TEMSIS - A Transnational Environmental Network

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INTRODUCTION

This presentation concentrates less on the many technical aspects of the TEMSIS network operation but tries to show the regional basis and the working of the user group. The present Telematics Programme encouraged user-driven project initiatives and TEMSIS represents one such an initiative, undertaken by a group of cities in a transnational region.

Telematics and other European Programmes often involve diverse groups consisting of European regions or cities who will work on a common subject, but without real close cooperation at the regional level. TEMSIS tries to overcome this by not only cooperating within the bounds of this project but also in many other fields.

This presentation will begin by briefly introducing the Saarbrücken region and, after a short overview of the objectives of TEMSIS, will describe the user group. The central applications of TEMSIS, the administrative and public kiosks will be offered, followed by an outlook.

For those interested in more technical details, there are a number of public project reports available at the ANIMATE site on the EU servers at http://www2.echo.lu.telematics.

THE REGIONAL FRAMEWORK

The SaarMosselle Region

The demonstration region for the TEMSIS project is the SaarMosselle Region, an area constituted by the trans-national urban agglomeration of Saarbrücken and Moselle Est. It has its origins in a common industrial history. For over a century the region's industry was shaped by coal, iron and steel. For the past 25 years, radical changes to the region's industrial structure have been taking place. This industrial past left the region with a number of serious environmental problems and the communities on both sides of the border have hereto been meeting for a number of years to discuss their common problems and development.

The communities represented by the Association "Zukunft SaarMoselle Avenir" cover an area of about 1000 km², and have a population of more than half a million inhabitants. The ten German communities are counterweighted by over 50 French communities; although these are, as a rule, considerably smaller than the German communities. In keeping with this state of affairs, the installation of TEMSIS in the French part of the region is planned in larger communities and community associations.

Cooperation between French and German Communities

The Saar region and Alsace-Lorraine has had a varied history during the past 200 years. After the Franco-Prussian war of 1870/71, Alsace-Lorraine belonged to the German Empire until 1918. This region returned to France after the first world war. The Saar Region was placed nominally under the administration of the League of Nations, but economically was placed under French rule - the most important example being the coal mines. This administration failed to make an impact and so in 1935 the region voted to return to Nazi Germany.

After the second World War, the Saarland once again returned to French administration for 10 years and a French governor general was installed. In spite of a weak administration, a vote in 1955 resulted in 70 percent of the inhabitants voting to return to German rule (compared with more than 90 percent in 1935). Nevertheless, it was still close to four years until the economic reunion with Germany took place in July 1959.

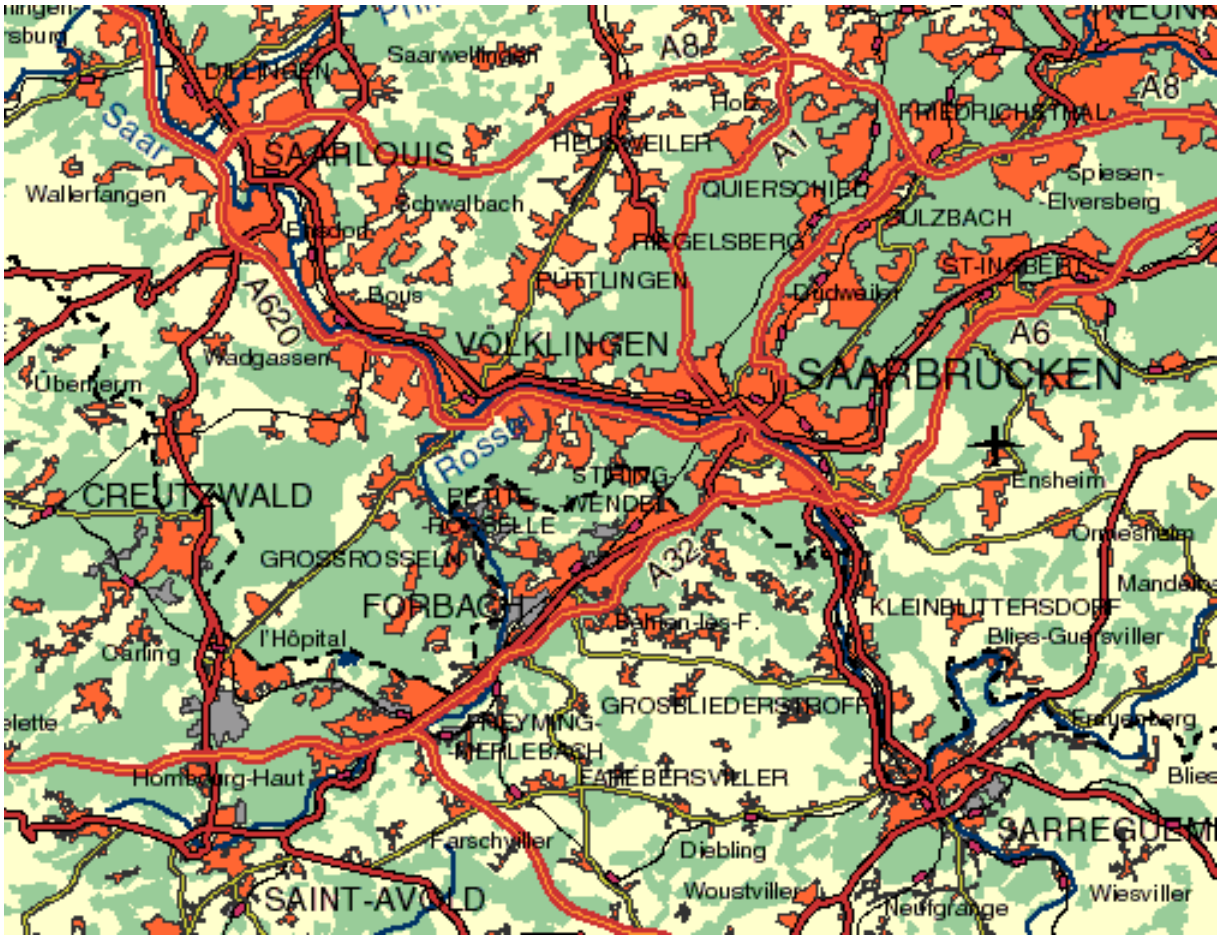


Figure 1. The SaarMoselle Region

These experiences are not a very favourable basis for close cooperation, though a number of ties continued to exist. At the beginning of the 1960s, the so-called reconciliation process between France and Germany began under Chancellor Adenauer and President de Gaule. The early seventies saw new beginnings of communal cooperation, including the annual meeting of city mayors in border region. This laid the foundations for greater contacts between the administrations. But the French tradition of a strong centralised state and authority set a certain level of bureaucratic difficulties. With the arrival of decentralisation in 1982, these obstacles began to disappear, and real progress was achieved in French-German cooperation. The INTERREG I Programme of the EU promoted additional cooperative efforts.

Zukunft SaarMoselle Avenir

After a period of almost 20 years informal and low level cooperation, the Inter-communal working group got together in 1993. The basis for this cooperation was completely voluntary, however, more regular meetings took place than before the annual mayoral meetings. For the day to day operations sub-groups for a number of special projects were established. Many of these projects were developed within the framework of the INTERREG Programme.

During this period, a number of structures developed which proved essential for further developments toward closer cooperation. Though the voluntary and informal activities of the inter-communal working group worked well, there was growing concern for an institutional basis.

In November 1997, the Association Zukunft SaarMoselle Avenir was created, based on the local law of Alsace-Mosellan. With this foundation, it was possible to bundle the interests of both French and German cities under one umbrella. The statutes of the association promote more intense cooperation, thus actively shaping the future for their citizens in a united Europe. To improve the competitiveness of the SaarMoselle region, the Association members aim to realise;

Projects and initiatives of a common interest in the areas of economic development, infrastructure, tourism, culture and education, environmental protection, city planning, etc.

All projects meeting this criteria are carried out by at least two members of the association, but where possible more members are involved. The functions of the Association are organised on a strictly mutual basis.

OBJECTIVES OF TEMSIS

A good deal of user based activities were considered when defining the objectives of TEMSIS, since these show communal concerns. In the areas addressed by TEMSIS, citizens also were considered with special interest (Diagram 1). Some of these objectives are listed below.

- Public access to information and discussion among citizens, citizen pressure groups and enterprises. During the course of this project this issue grew in importance because participating citizens demanded a more active role in defining the information criteria, rather then simply receiving information regarding the state of the environment. The aim of this project is to fulfil the Commission guidelines of 7th June 1990 (90/313/EWG) concerning environmental information and the activities concerning eco-auditing. The methodological basis for TEMSIS' contribution to strategic environmental planning is the creation of a strategic environmental assessment resource for political decisionmaking bodies and the general public, which provides easy access to information concerning projects, schemes and programmes within the urban agglomeration. Enterprises can use TEMSIS to obtain information as any citizen can, but in addition, the system provides opportunity to publish the results of enterprises eco-audits;
- Community support in political decisionmaking in planning and environment issues. These decisions tend to be prepared and made by experts in administration on the basis of a large amount of data evaluation. Usually there is more than one alternative to consider;
- Simplifying procedures by simple and quick communication and telecooperation in communities, regional authorities and institutions;
- All tasks must be implemented bilingually and transitionally.

Bilingual operation does not only mean a translation of activities but also support for the different concepts and methods of both national sides. A good example is the support of the French and Germap coordinate systems, LAMBERT and Gauss-Krüger, in mapping. Because maps serve as an important basis for planning, another project in the INTERREG II Programme of DG XVI was established: a common basic map to a scale of 1:5000 for the border region of the SaarMoselle region. This is another example of cooperation in the SaarMoselle Region, where the partners in this project are bigger cities in the region and the national geographic services.

Content of the Environmental Information System

The list below serves to indicate the information content of TEMSIS' individual subjects which form a central part of the tasks of both citizens and administrations. From the beginning it was clear that the project could implement only a part of the complete environmental information system. The four areas covered were chosen to represent different kinds of data. Air quality data, for example, is taken almost directly from measuring stations and represents constantly changing information. The water quality data for surface waters is updated between periods of 3 to 5 years, while local and regional master plans stand for highly aggregated environmental data. This data can only be correctly interpreted when one looks at the population statistics for the different areas.

FNP/P.O.S.

- Local/regional master plans (vectors: lines, polygons, areas)
- Community Borders
- Residential areas (existing/planned)
- Industrial areas of varying degree
- Public areas
- Nature protection areas
- Surface Water

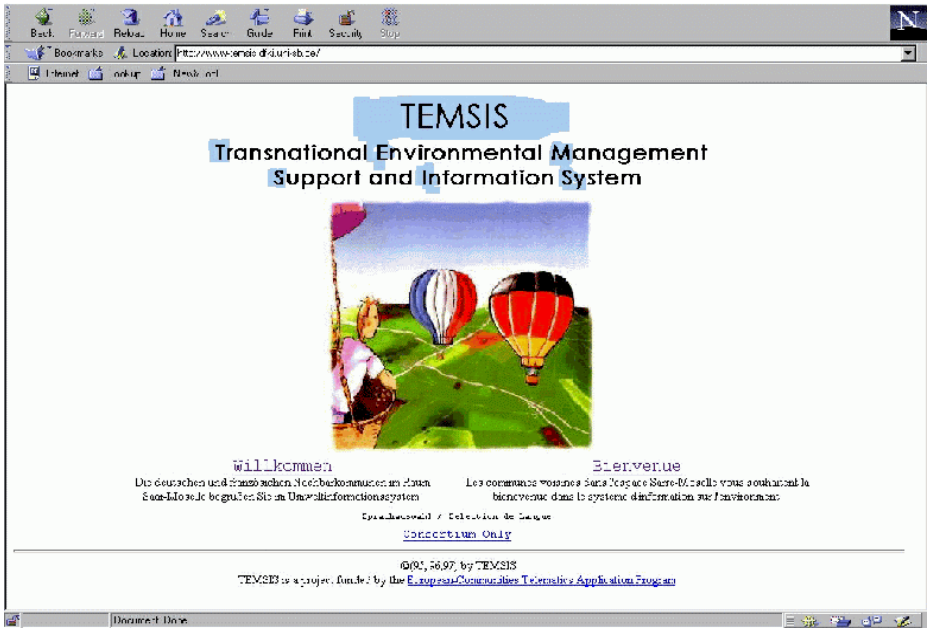


Diagram 1: TEMSIS Home page

Air Quality

- Grid data
  - Sulphur dioxide
  - Ozone
  - NO_x
- Statistics
  - Actual values
  - Mean values with tendencies (days, months, years)
  - Time diagrams (days, months, years)
  - Standards and recommendations
  - TA-Luft standards
  - Behaviour advice for citizens

Water Quality

- Point data, areas
- Water in rivers and lakes
- Quality of surface water (Updated ca. 3-5 years)
  - Use of drinking water
  - Protection and supplying areas
- Statistics ordered by users
  - Households
  - Industry
  - Monthly and yearly averages
  - Quality parameters
  - Calcium content, Nitrate content etc.

