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**EIES - New applications for an efficient co-operation in/between  
harbour areas**

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## **Introduction**

Within the scope of the ACTS project EIES a telematic platform<sup>1</sup> for several harbour regions in Europe will be developed and implemented. Here is an outline of the main points:<sup>2</sup>

- Development of an information system for companies and administrations in the port region; for routine tasks as well for exceptional situations,
- Definition, implementation and validation of sample applications in the maritime environment (ports of France, Germany and Spain),
- Use of state-of-the-art network technologies (ATM, ISDN, DSRR, etc.)

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<sup>1</sup> by using the following services: ISDN, ATM, Internet, DSRR (Digital Short Range Radio), DECT and INMARSAT for the mobile access

<sup>2</sup> Detailed information can be retrieved via Internet at two locations: <http://www.isl.org/EIES/> or <http://www.expertel.fr/EIES/>.

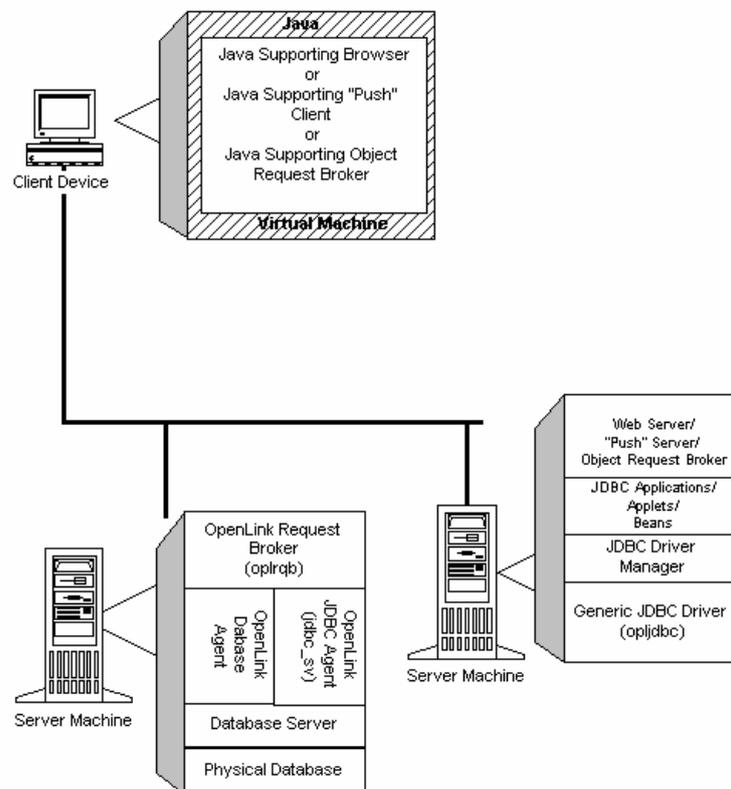
- Applications for cargo transport (especially hazardous goods), maintenance and repair as well as maritime transport co-ordination,
- Applicability of the results to other European harbour regions

One of the first phases of the project was the user requirements analysis, which was presented at MARCOM'96 [1]. The results led us to scenarios which were transformed to application modules. Three of them are presented in the following; these modules are the:

- Blue Pages,
- Port Entry Guide,
- CSCW, and
- The mobile access to these modules, respectively parts of them.

**Blue Pages**

The idea of the "Blue Pages" (B.P.) is the maritime counterpart of the "Yellow Pages"™. This service is designed to be used from the Internet. The user can connect to a project's WWW server (for performance reasons every country should have one) and on the first screen an input form is presented. By typing in a person's or company's name or a keyword, e. g. for a service, the underlying database will be searched and the results of the query will be shown in the browser's window.



**Figure 1: The Blue Pages system architecture[2]**

During the specification of the database model we added some fields beyond the standard YP entries like today's communication links (email, video conference address, etc.) and the possibility to establish the communication directly out of the Blue Pages – if available. The definition of the database model was done using the entity relationship method (ERM), software-supported by the tool Silverrun which is capable to generate SQL scripts. These scripts were directly used to setup the database in Postgres95.

