-14/9/99	Pekka Koskinnen	International Workshop „PROSIT – Further Steps and Measures“	Ivalo, F
17/07/00	Horst Pahl	National Workshop at the Bundesvereinigung Logistik (Federal Logistics Association)	Lübeck
27/01/00	Horst Pahl	International TEDIM-Workshop	Lübeck

PROSIT-Publications

Date	Person	Activity	Location
28/03/98	Niels P. Jørgensen	Article „In Bremen heißt es PROSIT“ in <i>Deutsche Verkehrszeitung</i>	Germany
02/05/98	Niels P. Jørgensen	Article „Datenaustausch für die Schifffahrt“ in <i>Weser-Kurier</i> (regional newspaper)	Bremen
02/05/98	Niels P. Jørgensen	Article „Ein PROSIT zur Stärkung des Seeverkehrs in Europa“ in <i>Nordsee-Zeitung</i> (regional newspaper)	Bremerhaven
30/06/98	Pekka Koskinen	Article „Uusi ATK-järjestelmä tehostaa sisävesiliikenteen tavarakuljetusta“ und „Vankila joutuu maksamaan vangin erikoissairaanhoidon“ in <i>Etela Saimaa</i>	Finland
01/07/98	Niels P. Jørgensen	Article „PROSIT soll Straßen entlasten“ in <i>Weser-Lotse Logistik</i>	Germany
01/10/98	Niels P. Jørgensen	Article „Moderne Telematik für Short Sea Shipping und Binnenschifffahrt“ in <i>Weser-Lotse Logistik</i>	Germany
24/10/98	Niels P. Jørgensen	Article „Bremer promotie voorsshortsea“ in <i>Weekblaad Schuttevoer</i>	Netherlands
26/11/98	Niels P. Jørgensen	Article „PROSIT soll Schiffstransport attraktiver machen“ in <i>WAZ</i> (regional newspaper)	Duisburg
26/11/98	Niels P. Jørgensen	Article in <i>Rheinische Post</i> (regional newspaper)t	Duisburg
27/11/98	Niels P. Jørgensen	Article „PROSIT auf dem Schiff“ in <i>WAZ</i> (regional newspaper)	Moers

01/12/98	Niels P. Jørgensen	Article „PROSIT für die Schifffahrt“ in <i>Rheinische Post (regional newspaper)</i>	Duisburg
01/01/99	Niels P. Jørgensen	Article „Telematik-Night im Hafenhause“ in <i>Weser-Lotse Logistik</i>	Germany
05/01/99	Niels P. Jørgensen	Article „TLI 99“ in <i>Weser-Lotse Logistik</i>	Germany
11/01/99	Niels P. Jørgensen	Article „Bremer Transportbranche: Vollgas auf der Datenautobahn“ in <i>Die Welt</i>	Bremen
14/01/99	Niels P. Jørgensen	Article „Forum Transport Logistik Internet“ in <i>Weser-Kurier (regional newspaper)</i>	Bremen
16/01/99	Niels P. Jørgensen	Article „Mit EU-Förderung ins Internet“ in <i>Deutsche Verkehrszeitung</i>	Germany