Social & Economic Data

- Number of inhabitants
- Age structure
- Population density
- Working population (for region, cities, smaller units)
- Development patterns over time and space

Basic Maps

- 1:25 000 (scan, detailed overview)
- 1:100 000 (scan, regional overview)
- 1:5000 (vector, detailed planning level)

THE USER GROUPS

TEMSIS is a user-driven project, whose interests were formed by a large and diverse group. Considering the users would be interested in different aspects of environmental data, the consortium suggested discussing the user requirements within three sub-groups: one for regional authorities as important data suppliers, one for local authorities as data suppliers as well as data users, and one for the citizen or citizen groups with the special task to design the public kiosk. All users agreed to this suggestion. The task of the regional authorities and data suppliers was to clarify what kinds of data they could make available, while the local authorities and citizen groups discussed their most important data requirements. The citizen groups concentrated on the funding of the public kiosk, while all users discussed the kinds of communication services that were to be made available. To ensure coordination, there was a plenary session for all groups after the basic decisions were reached.

For the formulation of user requirements, there were five sub-group meetings and two plenary sessions within the first six months of the project's course. This shows the high level of commitment from the user side. The community sub-group still meets every month to refine these requirements and to find practical solutions for the many problems that come up during their daily work. The other two subgroups are invited to the plenary sessions, which are scheduled on a yearly basis and which receive a positive response from the sub-groups. This underlines the fact that an environmental information system is a continuous task.

KIOSK CONCEPT

The communities of the SaarMoselle region practice an active and open information policy. This means that basically the same information is available to both administrations and to the public through the Internet and information kiosks. For persons without Internet access, information kiosks are also located at town halls and other central administration institutions.

The kiosks are different insofar as administrative kiosks allow the manipulation of data and telecooperation. Diagram 2 below shows this. For the data providers, however, there is no need to change their data for the uses of the separate kiosks, as data is delivered in one format. All further handling is performed by the TEMSIS server software.

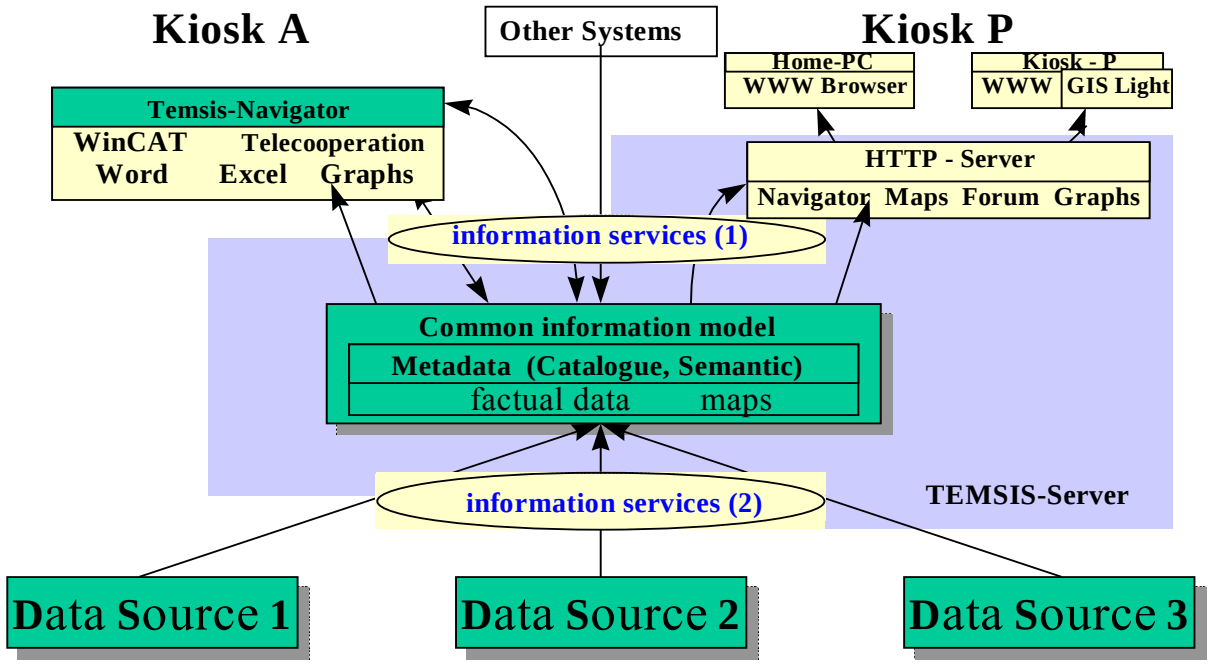


Diagram 2: Administrative (A) and Public (P) kiosk design.

The Public Kiosk

Citizen participation is required by national law, and so they should be informed about various projects and their environmental impacts. General interest in environmental problems has also been increasing and citizens are now becoming involved in the Agenda 21 process to support sustainable development.

Following the *Directive on Access to Environmental Information*, European citizens have the right to access information on any environmental issue they require. It was explicitly pointed out during the discussion of this Directive that there should be no restriction on the intended use of that information, therefore, the citizen requiring information does not have to justify his/her interest.

In addition to the Directive, it is increasingly becoming good practice (at least in some EU Member States), to actively provide environmental information to citizens, To date, this is usually done in the form of press releases and in regular publications by national, regional or local government authorities.

In promoting the active involvement of citizens, the public kiosk provides a discussion forum besides straight information. The information component, is not limited only to environmental data.

The Discussion Forum offers:

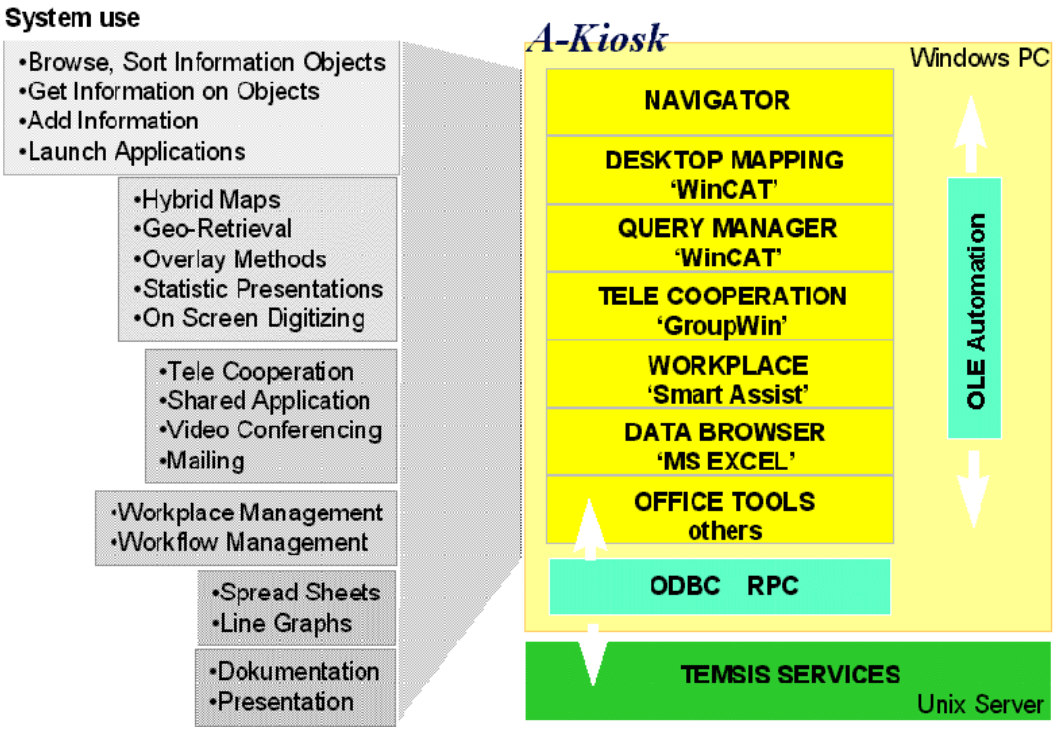
- Message boards (newsgroups);
- Moderated discussions;
- User portraits (citizens, communities, authorities, enterprises).

The Information Forum provides:

- The actual environmental situation;
- Catalogues of data, expertise, competencies;
- Lists of local and regional events.

The Administrative Kiosk

Using the TEMSIS network, local and regional environmental authorities can easily discuss developments or incidents which require immediate action. Environmental viewpoints can be introduced into the decisionmaking processes as early as possible. Applying advanced telecommunication technology to environmental problems strengthens the decisionmaking process and thus creates a considerable social impact. The following diagram shows the properties of the administrative kiosk:



The information delivered to the citizen can be produced by administrative experts. There are a number of automatic processes for data presentation.

An important component of the administration kiosk are the **collaboration services** provided based on the GroupWin system. This incorporates the following functions:

- External start up of the conference from the Navigator application;
- Videoconferencing using the H.320 and T.120 standard;
- Application sharing with Netmeeting functions;
- Answering machine;
- Switching of bandwidth from 1 to 2 B-channels and vice versa;
- Basic functionality for flexible allocation of bandwidth to different resources (audio-video data);
- Database access using TCP/IP over ISDN with additional driver software;
- Reservation service based on database;
- Workflow for conferencing including Agenda and Checklist;
- Multi-point conferences;
- Workflow support for Multi-point conferences including support software to manage conferences.

There is widespread suspicion that that the longwinded process involved in obtaining permission to build and extend premises e.g. for industrial operations result in economic loss (disadvantages). A regional networked environmental information system provides a quick overview of the possible problems related to the investment decision. At an early time, the planner can take these facts into consideration. This advantage lacks in most circumstances where a national frontier is involved. Data on a network can be more easily maintained and thus be more reliable and more up to date.

OUTLOOK

There are more then 60,000 communities in the EU with a potential for using Info Kiosks to distribute information to their citizens. TEMSIS is an exemplary implementation of the EU Directive concerning access to environmental information. Enterprises are increasingly devoting greater interest to Eco-auditing and can utilise info-kiosks to publish their results, thus reaching a wide sector of the public, and improve their "green image."

Experiences gained in transnational networks can be valuable in all regions within and beyond the EU. For those regions with environmental problems, TEMSIS can offer help for administrative and political decisionmaking. The multi-media presentation in the form of maps, pictures etc., can easily clarify complicated facts. A comparison between similar or different regions will be made more obvious.

Many cities in the SaarMoselle region are now considering Agenda 21. TEMSIS offers a good basis for citizens involvement in this process, especially if transnational aspects are also taken into consideration.

The causes for environmental problems are sometimes of a community-based local nature. Most frequently, common industrial standards of production, consumption habits of societies, and deficiencies in regional, national and international regulations can be traced as the cause of environmental hazards. Thus, local noise problems depend on global transport and traffic policy, air pollution depends on international legislative standards of emissions on power utilities, heating, vehicle emissions, and industrial processes.

Local environmental policy is trying to cope with this diversity of environmental problems. Following the subsidiarity principle, environmental issues are treated locally or regionally wherever possible. But the transboundary nature of the environment and its problems forces local policy to act in the spirit of global responsibility. And this forces international cooperation in environmental issues.

Good environmental policy is built on three pillars:

- Awareness of environmental problems;
- Legal regulations;
- Enforcement.

In all three areas there are great differences between the EU Member States. TEMSIS has begun to have an effect in the first of these three issues, and thus aids closer cooperation in our region. With growing integration of Europe, the next two subjects will also see progress.

The communities of the SaarMoselle Avenir Association are committed to continuing TEMSIS following the official close of the project. Though financing the project will be rather difficult, the benefit in realising cooperation is essential.

REMSSBOT: Integrating Distributed Local Environmental Information Systems

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FOREWORD

The REMSSBOT project (Regional Environmental Management Support System Based On Telematics) was launched in January 1996 with the support and financial contribution of the European Commission within the fourth Telematics Application Programme (TAP) of DGXIII. It succesfully completed in December 1997.

OBJECTIVES

REMSSBOT's main objective was to make data from several different databases available to the user (typically public administrations), not by building a centralised data warehouse but by keeping data at its original location. This included developing one simple interface for multiple environmental topics and simplifying access to integrated environmental information. This is accomplished through the use of a Catalogue of Data Sources (CDS) as a main front-end information tool (based on the guidelines of the European Environment Agency) and a number of gateways to the existing databases (defined as "information services"), accessing real data located in remote databases (see Figure 1 below).