When we started developing the service, we selected the rdbms (relational database management system) named Postgres95 that was available for free (that means public domain) as well as a commercial software package with customer support. The user interface for the input of data into the dbms is written in Java. Therefore we used the SUN Java Workshop version 1.0 and later on we made the update to the version 1.1 which had some consequences in changing parts of the code. The Java/Postgres95 interface was realised with the OpenLink Request Broker's JDBC Agent. In addition we use a Java Class Library (JDBT) that was developed (and is still under construction) by ISL<sup>3</sup> and that contains classes for designing a user interface accessing the underlying database tables. The following Figure 1 shows the relationship between the several drivers and the application on the client and server side.

As described above on basis of the user requirement analysis we selected the client architecture as PCs with MS-Windows as the operating system / the user interface. For the services presented in this paper we use UNIX based work stations as the server machines. In most cases these are SUN stations with Solaris OS 2.5.1 and the web server is the 'Apache' v1.1.1.

During the first phases the tests and experiences with Postgres95 showed that the capabilities and the performance of this rdbms is not sufficient for our concepts. Therefore we decided to change the underlying rdbms from Postgres95 to Oracle v7. For the setup of the Oracle tables we re-used the Silverrun script generator. The JDBT offers an interface class for various dbms so that we only had to make minor changes to our Java code.

For the search user interface / engine we try to follow another technical strategy: Dynamic generation of JAVA script on the database server. The client communicate with a web agent on the database server. At the server a JAVA application will be launched after the established connection. A JAVA script will be transmitted to the client for the control of the communication and the JAVA application on the server connects via a JDBC driver to the database engine. During the user interaction this application generates a context related JAVA script and sends it to the client. The client's web browser executes the script and generates appropriate dialogue elements containing the transmitted data of the result set. The advantage of this strategy is the transmission of only parametric JAVA script templates to the client that results in a maximum performance.

## Port Entry Guide

The Port Entry Guide is based on guides that exist in nearly every port. Today in the Bremen Port for example the port entry guide is printed on paper and updated every two years. The advantage of an electronic representation is the faster possibility of

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updating such a document and the extended capabilities of searching and presenting of information. Export of the electronic Port Entry Guide to a transportable medium (like a CD-ROM) is planned and useful for the operation on board of a ship.

When activated, the P.E.G. shows a graphical overview of the location of the port in form of a sensitive map with "clickable" areas. Besides this there exists a form for searching the information in the guide. Let us assume, that the user has a ship with the direction to a totally unknown port and he wants to be informed about the best way to enter the port, about the facilities of the port concerning stowing, docking etc., and the cost structure of the port. First he will click on the map and get a zoomed view of the port facilities. He should easily identify the right location for his ship to go. In this case he can click on the specified area of the port (e. g. a container quay) and the screen should show now the relevant information in a table complemented by pictures or even video short sequences. The Geographical Information System (GIS) that is used for the development of this functions is called Visor, a product of the German company megatel<sup>4</sup>.

In the part of the PEG which is implemented on the network (e. g. the Internet) there are 'links' to relevant information in the Blue Pages (e. g. institutions and companies located in the selected port). The CD-ROM edition to be used on board the ship should also include addresses of the persons to turn to. To sum it up it can be said that the PEG will keep all harbour related information concerning port profile, advertising, acquisition, actual, geographical and technical information.

The Port Entry Guide database system is – like the Blue Pages – Oracle and the two databases will be connected. Thereby, both databases can profit from each other. The connections can be establish from the fixed network (ATM, ISDN, PSTN) and the mobile network (DECT, DSRR, Inmarsat). That is a further difference between this two databases, because Blue Pages allows as single application only the fixed network access. One unusual feature of the Geographical Information System (GIS) is the hybrid system which allows the combination of network and CD-ROM data. Therefore dynamic data will be transmitted via narrowband mobile or fixed network access, while the data with high bandwidth requirements is available on the client stored on a CD-ROM or via a broadband network – if available.