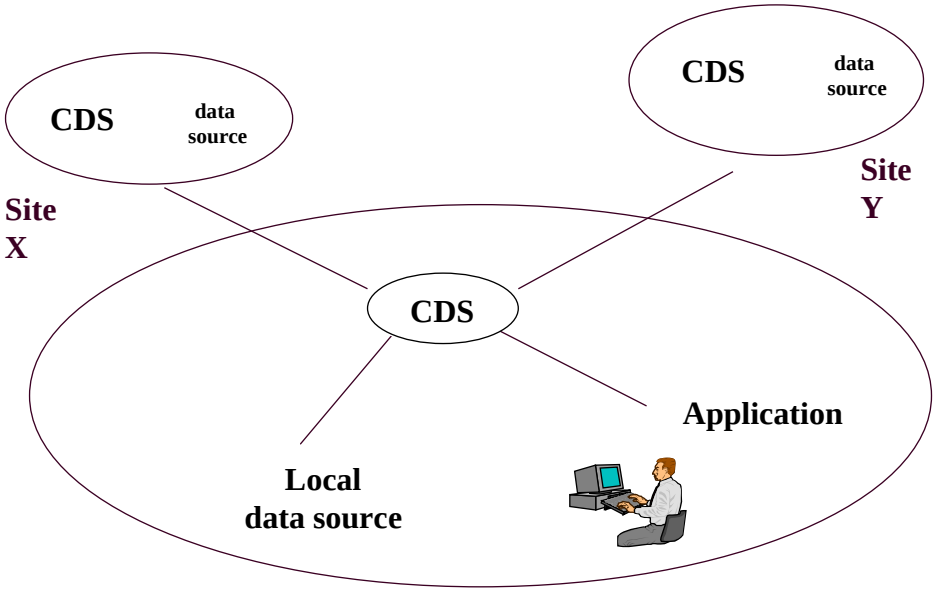

Figure 1: The REMSSBOT system providing distributed access to local data sources through CDS

The CDS describes which information is available, at which location, and at what time, and provides the necessary automated procedures to access the actual information. The supporting tools and the building blocks allow users to navigate through the catalogue and explore information sources regardless of environmental topic and location.

The systems further objectives included the better deployment of existing technologies and information, the implementation of integrated environmental management through the CDS, the wide dissemination of publicly available environmental information, and closer cooperation among public administration concerning environmental information.

USER NEEDS

The REMSSBOT Project proposal was based on the partners' common aim to share information in order to better manage the environmental problems faced by public administrations from the Piemonte (IT), Attica (GR) and Zeeland (NL) regions. However, the project results can be of interest to all public administrations at the local, regional, national and European level, research institutes, universities, laboratories, environmental agencies, the mass-media, private companies and the general public. The technical solutions proposed by REMSSBOT are not limited to the environmental sector but are suitable and easily applicable to other domains.

THE REGIONS AND AREAS OF APPLICATION

Seven partners from the following three European regions participated in the project: Attica (Greece), Piemonte (Italy), and Scheldt (Netherlands-Flanders). One demonstrator in each region supplied environmental data and evaluated the technical solution proposed through REMSSBOT.

- In Piemonte, the chosen field of application was a system that could support the management of administrative and technical investigation procedures by providing regulatory information concerning industrial plants, specifically those plants which carry significant risk of accident generated by industrial activities characterised by the storage and/or processing of relevant quantities of hazardous substances. Support was provided for analysis of the plant setting (process cycle and hazardous materials), the plants surroundings both from a territorial and an environmental point of view, the risk analysis, the safety measures and the emergency plans.
- In Attica, the demonstrator targeted a single, unified system, through which it would be possible to access information collected by various authorities concerning air pollution and bathing water quality. Concerning air quality information, the system aims to collect all air pollution measurements and to unify them into a single air pollution picture. Concerning bathing water quality, the system has the objective to register bathing water quality measurements made according to EU directives and present them in a unified and structured way.
- In Scheldt, the objective was to implement a system that supported water managers with environmental information within the region (the Dutch and Flemish part of the River Scheldt catchment area). Specifically this concerned different aspects of water management: documents (projects, investigations, permissions), digitised maps and tables with different parameters, such as the dissolved oxygen concentration, nutrients, the concentration of a selection of heavy metals and the situation of communal and industrial pollution.

THE PARTNERS

CSI, the consortium providing the information system, is a Government Agency providing IT services in Piemonte, Italy. Two of its main customers (and which are also CSI owners), Piemonte Regional Government (Regione Piemonte) and the Province of Turin Government (Provincia di Torino) acted as sponsoring partners of CSI in the project. The Province of Alessandria and the Laboratory of Public Health of Grugliasco, now the sub-provincial Department of the Regional Agency for Environmental Protection (ARPA), were also involved in the REMSSBOT project as both providers and users.

In the Netherlands, the Rijkswaterstaat, the Dutch Ministry of Transport, Public Works and Water Management (RWS) served as the Scheldt-based partner. Three bodies of the Rijkswaterstaat were involved:

- The Zeeland-based, RWS Regional Department, which, due to geographical location (with responsibility for the River Scheldt), acted as a full partner to the Dutch contractor;
- RIKZ, the National Institute for Coastal Zone Management, which advises and provides data on the sustainable use of estuaries, coast and sea, and protection against flooding by the sea, was involved as an associated partner;
- RIZA, the Institute for Inland Water Management and Waste Water Treatment, which conducts research and provides advice on matters relating to water management and the restoration of water systems, and which also provides recommendations on the issuing of licenses for wastewater emissions.

EDS Netherlands, a Dutch subsidiary of one of the world leaders in the application of Information Technology and a long time supplier of Rijkswaterstaat was involved as an associated partner. The Flemish Environmental Agency (VMM) was also directly involved in the project for the Scheldt region.

ITLD (Information Training Local Development) represented the Greek Attica region. ITLD is a development agency serving Greek local authorities, established in November 1990 by 23 municipal enterprises as a public limited company. Its establishment came as a response to the continually growing needs of local authorities for extensive information, by making the most of local resources, and by becoming actively involved in development projects. Its mission, and the strong representation of the local authorities in ITLD testifies to the high integration of user needs in all the phases of the project. DIENEKIS, which cooperates with many local bodies in the development of innovative projects, was involved as an associated partner of ITLD.

PROJECT ORGANIZATION

The project was divided into 10 work-packages, in order to properly perform the required activities. The first four work-packages (WP01-WP04) pertain to horizontal activities, valuable for all partners and important in coordinating efforts. The remaining six work-packages (WP05-WP10) concern activities at the regional level, devoted to upgrading knowledge on current technologies and understanding of user aims through useful demonstrators. Figure 2 shows the REMSSBOT project work-package list, and internal organisation.

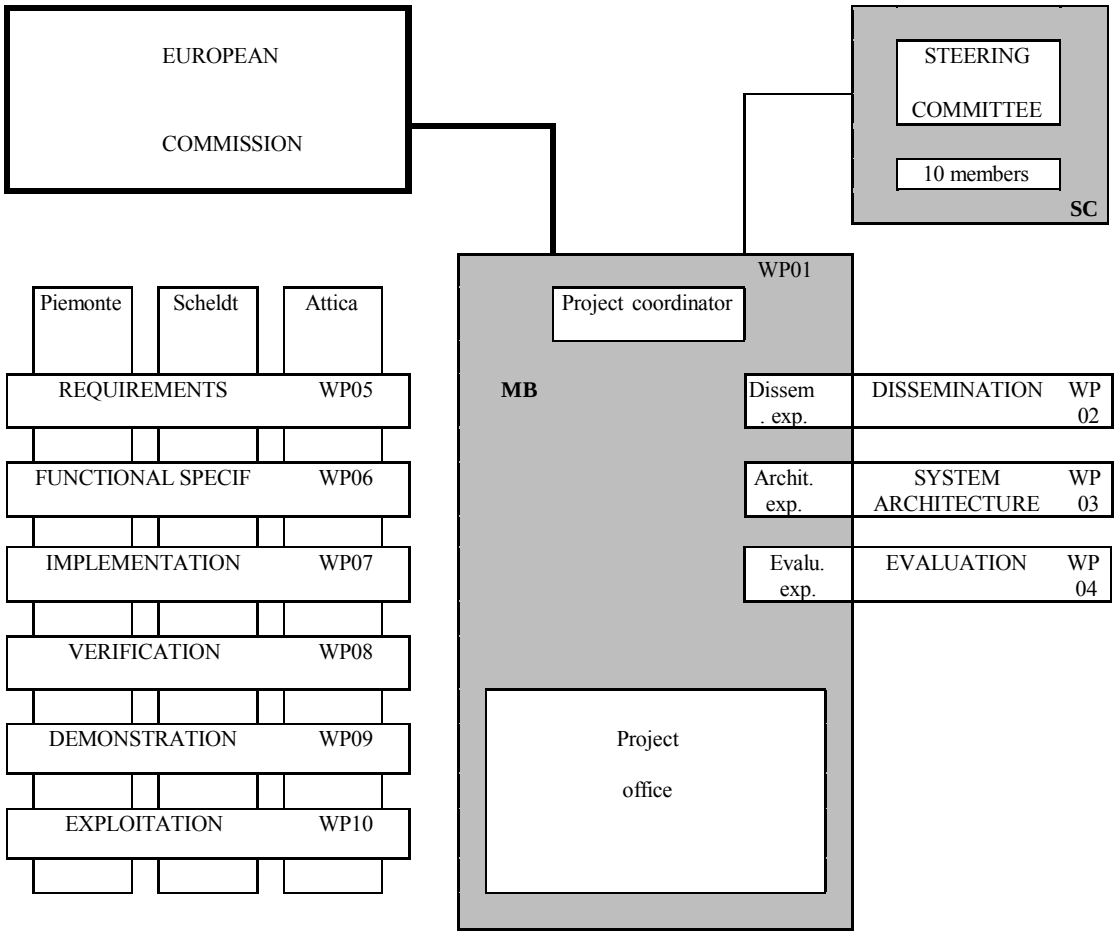

Figure 2: REMSSBOT work packages and organisation

TECHNICAL INFORMATION - THE CATALOGUE OF DATA SOURCES

The REMSSBOT system provides access to factual data and information through the Catalogue of Data Sources (CDS). The CDS is a database or "catalogue" containing information about a number of available data sources, i.e. the data contents, providers, and the means to access the actual information through the CDS. Thus, the user of the system can find out what information is available in the network, at what location, and how to access that information at any specific location. These retrieval services can be summarised in the following way:

- **R-Information** offering a description of the available environmental information at a site for which the data provider must be directly contacted;
- **R-Product** including documents, spreadsheets, flat files, HTML pages, and maps that can be downloaded;
- **R-Process** including access to data from the regional data providers databases.

While R-Information provides simple information about the source of information, R-Product initiates a URL to an html page on the WorldWideWeb. Textual documents or an image is made available for the user which can be saved or downloaded (depending on the type of R-product). Textual forms of information are documents in a .doc format. Available images can be either simple bitmaps or images of downloadable georeferences as e00 files and can be visualised in an ESRI ArcView environment where the user can edit these images.

In activating the R-Process, the user launches a query directly onto the database of the provider. The nature of the query is to some extent predefined by the provider of the data while the user sets the value of each constraint parameter.

REMSSBOT also defines an underlying layer of services, the E(lementary)-Services, which rely on Object Oriented Technology and in particular CORBA (Common Object Request Brokering Architecture). E-Services are designed to accomplish elementary tasks, such as data retrieval and filtering. More complex tasks are implemented at the R-Service level by executing a series of E-Services. R-Services consist essentially of a list of the executed E-Services.

The REMSSBOT Key Technologies are the following:

- Object Oriented Technology;
- Web Technology;
- CORBA (Common Object Request Brokering Architecture).

The CDS and R-Process functions can be accessed through:

- The REMSSBOT-client program installed on a PC or a Workstation
- A web browser.

The REMSSBOT-server application can access meta-information from the CDS database and execute R-Processes which access data from different Regional Data Providers (through the E-Services). The data provider databases and the CDS database are accessed through CORBA.

Figure 3a highlights how information would be traditionally accessed. Each would access data either in a client/server environment or through a Web browser.

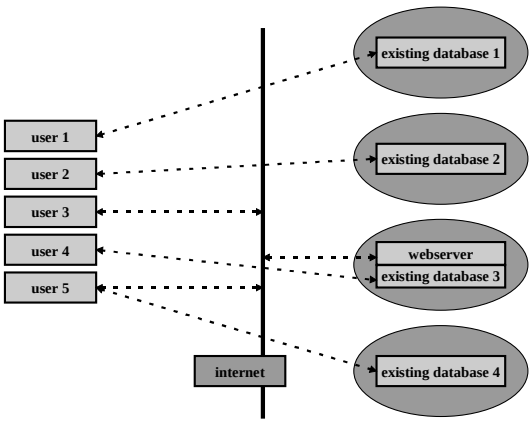

Figure 3a: Traditional means of accessing databases

Figure 3b shows how the REMSSBOT solution allows the user to access several different databases without departing from their remote site. Access is permitted through both a client/server and Web browser environment. Both of them use CDS to navigate among data and information as if it is one collection.

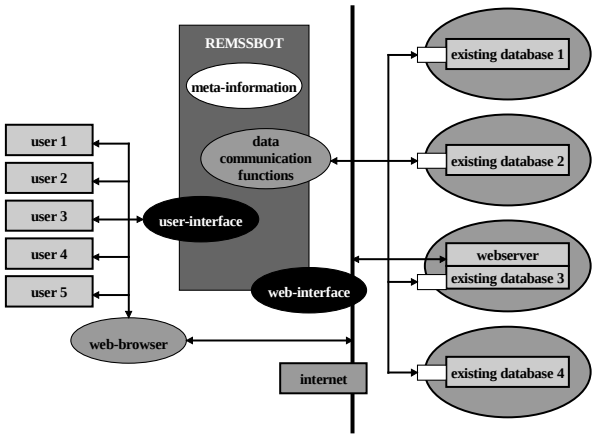

Figure 3b: The REMSSBOT solution to accessing databases

Figure 4 shows the general REMSSBOT system architecture.

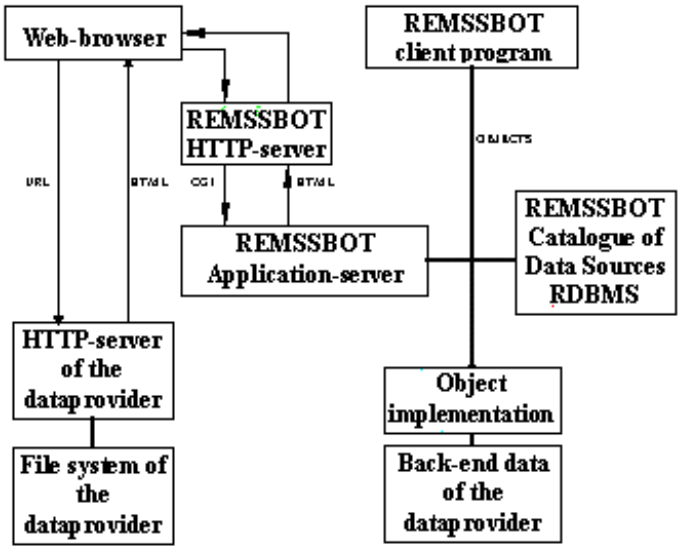

Figure 4: REMSSBOT architecture

EXPERIENCES IN IMPLEMENTING THE APPLICATION

The REMSSBOT project has proved to have been valuable, not only at the regional, but also at the European level. First, it has shown how telematics applications can be used efficiently for the benefit of the environment, and has helped in understanding and gaining experience in the CDS concept. Second it has showed the value of pan-European cooperation and knowledge transfer and expertise through the coordination and parallel implementation of three applications on varying topics in differenct regions. During the project, special care was taken to define an evaluation mechanism for the project according to Commission guidelines.

Having closed the project, and an assessment of the three "pilot sites" completed, the main benefits of the REMSSBOT application at the European market level can be described as follows:

- Better and easier management of environmental information for European institutions in multiple locations. Benefits include:
  Improved effectiveness of authorities: better and quicker information, more sophisticated information organisation and management, possibility for more efficient decisionmaking;
  Economic development: money saved from avoiding duplication of existing information through building a centralised data warehouse;
  Pan-European cooperation: simpler and broader information exchange, better monitoring of the environmental situation in Europe.

- Flexible system architecture and software tools:
  Useful for several application domains;
  Independence of other operation systems, platforms and databases types;
  Ease in upgrading or extending functionality.

- Compatibility and contribution to the current EU needs and activities (especially EEA and ETC/CDS)

TRANSFERABILITY ASPECTS AND EXPLOITATION

The purpose of REMSSBOT was to demonstrate the feasibility of designing and implementing environmental applications using an architecture based on the CDS as the unifying element between geographically dispersed and topically separated data sources. This main purpose was fulfilled, as shown in the results described in the previous paragraphs.

REMSSBOT, though the three regional demonstrators in Piemonte, Attica and Scheldt, also proved that the concept of the project can be successfully applied in different application domains and geographical areas (addressing different user needs and requirements), where the exchange of information from several locations is needed.

The REMSSBOT approach in environmental information management has already been appreciated from users at a regional, as well as European level. Some areas for its further exploitation have already been identified:

- The European Environment Agency (EEA) expressed interest in using REMSSBOT to offer access to data between the European Topic Centres (ETCs), the National Focal Points, and Reference Centres (NFPs, NRCs). This comes in light of the fact that the EIONET network has now become operational. REMSSBOT has been in close contact with the ETC/CDS of the EEA, since the project was largely based on the EEA's CDS. At this point, REMSSBOT is considered to be an extension of the EEA Catalogue of Data Sources concept, since besides navigation through the Catalogue and the metadata, it also enhances access to real data (using CDS as the core information element). The REMSSBOT CDS data model has thus been adapted to form the new version of their CDS (version 2), which has been recently developed.
- The National Biodiversity Network in the UK has the REMSSBOT data access concept most suitable and appropriate to their needs, and is in the process of negotiating future cooperation.
- In Italy, the REMSSBOT approach was applied to GAIA, an inter-regional project that started in December 1996, with the aim of developing an Environmental Information Network among six partner Regions, the Ministry of the Environment and the National Agency for Environment Protection. Moreover, local public bodies asked CSI for a follow-up to the project, in order to complete demonstrator development, providing a stable and fully operational service. REMSSBOT is currently under evaluation for application to a further domain;
- The REMSSBOT architectural solution has also been proposed for inclusion in the European Union, INTERREG2 project whose task is to share meteorological data and information between the two partners involved: the Piemonte Region in Italy and the Rhone-Alps Region in France.
- Other examples of likely REMSSBOT application in Europe include:
  - The development of a Decision Support System for Estuary management.
  - Access to remote sensing data using the REMSSBOT architecture.
  - North Sea monitoring using the REMSSBOT System for integrated data access on sediment flow, nutrients, currents, algaeblooms, etc.
  - Improvement in monitoring and accessing databases, and document sharing,
  - Linking of all databases related to oceanographic issues and ensuring available content to all user groups.
- The development of a National Environment Information Network and National CDS in the Netherlands and Greece, expanding the domains, as well as the areas of application.

COST-BENEFIT CONSIDERATIONS

REMSSBOT is considered by its users to be an essential tool for environmental information management. The benefits include:

- For authorities:
  - better and quicker provision and retrieval of information;
  - standardisation of the information management through the use of the CDS;
  - improved efficiency of decisionmaking;
- Increased cooperation between different public bodies;
- Wider diffusion of environmental information to the general public;
- Compatibility and contribution to the current EU needs and activities (especially EEA and ETC/CDS);

CONCLUSIONS

REMSSBOT offers potentially high benefits since it implements the ETC/CDS which has been developed by the European Environment Agency. It also promotes an advanced technical architecture, which facilitates information exchange between different systems. The Catalogue of Data Sources as a basis for data communication between regions and countries also gives a great stimulus for the standardisation of terms used for certain objects, activities or locations within a system.

Finally, the REMSSBOT approach and technical solution is in fact quite general and can be applied to similar problems of information exchange among data providers in many different application domains, and not just the environmental field.

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ENVIROCITY: Delivering Environmental Information to the Public

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INTRODUCTION

In every market-based society, environmental information serves several purposes:

- To support administration in long-term decisionmaking;
- To raise public, NGO and administrative awareness, and;
- To give up-to-date information about environment problems.

Electronic media can facilitate the distribution of environment related information, it increases the speed of access, and helps lower costs.

The users of such information can be divided into several groups with different needs (see also Diagram 1 below);

- The General Public - Small amounts of information which are simple to understand
- Education - Additional background-information
- Administration - Evaluated information for help in decisionmaking
- Science, planning companies - Complete high-level information including source data

Information services receive and deliver this information by different media in order to account for different user needs. In the states of the former European "Union of Twelve", some 5 to 15 percent of households had Internet-connections - a small audience for electronically delivered information to the broad public. Increasingly, universities, science and commercial sites are now well equipped with Internet access, forming an audience for high quality/high depth electronic information.

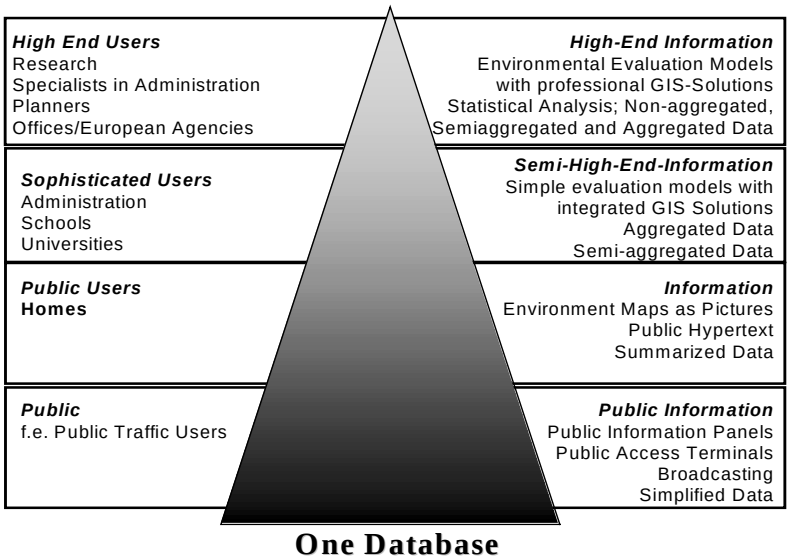

Figure 1: Information uses and types of information

MUNICH: A CASE STUDY

Munich covers an area of 313 km² with 1.3 million inhabitants. About 8 percent of the total area is public green space, while17 percent is dedicated to transport routes. The main industrial sectors are car production, electronics, the media industry, insurance and banking. Munich is privileged to be a more or less young industrial centre. There are few severely contaminated sites, and the groundwater, which traverses Munich from south to north, quickly disperses pollution. The flora/fauna situation in Munich is less satisfactroy because of the limited resources in the area. Traffic induced air pollution caused by 800,000 cars and trucks crossing the city borders daily is the main problem in Munich.

Municipal Environment Information

From the inception of the Department of Environmental Protection at the City of Munich Authority, an environmental information facility called "Umweltladen" (Environment Information Shop) collected and disseminated information, relying on classic paper sources and personal communication as a means to inform people, and improve environmental awareness. In 1991, an environmental atlas for the City of Munich was compiled. It has twice been upgraded, and now contains some 70 maps and collateral texts describing the environmental situation. About 1300 copies of the Umweltatlas were printed and distributed mostly for free to administrations, universities, schools etc. The sale price of 390 ECU does not cover the production costs. This year the Department of Environment will merge with the Department of Health. The objective now is to build a health and environmental information system.

In 1995, the environmental information system was successfully funded under the EU DG XIII Telematics Programme. This enabled the existing environmental information, especially the environment atlas, to be produced in an electronic media form i.e. Internet and CD-ROM format. In cooperation with the Environmental Systems Research Institute (ESRI), a pre-demonstrator programme for public access mapping programme was developed. Later it was decided to develop first classic Internet pages and to postpone mapping solutions until the availability of server-based Internet mapping facilities. The prototype of our health and environment system has now been running on an Intranet for more than a year now.

Intranet

The complete "Umweltatlas" has been converted into WWW format. For the Intranet, we have an ArcView/ESRI based, but heavily simplified map viewing program which allows layer selection, zooming/panning and information retrieval of the maps and linkage to our oracle database. This client based map viewer will be replaced by a server-sided mapping facility based on MapObjects/ESRI to ensure complete independence of the client Software.

Online data is also transferred from two ozone measurement facilities while automatic warnings are generated (and checked) in case the permitted limits are exceeded. Connecting to several other Bavarian measurement sites is currently underway. Additional data includes health, Agenda 21, energy, recycling as well as a metadata catalogue.

The Intranet is used for intra-administration information purposes as well as for the evaluation of the Internet pages. In the third quarter of 1998, all our Intranet information will be available to all departments of administration in the City of Munich connected to the backbone.