As stated above the used dbms includes a SQL interface like the Blue Pages. Therefore different ODBC databases can be used. For the CD-ROM based single application of the P.E.G. the experience proved to use MS-Access as the database engine. MS-Access allows to setup an executable file without implementation of the whole database on the CD-ROM. This guarantees that the performance of the single application is appropriate and the licence fees can be held low.

## **CSCW**

The Computer Supported Co-operative Work (CSCW) service integrates more than a simple videoconference into the global EIES service. CSCW means videoconference and application/screen sharing between distributed partners to make a more efficient co-operation possible. EIES has chosen the Mbone tools as a CSCW tool witch are based on the Internet Protocol (IP). Therefore the interoperability in a heterogeneous environment is guaranteed.

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<sup>4</sup> megatel Informations- und Kommunikationssysteme GmbH, Bremen, Germany

The transmission of the data, audio, and video streams will take place over the UDP/IP protocol. Therefore no secure mechanisms are available for this type of data transport. Additionally the different MBone tools 'vic' (video conferencing tool), 'vat' (visual audio tool), 'wb' (whiteboard), and 'nt' (NetText) have to be managed with a separate conference manager like for example the Confman (a development of the University of Hannover, Germany).

A conference management tool is necessary for the following features:

- running and carrying out meetings
- support of planing, initiating, and controlling of a multimedia meeting
- guarantee of the correct data transmission with an additional protocol
- secure mechanisms

During the implementation test phase of the MBone tools we noticed that the Confman tool was too hard to handle. In addition the configuration of the software is very complicated and is only working in environments such as SunSparc or SunUltra. Further problems are:

- no real control, just start up and close down of the programs
- interface design issues: interface too technical, too much information or too simple for real conferencing

For the fulfilment of the task concerning to implement a handy user interface another co-operation was established with a project named CONTRABAND. This project has the only one task to develop a conference manager for CSCW tools. The working group „Digital Media and Networks“ in the technology centre of the University of Bremen is responsible for the project CONTRABAND. The new conference manager will include the following features:

- efficient control of the different MBone tools
- confidentiality by closed user groups and encryption keys
- sequence control
- participants finding

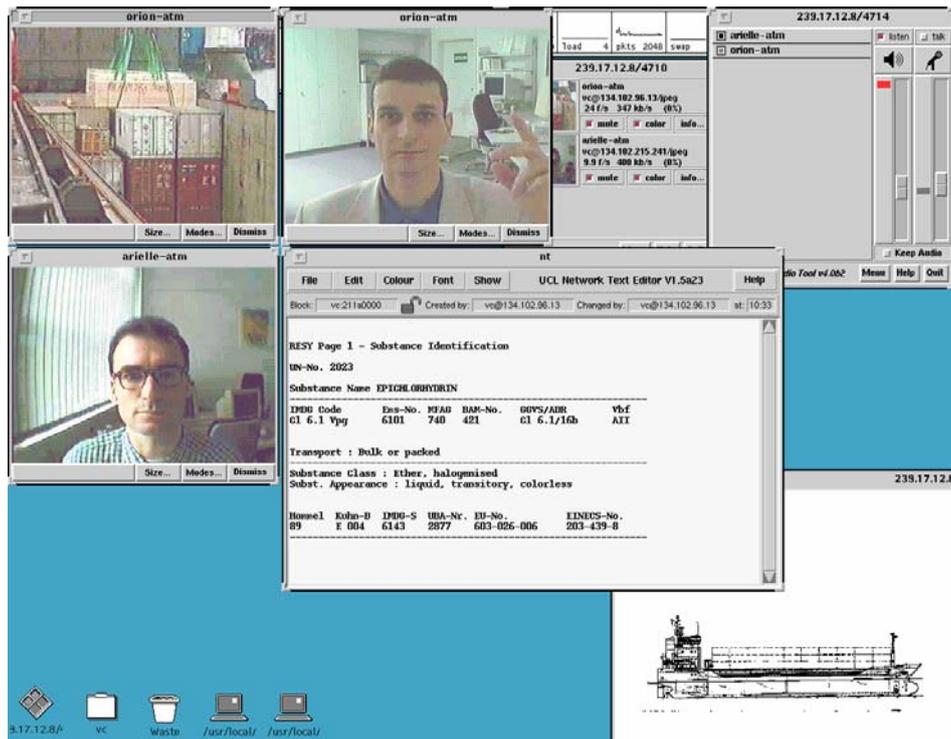
The main task of this project is to define and develop a conference manager which allows to handle a CSCW conference such as easy as a telephone call.