Internet

Most of our Intranet pages are copied to the Internet site (http://www.muenchen.de/referat/rgu), with the exception of the map viewer which is replaced by gif images of the maps. The air pollution-values are shown on the main page in a 'ticker-like' fashion and in depth on lower-level pages, which allow a comparison of past values. For feedback, email addresses are provided on every page.

Public-Access PC / InfoKiosks

These facilities mirror the Internet site, but are limited to local WWW addresses. The Public-Access-PC in our 'Environmental Information Shop' uses the same map-viewing-tool as that used in the Intranet, and therefore offers enhanced viewing capability over the classical small-scale paper maps of the "Umweltatlas".

Infoscreen (proposed)

Online data concerning ozone air pollution (summer) and NO_2 (winter) will be displayed on infoscreen-terminals (about 3 x 4m beamer screens) in Munich's subway stations once contract negotiations are completed and a sponsor has been found.

Automated Air Pollution Email Warnings

Until 1998, warnings caused by exceeding ozone value limits imposed by the environmental protection law were manually faxed. This costly manpower method has now been replaced by automated email warnings, since most receivers have email addresses. For those without email, an email-fax gateway will be tested.

Accessibility and User-needs

Access to electronic environmental information was and still is, a controversially discussed theme within the Department of Health and Environmental Protection. In Germany, only a minority of private persons are able to request information by Internet, and it must not be underestimated that this is a minority characterised by;

- High education level;
- Above average financial power.

Science and commercial sites are using the Internet more and more as a searchable medium, and this can only diminish the value of paper-only publications. For the broader public, on the basis of the 'user-pyramid', news delivered by 'modern' media seem to have a value of their own. Furthermore, because of the growth of commercial radio and TV channels, even minor news presented in a tailored way is distributed because of their local relevance.

COST/PROFIT ANALYSIS OF THE DIFFERENT MEDIA

The levels of funds invested by any administration must be accounted for from a user's point of view, since every cent spent is contributed by the very people the information systems are built for.

The value of Health and Environment Information itself can not be submitted to a cost/profit analysis because of the lack of fundamental data and firm evaluation methods. The popular (German) knowledge that 'precaution is cheaper than cure' obviously is true for environment problems. Furthermore, constraints, for example, in the traffic sector are very unpopular, so information seems to be the only way to achieve a change in behaviour, and with that a relief in environmental stress and resources.

Different means for distributing health and environmental information can be evaluated one against the other and be brought into an ordinal file. The experience gained in the process of publishing environmental information in the City of Munich shows that electronic media can be a cheap method in comparison with print media when publishing environmental information. The "Umweltatlas," for example, cost some ECU 40,000 to print one enhanced version with 13 Maps. The entire electronic health and environmental information system in comparison costed some ECU 150,000. The air pollution warnings via fax require some 100 to 200 man hours per year, while the email service, perhaps 10.

DESIGNING A SUCCESSFUL ENVIRONMENT INFORMATION SYSTEM

- **Check Target Groups and User Needs**

News and local problems deserve the same attention as in-depth environment and health information. Public interest for an information system is therefore very important in justifying spending. In Munich, ozone-warnings attract public attention and intend to guide people to our other Internet pages.

- **Evaluate Existing Information**

In many administrations environmental information is already collected. This data may become components of an "environmental information system," effectively shortening the development period for such a system.

- **Allow a Construction Phase for an Internet Site**

Start with a small, well structured system to attract public attention and to accustom the public to the continuous growth in information rather than presenting a full grown site which remains static for a longer time is advantageous.

- **Develop Meta-level Information**

Electronic media and information systems are forced to operate with constantly changing data formats. Methods that can use information from one source for several media, and in several depths of detail are necessary. The Department of Environmental Protection of Munich therefore developed an SGML (ISO 8879:1986) system to capture and process textual information. Hopefully it will outlive the next three generations of word processors we are otherwise faced with using in developing the paper version of the "Umweltatlas". To reduce costs, a lot of public domain software can be used (perl, nsgmls, emacs) which has the additional advantages of multi-platform availability, continuous development and less breaks in backwards compatibility. Cooperation with students can also reduce costs.

- **Create a Corporate Identity**

Creating a uniform framework for all pages of the information system and staying free of browser-dependent features is of considerable importance. A corporate look can be modified in moderate steps to retain a 'modern' and 'fresh' look.

- **Select Distribution Media and Tools**

Though Internet/WWW is very popular, other electronic media are just as important for different tasks. For example, in distributing news in a non-highspeed environment, email is recommended because of its low bandwidth needs and hardware and software server needs. For public infokiosks, the widespread model of a joint venture with a commercial agency seems to be a good way to cut costs. The City of Munich leases locations for the free publication of municipal WWW-Contents. To attract the attention of a greater number of people, infoscreen-like devices in crowded places are a suitable means to distribute headline-like environment information.

- **Maintain a Permanent Dialogue with User-groups**

Quantitative evaluation of any information system's success is almost impossible. A reasonable way to accurately develop the system is a permanent dialogue with target groups, especially those multiplying your information (schools, newspaper, NGOs).

IOZIP: The Prague Environmental Information System; Information for City Authorities and the Public

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SUMMARY

Prague, like other large cities, has its own environmental problems and requires necessary background information. One of the most important activities in this field is the development of the Prague Environmental Information System (in short IOZIP). The system is managed by the Institute of Municipal Informatics of the City of Prague (IMIP). It was developed more than ten years ago, and since then has passed through several conceptual, technical and organisational changes, however the basic objectives are still valid. Its purpose is to collect environmental data from different sources, to process the data in digital form, and to produce summarised output information for the City Authorities, experts and the public. The system covers a number of problematic issues such as air, water, soil, landscape, noise etc. Modern telematic technologies like GIS and the Internet are also being used for data processing. The resulting information is available either in digital or printed form (CD-ROM, Internet, yearbooks, atlas etc.).

INTRODUCTION

The Institute of Municipal Informatics of the City of Prague (IMIP) is an institution supported from the municipal budget of Prague and is responsible for activities aimed at supporting the development of the city's information systems (such as the development of a municipal computer network, electronic mail services, municipal WWW server administration, compilation of digital maps, administration and management of selected city data). One area the Institute has been focusing on is the environment, namely through the Prague Environmental Information System and other related activities.

The origins of the System date back to the mid-1980s, when the environment field was earmarked to be one of the thematic registers covered by the Municipal Information System Project. At that time "IOZIP" (derived form the Czech "Informacni system o zivotnim prostredi v Praze") was launched with the monitoring of selected environmental elements and supplementary data collection. During its existence, the system has undergone some organisational and technological changes. Since 1994, it has been operated and administered by IMIP. IMIP also launches and coordinates additional activities related to the processing of information on the environment in cooperation with Environmental Department of the Municipal Authority of the City of Prague.

PRINCIPAL CHARACTERISTICS OF THE IOZIP SYSTEM

- The Prague Environmental Information System (IOZIP) covers a range of complex different activities related to the collecting and processing of data on selected environmental components within the City of Prague.
- The purpose of the System is to:
  - Collect, sort and process data, acquired by various organisations and institutions;
  - Ensure regular measurement of environmental factors for which no other monitoring sources exist;
  - Evaluate and summarise the data and produce output information;
  - Provide outputs from the System to municipal authorities and other users.
- The System is managed by the Institute of Municipal Informatics of the City of Prague, both in material and financial terms, and in relation to other environmental activities;
- IOZIP does not replace other specialised data collection and processing systems, e.g. air pollution monitoring, waste management etc., but relies on selected data acquired from other systems;
- The central IOZIP database runs on a network server under the FoxPro software system. Preparations for its conversion onto a higher-level relational database (Oracle platform) and establishing direct links to GIS are currently underway;

- The central database content consists of results of measurements of environmental components in the following main "problem areas;" air, water, soil, surface and greenery, noise;
- During the last three years, thematic environmental maps have been generated and administered in GIS format as part of the IOZIP System;
- Information is disseminated in both digital and printed form (e.g. from database applications and GIS formats, yearbooks, atlases and maps). Selected data is also available on the Internet (http://www.monet.cz) and on CD-ROM;
- Yearbooks and other publications are produced based on data extracted from the central database, sets of map layers, the results of other projects, and data requested from experts.

THE IOZIP DATABASE

The IOZIP database currently comprises four principal components which mainly reflect the organisational aspects of data administration.

The Central Database

The initial phase of the System's development included a central database, regularly updated since the 1980s, and divided into problem areas and problem sub-areas of air, soil, surface and greenery, and noise (see Table 1 below). This reflects the nature and manner of data acquisition. The data is either collected from other organisations and institutions that operate state-financed data acquisition projects (such as the Czech Hydrometeorological Institute, National Public Health Institute, Public Health Office of the City of Prague, Water Management Research Institute etc.), or acquired under contract to IMIP (e.g. PÚDIS, Prague Sewage and Water Management Company, SALIX, Czech Union of Nature Conservation etc.).

Table 1: Review of Sub-areas of the central IOZIP database.

AIR	
PPO 11 - Local air pollution along roads	Data acquired by a mobile measurement unit with a measurement cycle of several days; including immissions of sulphur dioxide, nitrogen oxides, carbon monoxide, hydrocarbons, dust, lead, as well as complementary traffic and weather data
PPO 12 - Suspended particulate matter	Data on dust and contents of major elements and heavy metals in aerosols
PPO 13 - Dust fallout	Data on dust fallout, i.e. the solid fraction of atmospheric deposits, and major element contents
PPO 14 - Atmospheric deposition	Precipation quantity and quality data - total rain/snowfall, pH, conductivity, anions, cations, and heavy metals
PPO 15 - Station measurements of regional atmospheric pollution	Atmospheric pollution taken from the Air Quality Information System of the Czech Hydrometeorological Institute, including data from Prague automatic monitoring system sites
WATER	
PPO 21 - Surface water	Data acquired by monitoring the quantity and quality of water in streams - Vltava and Berounka Rivers, selected profiles on creeks
PPO 22 – Groundwater	Monitoring of groundwater quality in selected springs and wells
SOIL	
PPO 31 – Soil	Soil composition and contamination data from selected sites - urban, roadsides, reclaimed land etc.
NOISE	
PPO 81 - Traffic noise	Traffic noise data, complemented by traffic and weather information
SURFACES AND GREENERY	
PPO 41 - Surfaces and greenery	Environmental characteristics of land lot surfaces, acquired by visual inspection

Independent Database Files

Database files resulting from other projects are also collected within IOZIP. This includes data on air pollution sources (REZZO - Registers of Air Pollution Emissions and Sources), used particularly for air quality model calculations (see Table 2 below).

Table 2: Data on air pollution sources.

REZZO 1	Large stationary sources (capacity > 5 MW) and significant technologies - point
REZZO 2	Medium stationary sources (0.2 - 5 MW) and technologies - point sources
REZZO 3	Small stationary sources, local heating - airborne sources
REZZO 4	Mobile sources, traffic - linear sources

Thematic maps (GIS)

Thematic maps are generated in GIS format (MapInfo, ArcView) as a part of the IOZIP system under the name GIS-ZIP, and include an application program for their presentation. The GIS layers present data selections and aggregations from the above mentioned two categories (see Table 3 below), and digitised map outputs produced as parts of projects run by other institutions (such as maps of the Institute of the City Development, Municipal Authorities of Prague etc.). The digital maps of IMIP's Geodesy Department serve as background for environmental maps.

Table 3: Review of thematic map layers in the GIS-ZIP system

THEMATIC AREA – Topic	**Remark**
AIR	
Local atmospheric pollution along roads	Sites and data from the PPO 11 database
Airborne dust particles	Sites and data from the PPO 12 database
Dust fallout	Sites and data from the PPO 13 database
Atmospheric deposition	Sites and data from the PPO 14 database
Station measurements of regional atmospheric pollution	Sites and data from the PPO 15 database
Prague climate quality classification	Digitised maps contributed by ÚRM, ČHMÚ
Note: ATEM layers are generated in the framework of an independent project (air pollution sources, reference points with results of model calculations and maps of air-pollution areas are incorporated into interlinked GIS-ATEM and GIS-ZIP applications)	
WATER	
Surface water	Sites and data from the PPO 21 database
Groundwater	Sites and data from the PPO 22 database
Streams - water management authorities	Stream courses digitised from maps provided by PKVT
Hydrogeological risks	Digitised map contributed by ÚRM
Springs and water-conveying channels	Digitised data contributed by ÚRM and VÚV (new in 1997)
Sources of drinking and supply water	Digitised data contributed by IKE (new in 1997)
SOIL	
Soil	Sites and data from the PPO 31 database
Radon-related risks	Digitised map contributed by ÚRM
LANDSCAPE	
Surfaces and greenery - cadastral areas	Data from the PPO 41 database - review of the cadastral area
Biomonitoring	Boundaries of areas under observation
Nature protection areas and their protective zones	Accurate boundaries delineated by IMIP in cooperation with the Environmental Department of the Municipal Authority of the City of Prague (new in 1997)
Nature parks	Boundaries taken over from URM

Table 3 (cont.)	
Vegetation maps	Outputs of the "Health Condition of Parks and Greenery Assessment" project - IMIP, MHMP, Aquatest (new in 1997)
Landfills and historical pollution	Digitised data of the Environmental Department of the Municipal Authority of the City of Prague
Note: The Greenery Master Plan and Territorial System of Environmental Stability layers are produced within the framework of independent projects and will be included into the GIS-ZIP system after verification	
NOISE	
Traffic noise	Sites and data from the PPO 81 database
Noise distribution map	Noise levels on the front faces of residential houses, digitised data by IMIP, provided by PÚDIS, AKMEST (new in 1997: Prague 8 and Prague 2)
Automotive traffic noise map	Noise levels along selected roads and streets, digitised data by IMIP
Air traffic noise	Digitised maps of ÚRM, Techson
Anti-noise barriers	Digitised maps of ÚRM, Dinprojekt

Supporting Data Contributed for the Yearbook and other Publications

Sets of data collected for publishing purposes are presented, for example, in the *Prague and its Environment Yearbook*. In addition to all the data categories listed above and maintained in a digital form, written documentation from a number of institutions is also being collected and presented, such as annual reports or articles prepared specifically for the Yearbook. For the purpose of achieving a certain level of national and standardised environmental assessment allowing comparison of different regions and time periods, work has commenced on the development of an Environmental Statistical Database for the City of Prague.

In 1997, the transfer of data from IOZIP into the Oracle database environment began, with the installation of the necessary technology at IMIP. The project also includes the development of data management tools and output generation utilities in the Oracle environment, direct links to the GIS system, as well as the presentation of user outputs using Intranet/Internet (Web server) technology. Thus, the first steps toward data management standardisation in a standardized environment have been made, although the data has hitherto been produced and managed in various ways.

OTHER PROJECTS

Besides IOZIP, other municipal projects and activities undertaken by IMIP include:

- Digitisation of the Master Greenery Plan and the Territorial Environmental Stability System;
- Review of Boundaries of Small-area Nature Reserves and Sites;
- Noise Load Distribution Maps;
- Data on Air Pollution Sources (REZZO);
- ATEM - Air Quality Assessment Project;
- Monitoring of Toxic Organic Substances;
- PREMIS - Air Quality Information System.

Output data from these projects are incorporated into the IOZIP System, where possible, mainly as a part of the GIS-ZIP. Detailed information on these projects is regularly presented in the Yearbook.

USERS AND OUTPUTS

Data from IOZIP is provided to users in several standardised forms:

- Selected data from the central database and through user applications on PCs (SGU system, 1994);
- Data processed in the GIS environment and under user applications (GIS-ZIP system, 1997);
- *Prague Environment Yearbook* (in Czech since 1989 and in English since 1992);
- Other specialised publications - *Surfaces and Greenery in Prague by Cadastral Units* (1995), *Air Pollution Sources in Prague* (1997), *Prague Environment - Trends and Statistics* (1998);

- Set of standardised map sheets; *Atlas of the Environment of Prague* (1997, 1998), produced as output from GIS-ZIP in A3 format;
- New editions of maps in formats up to A0 (scale 1:10,000) containing environmental data (maps of natural protected areas, vegetation maps, noise maps, air pollution sources maps etc.);
- At the end of 1997, a set of eight publications was published on a CD-ROM under the name *Prague Environment 1*. The CD-ROM contains 6 yearbooks (4 Czech and 2 English), plus the Atlas of the Environment 1997, and a publication on nature protection areas in Prague;
- Yearbooks are also presented on the Internet under http://www.monet.cz

The primary data and PC applications are intended for the use of experts, namely members of environmental departments of the municipal and district authorities. Yearbooks, maps and other publications are available for public use (e.g. at the municipal map-shop at IMIP). Besides this, bespoke information (data selection, aggregation, maps etc.) can be collected and produced upon request.

Regular users of IOZIP's outputs are the municipal authorities and other institutions of the City of Prague (e.g. Institute for City Development, Public Health Office), organisations contributing data sources, state administration (The Ministry of the Environment of the Czech Republic), territorial planning architects and designers, experts for environmental assessment, students, and any Prague citizen interested in environmental information.

IOZIP plays an interesting service role not only for city decisionmakers, but for anyone looking for aggregated data on Prague's environment, or who needs better orientation with regard to Prague's environmental data.

Community Building through the Telecottage Network

The Practice of Estonian NGO's in the use of Telematics for Sustainable Development

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INTRODUCTION

In 1980 I was walking the streets of Budapest and asked for directions. The person I turned to asked me where I came from.

”Estonia”, I answered.

”Oh, Esztorzsag”.

When we ourselves had lost our belief in independence, in Hungarian, the word for our State still existed. It was a good experience.

We greet Hungary today, when we discuss communication. It is a means of living together, understanding, tolerance, negotiation, and a means of cultural memory. But how best to use it?

THE "KODUKANT" (HOME NEIGHBOURHOOD) PROJECT

The Estonian State began rebuilding itself in 1991. Having been left without homes, land and ownership, but with independence regained, it is natural that Estonian's started looking for a way back to reasonable, traditional ways of rural life. Ways of life that sought a natural and cultural identity.

In an environment context, rural structures, built up to unreasonably use resources had been destroyed and left behind empty spaces. Agriculture that polluted the environment had ceased to exist. Small farms and small enterprises that are in better harmony with the surroundings have begun to take over with changes in land use and land ownership. Many people have begun to acquire land to build on or to invest in. At the same time, changes in the economy and in the social sphere are overwhelming. New business concepts are changing the working climate. This being the situation, it is important that new owners are fully absorbed into existing communities and accept the nature saving values of generations, and love towards local culture.

From here, one can say, the idea of reviving the village community in rural Estonia started. First as smaller, single projects and later on with more regular initiatives and even formal village movements on voluntary bases. The so-called "Kodukant" (or Home Neighbourhood) Project was initiated by a group of village people, together with Estonian and Swedish volunteers, with support from several Ministries in Estonia and the financial assistance of the Swedish Popular Movement Council in 1993. The objective was to support rural people and to rebuild village communities assist the process of social change with local people playing a leading role, local mobilisation, local initiatives, and increasing public participation, underlined by the principle of subsidiarity.

The Home Neighbourhood movement today involves ten regional organisations in Estonia, 500 local societies or groups, and 6000 participants, and can be said to have a big influence among rural people.

COMMUNICATION

The changes required of society cannot be managed by the State and private sector alone, particularly since it takes the participation of many people, namely the third sector. For this, the following changes in approach within society, and particularly among local community authorities, are necessary in facilitating social mobilisation, communication and cooperation:

i) Understanding the contribution of an individual;

ii) Technological development with an accompanying infrastructure that includes establishing communication networks;

iii) Development of media sources, dissemination and access to information.

To this end, so-called telecottages have been established to inform local people, and to facilitate feedback to local authorities and decisionmakers. Telecottages aim to: i) provide local information services in electronic and hardcopy format; ii) mediate information into the information network; iii) support local development; iv) support continuous and distance education, and; v) reach rural people through telematics. They are seen as a means for overcoming the degeneration of rural life brought about by the above mentioned changes in social structure, "braindrain", and desertion of rural areas, and help facilitate improved awareness among the general public and encourage public participation in the decisionmaking processes.

The History and Development of Telecottages in Estonia

Four periods can be recognised in the development of telecottages in Estonia:

1) 1993-1995 – Ants Tuuleveski, manager of the Rapla County Village Association, established the first telecottage in 1993 at Kaiu in Rapla county as a means to provide people, farmers and small entrepreneurs vital information and consultation opportunities to elaborate business plans. Other economic activities were linked to the telecottage and as a result the first telecottage seminar was held together with Swedish and Finnish representatives in 1993. The telecottage concept and network, supported by the Village Movement, began to spread when the Rapla Village Movement required information network connections and communication.

2) 1995-1997 – The Estonian Association of Rural Telecottages (or Telecottage Association) was established in Põlva County on 7 December, 1995. Endel Ervin, manager and founder of the Hüüru telecottage in Harju County became its project leader. The Association was established to coordinate the telecottage network, guarantee the feasibility of its activities, and encourage the development of local telecottages. These activities are achieved through seminars, workshops, regional meetings and information gathering exercises. Telecottages were subsequently established by enthusiasts and consultants, developers, small entrepreneurs, and farmers across Estonia.

3) 1997-1998 – The Telecottage Association started bringing together schools, libraries, and telecottages already serving information needs in rural areas by succesfully channelling their efforts into supporting telecottage services. The Association grew to some 50 telecottage initiators and members. Some 32 telecottages currently operate, with 20 more ready to start, and potential for 50 more to be established. The Association was joined by several foreign partners including the Swedish and Finnish Telecottage Associations, as well as the Open Estonian Foundation, supporting the provision of information services to the third sector in rural areas. Telecottages also have begun to receive support from the Estonian Ministries of Education, Culture, Regional Affairs, and Agriculture. However, central national fund programmes in Estonia have yet to support the further networking of telecottages. Support programmes still target the establishment of single telecottages. For this reason some telecottages exist that are not able to fulfil all their tasks, but are technically well equipped.

4) New challenges – A conference organised by the Telecottage Association, the Stockholm Environment Institute (Tallinn Centre) and under the ”Capacity 21” Programme in April, 1998, saw discussion concerning the further development of the telecottage network, including the establishment of a "National Telecottage Development Programme". In addition, the activities of telecottages in supporting sustainable development were discussed and experiences in strengthening communities were summarised. A symposium was proposed for October 1998 to discuss a common programme for the development of telematics in rural areas with an invitation extended to national and local authorities.

Opening Hours, Costs and Income

To guarantee that people can easily reach a telecottage, they have tended to be located in busy places such as shops, village centres, schools, and libraries. Most telecottages are open five days a week, and around 8 hours per day on average. Where a telecottage operator resides at the same location, for example, within a farm or family enterprise, more flexible opening hours are likely.

For young people and those users requiring ordinary information, access is usually free, while those requiring more specific services (plans, projects, design information) are charged. Income is small, however, and those operators having started with their own resources and without substantial outside help are increasingly working with outdated equipment which makes it difficult to satisfy the demands of clients and tasks.

Information collection relies on a network of volunteers, primarily from local community schools, libraries, and clubs, but also from across the county. Information dissemination activities have been part-financed with support from local and regional development programmes, however, this has not even covered a third of annual costs. Permanent contracts with local municipalities in terms of offering information services would support the network, while investments and operation might ideally be covered by national funds. In our opinion, an estimated 50 percent of the running costs and 90 percent of the investments should ideally be financed from outside. Otherwise, self-financing is relied upon and this accounts for the insufficient technical level of services.

Were the financing needs of Estonian telecottages to be met by national funds, the breakdown would be as follows:

Investments for 50 telecottages x 100,000 EEK = 5m EEK (Estonian Kroons)
Running Costs for 50 telecottages x 20 000 EEK = 1m EEK (Estonian Kroons)

SUCCESSFUL COMMUNITY BUILDING

Telecottages aim to support the development of communities, firstly by targeting the involvement of the following groups: local governments, politicians, schools and libraries, development centres and Agenda 21 work-groups, business circles, farmers, organisations working with regional and rural problems, and above all, villagers themselves, including local study circles and development groups.

Marking the growing success of telecottages, local municipal authorities are increasingly relying on telecottage information collections and skills when undertaking community planning and development activities. Communities have begun to cooperate with their respective institutions, culture houses, libraries, nongovernmental organisations (NGOs), and schools to elaborate Agenda 21 plans, and are now also working more closely and successfully as partners. The tendency is for the local municipality "Development Group" to choose three or four key fields for development within the telecottage including any of the following: i) informatics; ii) local culture and sustainable development; iii) eco-tourism and ecological lifestyle; iv) infrastructure, and; v) information on activities of different social groups such as women's clubs and youth groups. Table 1 further summarises the support telecottages are providing to community building.