Figure 2 shows a live videoconference without a conference management tool, but with all relevant CSCW modules running which was used to solve a problem concerning a broken container with pesticides on board a ship. In this situation, the ship owner, port administration members and a chemical specialist could discuss and speed-up the problem-solving process.

Concerning the client machines we found out during the implementation tests that the MBone tools are not performing very well at Windows95/NT operation systems yet. That means, the ports of the MBone tools for this kind of platforms don't fulfil the specifications at the time being.

Therefore we are checking another alternative tool called Microsoft-NetMeeting (current version is 2.0). At least for the narrowband connections (64 KBit/s) via mobile access the CSCW tool has to run efficiently on a Windows client. For this reason some tests will be carried out for the mobile service support. NetMeeting provides IP

transmission in real-time for the support of audio, video, and data. MS-NetMeeting should be used together with the Mbone tools, but the real proof of the interoperability is pending. Other problems are the platform dependency and the TCP/IP protocol which is used. That means, the Transport Control Protocol (TCP) needs acknowledgements which slow down the performance of a real-time application. Therefore the Mbone tools (UDP/IP) are further the best choice for CSCW applications, but NetMeeting can be a second and meaningful possibility for the mobile access via ship to CSCW tools.



**Figure 2: The Mbone Videoconference**

NetMeeting has the following features:

- Audio-, video, and data connection via TCP/IP,
- IPX protocol can be used,
- IP-multicasting (point-to-multipoint connection),
- Windows95/NT as the client operating system,
- Support of H.323 standard.

To sum it up it can be said that there is a variety of CSCW tools which stay close to established standards. The performance is still the most critical point, especially when using communication links up to 64KBit/s.

**Mobile Communication**

Hitherto envisaged applications, like B.P., P.E.G., and CSCW shall also be used in the complete harbour area. That implies to establish mobile links for more incorporation in work.

Possible participants are therefore not only people whose workplace is a bureau but also those, which are working outside and/or at alternate locations.

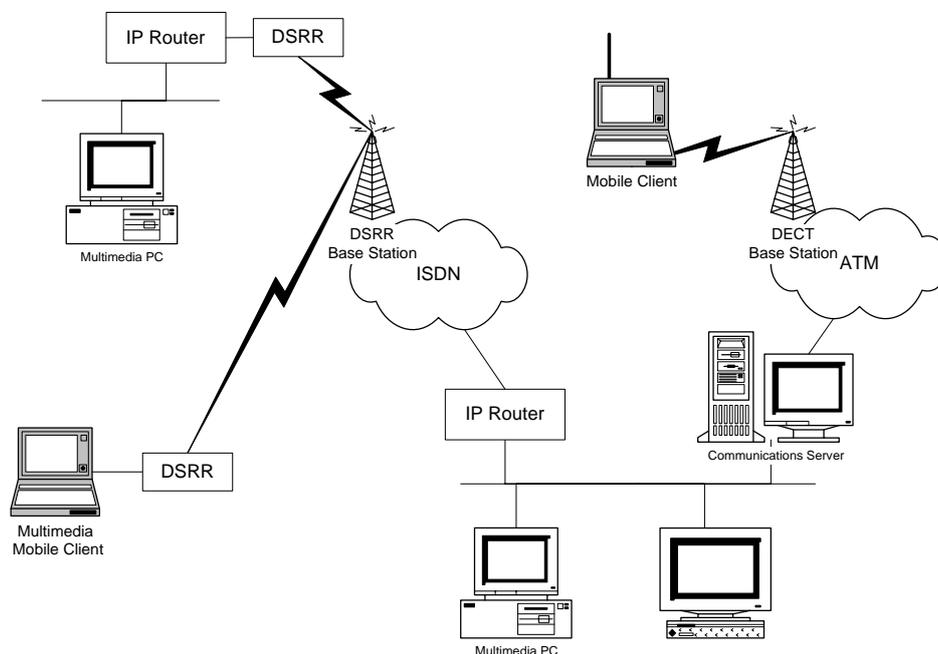
To enable mobility the EIES system uses three different kinds of radio technologies.