Table 1: Telecottage support activities

TASKS ASSOCIATED WITH BUILDING A COMMUNITY	TELECOTTAGE SUPPORT ACTIVITIES
Studies, needs, profiling of communities	Questionnaires, collecting, saving, processing, disseminating data
Common planning of activities and aims	Presenting models, experiences, assisting in planning
Sharing responsibilities	Supporting discussions for community development and assisting in their adoption
Assisting in developing common attitudes, shared values, and common activities	Servicing common activities
Protecting local natural and cultural values as a community	Publicising, liaising with the media, informing, writing press releases
Establishing cooperative networks	Creating and maintaining information connections

Therefore, they are mediating and disseminating information to the public, providing local information and advice, increasingly providing distant students and workers with Internet connections, and businesses with the opportunity to market their company products and communicate with customers. Village campaigns and events are also publicised. Telecottage information is made available on Internet homepages, telecottage newslists and in telecottage infobulletins. Other means for information dissemination include organisation networks, the mass-media, e-mail, local study circles and folk high schools, and local village development groups.

The Telecottage Association has come across many active supporters to its projects and activities, which has resulted in close cooperation with the Study Circle Association of Estonia cooperation with local societies and schools, and increasing support from the third sector, the NGO community, and public interest groups.

A regional development programme called ”Support to Village Initiatives” has seen several village revival projects carried out, including the restoration of local infrastructure, and the establishment of telecottages and Internet centres. The Open Education Programme supported by the Ministry of Education has created the possibility to educate and develop cooperation groups, whereby study circles have been supported by telecottages and together with them, village plans have been elaborated as well as development projects.

TELECOTTAGES AND SUSTAINABLE DEVELOPMENT

Data concerning the environment, nature and landscape, land use, proposed investment plans, transport operation, sustainable development networks, and so on is also discussed through the Telecottage.

Specifically, telecottages are participating in elaborating sustainable development village plans, informing the public about environmental problems and proposed investments, disseminating positive information concerning the environment, helping to facilitate the organisation of events, supporting sustainable development study circles through networking and provision of related information, publicising and disseminating information on local nature trails to tourists and visitors, helping to compile hiking tracks and schemes, encouraging the use of public transport (through the notification of new routes and provision of timetables), tourist information (accommodation, do's and dont's in nature) and so on.

THE PALADE TELECOTTAGE

My role in the telecottage network is to serve as manager of the Palade Telecottage, serving the small Pühalepa community of 2000 people. Palade is situated on an Estonian island called Hiiumaa. Its area is 1000 km^2 and has a population of 12,000. The island is divided into four rural communities and one town.

The telecottage was established in 1995 to collect and disseminate information that is so vital for the new life of the community and its participants, to serve as a means for connecting people, and to help people in remote areas overcome geographical and social isolation. We became the centre of the local rural development movement in the county, and a centre for the island's telecottages. The county Village Movement accounts for some 20 active members from villages, and those telecottages in every community. These telecottages, like that for which I am responsible for, are maintained by volunteers.

The first computer was acquired in 1995 for project-based work, for the filing of socio-economic and local cultural heritage information, for taking part in the development of project competitions, and for communicating by e-mail. Study circles for computer and language studies were also established. In 1997 another computer was acquired with an online Internet connection. Within this additional capacity, it is possible to use Internet, e-mail, text-processors, translate, perform secretarial services, perform information searches, economic consultations and provide information about socio-economic services. The computer is also used for providing information to study circles including those of the Palade Education Society and the Folk High School, as well as disseminating information.

The telecottage offers a library of nature, regional planning, personal development, cultural heritage and reference books. Information concerning the available forms of transport and communication (vital to island life) is provided as well as information relating to activities in the field of nature and the environment, building projects and development plans. The telecottage has to date been involved in introducing campaigns for the protection of local life and the environment, coordinating and assisting in the elaboration of the local sustainable development plan, educating people, and carrying out studies about local needs for the local municipal authority.

The business aspects of the Palade Telecottage are taken care of by a separate society, the members of which are responsible for the provision of rooms, management of maintenance costs, communication, elementary equipment, literature, newspapers and gathering of other information, its processing and dissemination. This society has received support from outside contributions, its own enterprise activities, and project work. Self-financing covers 75 percent of the telecottage costs.

THE FUTURE FOR TELECOTTAGES AND THEIR RELATION TO THE EU ACCESSION PROCESS

Among the goals for the forthcoming months and years with regard to the Telecottage inititive are the following:

- Further social support and the development of a national cooperative network;
- Expansion of the telecottage network and their establishment in border areas;
- Elaboration of a national programme to acquire the necessary equipment for telecottages and support for operational costs;
- Creation of an integrated cooperative network for information services and information management in rural areas.

With regard to the EU accession process, Estonia is determined to adjust all fields of life toward European systems and structures. Entering into the information society takes a concerted contribution from Estonia to develop telematics and its availability in the smallest regions. The EU accession process, it can be said provides a vehicle for supporting this progress, both from a national perspective, and from the perspective of EU financial support, in meeting the objective of building the information society.

E-MAIL – Decision Support Systems for Environmental Managers in Regional Public Organisations

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OBJECTIVES

The main aim of E-MAIL is to develop a telematics application that supports decisionmakers within (regional) public organisations in the environment sector. The E-MAIL application assists in environmental monitoring and planning by using data captured from different sources, converting this into standardised formats, and integrating this on a multi-media platform containing an integrated set of tools for modeling, mapping, analysis and reporting.

The objective is to provide the E-MAIL user with an efficient method for obtaining in-depth information on key environmental topics and for developing environmental indicators. These include, for example, population and residency census, urbanisation and sustainable development planning, actual and potential ecological risks, surface and groundwater quality, water resources management, defence from flash-floods, habitat management/conservation, waste management, pollution and industrial risks, and other relevant site data.

E-MAIL is based upon concrete work in four different European Regions:

- Tuscany, Italy;
- Rhone-Alpes, France;
- Fife, UK;
- Corfu, Greece.

Each geographical region reflects a different type of area (e.g., a river basin, agricultural area, industrial, and tourist area). The public authorities involved in the environmental management of these areas have been provided with a common set of tools for data analysis, synthesis, interpretation, knowledge discovery, visualisation, and collaboration, designed to enable them to undertake more accurate monitoring of the environmental indicators relevant to their region, thereby ensuring more effective and better targeted environmental planning and policy actions.

USER NEEDS

As a result of increasing concern for the environment, collaboration/cooperation among different administrations and agencies becomes more and more important in order to properly address environmental issues. Improving cooperation poses a number of new challenges and E-MAIL's goal is to satisfy these emerging requirements, namely:

- Involving different environmental actors;
- Overcoming isolated applications/systems;
- Improving data accessibility;
- Creating standards/norms for environmental systems;
- Providing management support;
- Building a synthetic picture of the environmental situation;
- Visualisation of information;
- Improving digitalisation;
- Better dissemination of information;
- Spatial information usage;
- Coping with system heterogeneity.

Understanding these requirements enabled the identification of a core problem in environmental management, namely data integration, and more specifically, geodata integration. Indeed, much of the stimulus for the E-MAIL project comes from a need to share geographic information more effectively between individuals and organisations who not only store and manipulate geodata in different ways on different computer systems, but who think about, talk about and visualise geographic contexts in very different ways.

All regions targeted by E-MAIL regions are good examples of the above situation, due largely to the involvement of a conspicuous number of environmental planners/decisionmakers.

APPLICATION AREAS

Figure 1 shows E-MAIL's system architecture.

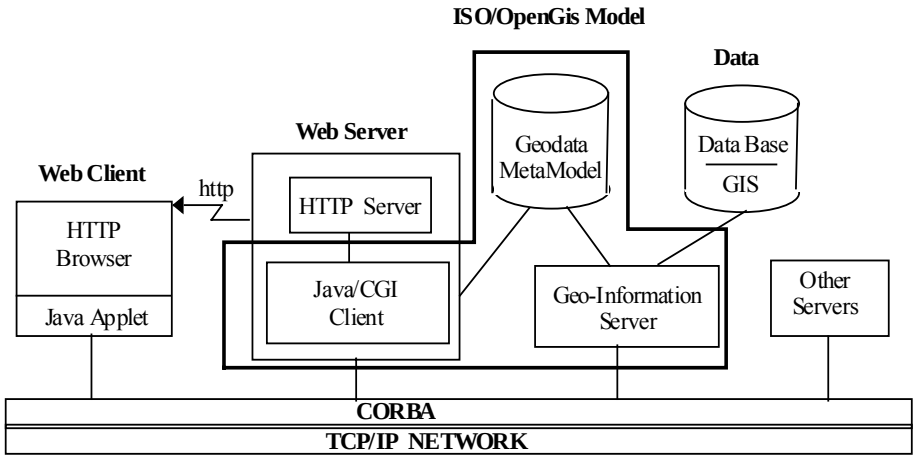

Figure 1: The E-MAIL Architecture

Built on state-of-the-art technology, four different applications were developed, each of which caters for a different environmental issue in a different European region. These regions included:

- The Arno River Basin Area in Tuscany, Italy;
- Greater Lyon, France;
- The Fife region in Scotland, United Kingdom;
- Corfu, Greece.

Arno River Basin Master Plan Management (Tuscany, Italy)

The services provided by the application in the region encompassed by the Arno River Basin are mainly devoted to improving the efficiency, quality and cost-effectiveness of the environmental planning and decisionmaking process. In particular, due to the specific importance of this area, the application provides telematics support to flood prevention (hydraulic risk) by addressing user needs for better access to spatial data, direct and spontaneous interaction with mapped data, visualisation of data, simple overlays, and database querying as well as to support inter-agency collaboration (broadly speaking some 200 local, regional, and government administrations are involved in the management of this area).

Indeed, environmental planning in such an area involves the systematic use of synthetic information from different disciplines, including hydraulic engineering, territories (land-use, urbanisation, roads, etc.), science (geology, biology and ecological resources; specific natural and artistic heritage, etc.), administration (existing laws and new constraints introduced by recent European, national or regional directives), and socio-economical information (water resource demand, and availability of resources, classification of current uses, etc.). Mapping activities range from geological issues to faulting, streams, wetlands, and flood ponds, vegetative cover, habitats, etc.

Within this structure, environmental planning is a multi-disciplinary activity and the decisionmaker not only is not an expert in all disciplines, but usually possesses limited basic computing expertise (word-processing, spreadsheets, Internet, etc.).

Application users need to be able to retrieve all information in a faster and simple way (to have more time to formulate ideas, call when specific questions arise, review the available data, and enter recommendations). Moreover, they can be highly involved in the creation of new information through the analysis and combination of existing primary data to develop their own derivative information, such as feature coincidence, buffer zone maps, or impact area calculations.

A sample E-MAIL session (see Figure 2 below) shows how a user can compile his/her personal mix of geographic data, bypassing the specialist command line interface of most GIS systems. The user can navigate in catalogues of

metadata where he/she can pick up geographic data just by checking them. Data preview enables viewing of data prior and after selection. The personal map is built on the fly and can be viewed in full-detail. Zooming in and out in a number of ways (by selection, by scale, by extent, etc) is possible by querying map components. This might be to ascertain associated data, e.g. census data associated with industrial images and movies related to a flooded location. Map details and associated data can be used, for instance to set up a report that is sent by the user via electronic mail to colleagues for further discussion and analysis. In addition, the user can access databases of laws and directives to check, for instance, whether some areas are protected against construction. Using the same interface, the user can also look for internal documents, for instance concerning previous versions of the Arno River Master Plan.

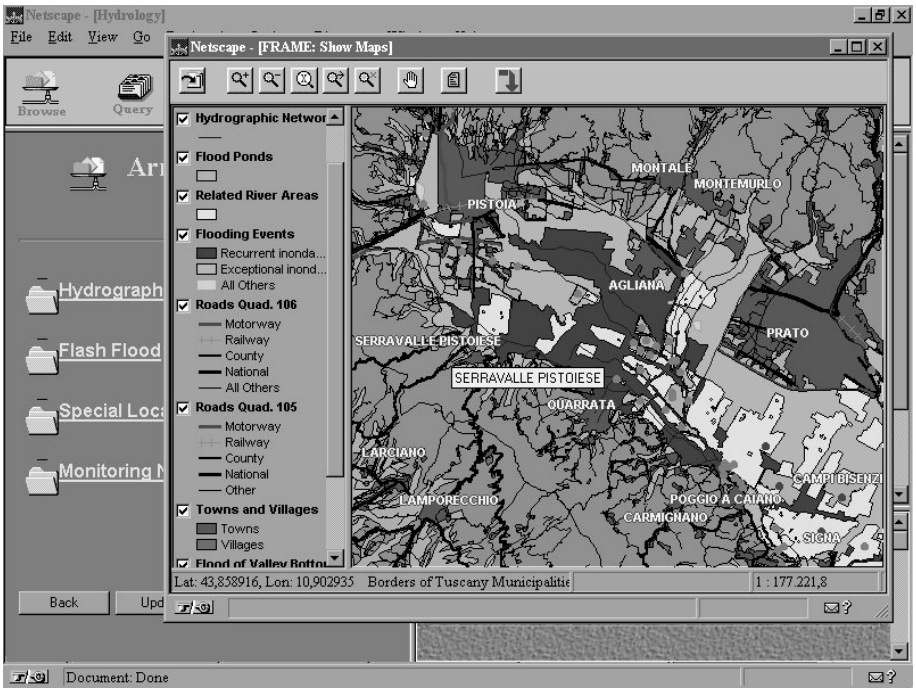

Figure 2. A typical E-MAIL session

Habitat Conservation and Planning (Fife, UK)

The E-MAIL application designed for use within the Planning Service of Fife Council complements the existing stand-alone GIS facilities. These facilities, dispersed across the Fife Council region serve as separate platforms for complex geographical analyses conducted by GIS specialists, as well as for more routine functions such as digital mapping, carried out by non-specialists. However, their availability and accessibility is restricted and so the valuable, as well as expensive, geographical data on which they operate is not readily usable by the potentially much wider set of non-GIS specialists who could take advantage of it. Furthermore, there are a number of datasets of regional importance, held only at the corporate offices of the Planning Service in Glenrothes and not in any form of GIS application. These include extensive biological and archaeological records, as well as aerial photographic coverage of Fife at both 1:10,000 and 1:5,000 scale.