- INMARSAT-HSD (High Speed Data)  
which should be used on sea far from any harbour,
- DSRR (Digital Short Range Radio)  
for the use inside the port entry area and near the shore,
- DECT (Digital European Cordless Telephone)  
for user with small scope requirement in harbour areas.

For low rate access to the EIES applications also cellular systems such as GSM could be used. However, the demonstrations will focus on broadband, real-time applications which require a higher bearer rate than the current available conventionally services offer.

Therefore in harbour areas just DSRR with up to 128 KBit/s and advanced DECT with 64 KBit/s are in perspective. It should be mentioned that 552 KBit/s is the maximum theoretical throughput rate of multi-bearer DECT. Figure 3 will give an overview of the possible configuration.

The aim of the EIES project is to provide seamless access to the same services and applications following the UMTS concept. This UMTS concept means to provide mobility and other services to mobile and stationary users in a variety of environments. As the preferred transport protocol between the participants at the different locations TCP/IP will be used. From there the system is transparent and works on a solid basis.



**Figure 3 Overview of Wireless Multimedia Demonstrator Configuration**

According to the bandwidth of the mobile systems there are some retrenchments regarding the different kind of applications one can use. Deviating to ATM and Ethernet connections it is less clever to use the whole functionality of the Mbone tools for example to establish multipoint videoconferences, but this restriction is also significant for ISDN connections.

All other kind of application like the above mentioned B.P., P.E.G., and less bandwidth intensive CSCW tools are applicable. Potential domains of use for CSCW tools are for example berthing operations or deployments of the fire brigade, the customs or coast guard services.

The electronic P.E.G. as well as the B.P. could be supported for mobile use by a delivered CD-ROM. This CD could contain all static data of the PEG and the BP. Updates of the dynamic part e. g. information about current availability of port services, should be possible on demand by access to port data bases. Therefore the restriction of the bandwidth is less important.

## References

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## Authors:



*Kai-Oliver Detken* studied at the technological highschool of Bremen electrical engineering and communication before he changed to the University of Bremen to the field information technology. Parallel to his study and after his final examination he works in several European projects like MOEBIUS, SECURENET-II, and EIES.

Since 1996, he works as a research scientist at BIBA in the department Manufacturing Systems, Communications and Telematics. His professional areas are: high speed network (ATM), Internet Protocol (IP), multimedia applications (CSCW), and mobile communication systems (GSM). He is responsible for the development of new concepts and solutions in a heterogeneous network environment.



*Uwe Kaufmann* studied computer sciences at the University of Bremen. After finishing his studies he joined BIBA in 1993 as Researcher in the Department of Computer-Aided Design, Planning and Production. In 1995 he transferred to the Department of Logistics and Globally Distributed Production. In several projects has been and is responsible for the design, maintenance and administration of local area networks. Since the end of 1995 he is the EIES project co-ordinator at BIBA.

His special interests include distributed information and database management systems and broadband networking techniques and applications.



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