The E-MAIL application integrates many of these disparate datasets, and makes them available to users' desktop computers through an Intranet service. The service implements a dataset catalogue (derived from the E-MAIL Geodata Model), which allows a user to select map features via metadata queries in order to generate an interactive map which displays those layers. The interactivity of the map permits typical GIS functionalities, such as zooming, panning and the selection of features (or objects) on the map. Users are also able to report on attribute data associated with features selected from the map, and are able to save generated maps for re-use or sharing. The emphasis of the application is on simplifying access to complex datasets, and for this reason, a series of standard maps have been incorporated to service more routine enquiries, such as the determination of ownership details for land allocated in the Council's Housing Plan. The application is designed with future expansion in mind by the range of geographic and related datasets it can offer. Data content is provided from materials which inform about the development planning process.

Industrial Risk Management (Greater Lyon, France)

Lyon is strategically positioned as an important industrial focal point which is made up of many small and medium-sized enterprises (SMEs). It has a well developed tertiary sector and a dynamic research and development strategy. It is also France's second largest metropolitan area, while Greater Lyon, serves as France's second most important industrial region. Greater Lyon is especially attractive to international companies that seek to operate in a natural environment, that at the same time boasts success in technology, science and economic endeavours. Several big companies achieved their first success in this heavily industrialised region e.g. Rhone-Poulenc, Pechiney, B.S.N. and more recently ECCO, KIS and Cap Gemini Sogeti.

The partners of this project are SPIRAL and the French Chamber of Commerce and Industry. SPIRAL is an organisation that exists to facilitate dialogue between state administration, the community, the society for environment preservation, and relevant persons. The first aim of this application is to support decisionmakers within public organisations in the environment sector specifically in the field of monitoring and planning, by capturing data from different sources.

The second aim of the application is to improve communication with the local population concerning technological risks and to define the technical terms often wrongly used by people. For example, the terms; danger, risk prevention, and protection are frequently confused.

The services provided by the Lyon application are divided into three categories :

- General information about the SPIRAL organisation;
- Nature preservation and protection data to improve the quality of the environment;
- Through a GIS interface to provide E-MAIL users information about industrial risks, water quality and air quality.

Tourism Hotspots (Corfu, Greece)

The application developed for Corfu focuses on a variety of services in terms of environmental issues and decisionmaking support. Additionally, environmental stakeholders have the opportunity to obtain information about the island itself, environmental issues, and the impact of tourists.

The end-user uses the Internet to access the various types of information in a dynamic way, in the areas of urban and rural waste, tourism, agricultural and food processing activities, and their impacts on the environment. Additionally, the end-user has the chance to be informed about Corfu via static pages which contain information about Corfu's coastline, climate, ground morphology, and meteorological data as well as information about the flora and fauna of the island.

More specifically, the system is able to track, record and present in a meaningful way information about the activities for the storage and processing of liquid, solid and hazardous urban and rural waste types, which is of great importance concerning their impact on the environment. Another area that is of great interest, is tourist activity, hotspots and more specifically the hotel resorts and their activities which can provide information for use in future land-use planning. Complementary information monitored through the system, includes the condition of various beaches, characterised with a "blue flag" showing the appropriateness for further tourist development. From this data, decisionmakers are supported through the use of a tool which improves understanding and assists in making the proper decisions with regard to ecological issues.

LESSON LEARNED/BEST PRACTICES

The recommended best practices on the technical side include:

- The establishment of a well defined methodology for user requirement analysis;
- Compliance with ISO standards, such as ISO/ODP (open distributed processing) 10746 and ISO TC211;
- The deployment of data warehousing tools specifically addressing the inter-operability of geodata, i.e., Allowing the integration of geo-data from different sources (census, internal data, etc.) often residing on different systems (Unix-based such as Arc/Info, mainframe/legacy systems, end-user PC etc.) in order to achieve a full geo-data warehouse functionality in a distributed environment using a Web interface.

Moreover, the project adopted the so-called "mock-up" approach, using a piece of software that allows a number of (or all the) actions to be fulfilled, by simulation, in a predefined order. This approach proved to be essential to the project as it encouraged early user feedback which could be incorporated into the subsequent development of applications.

The regional experience proved also that a number of organisational issues must be tackled, including:

- The political/top management project commitment within public administrations;
- Data ownership and access rights;
- Personnel training;
- More effective use of the telematics services being provided should include the introduction of new organisational models. At the very least, our activities succeeded to raise awareness among administrations to the ”organisational” dimension of a telematics project.

The difficulties encountered have, on the one hand, much to do with the specific tasks addressed by the E-MAIL project, including the provision of services in the public domain. In fact, dealing with public administrations is not always an easy task, due to their slow internal decisionmaking processes and subsequent difficulties to meet expiry dates. However, the organisation of project activities tackled these difficulties by anticipating possible organisational delays, and by planning activities well in advance.

TRANSFERABILITY ASPECTS

The E-MAIL application(s) can be transferred to any European area facing the same environmental problems addressed (management of river basins (flood prevention), industrial areas, rural areas and tourist hotspots). Potential user groups should involve environmental actors (knowledge workers) dealing with information handling such as regional/city environmental planners, civil protection, etc.

The E-MAIL toolset provides a further level of transferability by addressing different categories of users. By allowing the inter-operability of geodata (including access, retrieval, querying, storing, and displaying information throughout distributed systems), E-MAIL tools can be used to implement general map-based interface services. For example, E-MAIL is providing such tools for implementing the IA 1011 TITAN services, a project designed to deploy services to citizens and SMEs.

The transferability costs involved, apart from the product costs, involve consultancy and training fees. The major difficulties in ensuring transferability, however, lie in all these elements which are strictly related to administrative tasks (where administration rules vary according to different laws/rules existing in the EU and CEE countries).

COST/BENEFIT CONSIDERATIONS

Reduction of Environmental Damage/Risks

In considering only the prevention of flash-floods as an example, the EMAIL application is a means to avoid disasters such as:

1) The 1996 flood in Tuscany, Italy, which claimed 11 victims and ECU 500m worth of damage;
2) The 1966 flood in Tuscany, Italy which claimed 35 victims and some ECU 30bn damage (not considering the permanent damage to artistic and monumental treasures - Tuscany hosts 70 percent of Italy's artistic patrimony;
3) The 1994 flood in Piedmont, Italy which claimed 70 victims, 2000 evacuees, and ECU 10bn worth of damage.

Increased Productivity / Cost Savings

Among the benefits toward increased productivity are:

- Less time used to acquire information needed to make decisions;
- New products, concepts, processes, procedures, etc. can be introduced and integrated into operations more rapidly;
- Queries from other environmental agencies can be responded to more quickly and accurately. E-MAIL applications are designed to allow the reduction of time and effort by 50 percent when responding to customer inquiries;
- E-MAIL is designed to provide from between 30 to 50 percent reduction in document management and transaction time;
- Complex procedures are easier to understand and implement, and easier to maintain.

With regard to reduced costs through usual accounting practices and measures, the project demonstrates the following savings:

- Cost reduction in creation, maintenance, production, and physical distribution of paper-based materials and documents;
- Fewer delays and lower negative consequences resulting from delays;
- Reduced costs of material, production, storage, shipping and handling;
- Reduced mailing system costs against an electronic-based documentation system.

COSIMA - A Support Tool for Experts in Contaminated Site Management

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BACKGROUND

Objective: Develop an integrated, GIS-based tool to support environmental and planning experts in contaminated site management.

Main Partners: Stadt Koln (Coordinator), Cork Corporation, SEABO - Societa energia ambiente Bologna (Public Utility of the City and Province of Bologna), and Milieudienst Amsterdam.

Associated Partners: Commune di Bologna, Miasta Katowice, ESBI Computing Limited, ESRI Germany GmbH

Duration: January 1996 - September 1998

Programme: Telematics Application Programme, Environment Telematics, DG XIII.

OVERVIEW

Europe lies today in the cradle of industrialisation, and as a result, many European cities find themselves facing serious problems of soil and groundwater contamination. Industrial production has continued for decades without attention to environmental impact, while extensive rearmament in post-World War II Europe has resulted in severe ecological problems, especially in the area of soil and groundwater contamination.

Unidentified contaminated sites represent a considerable danger for the environment, flora and fauna. Moreover, for the affected population it poses a threat, particularly in the case of residential areas, and where groundwater is used for drinking water. Considering the constant growth in urban agglomerations, it is necessary to reuse historic industrial sites rather than develop new sites, in order to avoid further urban sprawl and to protect existing green areas and biotypes.

Excepting environmental considerations, soil contamination is an essential aspect of urban planning and development. Shortage of land on the one hand, and increasing competition among European cities and regions concerning industrial sites and inward investment on the other, make land availability a key issue on the agenda of many European Cities. Therefore contaminated site management is of vital importance for European cities and regions, not only for ecological, but also for economic reasons.

USER NEEDS AND END-USERS

Despite it's importance, the issue of contaminated sites has to date played a secondary role in environmental politics compared with other areas such as air pollution. Accordingly, the technological instruments used by the sector are not state-of-the-art, and the range of tools is restricted, leaving the evaluation of contaminated sites to be carried out manually, implying an enormous loss of time and public money.

There are a number of "expert systems" available which provide solutions for specific applications, but they neither offer enough flexibility, nor do they correspond with the scope of contaminated sites management. As the future users of the COSIMA system are contaminated sites experts themselves, they do not need an "expert system" to provide solutions. What they require is a system that supports work flows and the decisionmaking process, as well as the ability to handle enormous quantities of data and the methodology applied by the user. Thus, there is not only an urgent need for the automation of work flows, but moreover, a strong requirement for an *integrated* technological solution which considers the multiple aspects of contaminated sites management.

The COSIMA project addresses this market need. Its objectives are the development and implementation of a GIS-based system that assists environmental, planning and other experts in identifying, registering, assessing and remediating sites which may have been contaminated. The system is designed to implement standards for data structure, data integration and to present of database and geographical information. It is implemented using existing Geographic Information Systems (GIS) in participating cities and their institutions.

Using such a system, combined with standard relational database management systems (RDBMS), a uniform data model and harmonised presentation model for contaminated site management has been developed. Furthermore, existing data processing infrastructures are being integrated into the system.
Modern telematics structures and GIS systems allow the use of distributed databases, enabling each user to maintain his own data, while permitting access by other users and organisations. Development of communication technologies, storage capacities of CD-ROMs and optical disks, as well as improved speed of data access and transfer allow practical, cost-efficient access to Binary Large Objects (BLOBS) - e.g. raster images, scanned documents, photographs, etc. The high interoperability and standardisation potential of the system has allowed the integration of the Contaminated Sites Management Support System (CSMSS) as one module into a comprehensive environmental information system as currently established or projected in all COSIMA cities.

The distinctive character of this consortium is that it is led by the local (and provincial) authorities in their capacity as technology users. At each development step, the expert staff from the authorities in charge of contaminated sites management define the requirements for the technical work to be conducted by the industrial partners. The technical development is continuously controlled, assessed and tested by the future users of the CSMSS. Thus, permanent and coherent quality assurance is guaranteed.

Furthermore, the project is characterised by a harmonised approach among the partners towards development, i.e. the consortium jointly develop the core elements, notably the data model, the presentation model and the user interface. Therefore, the technological concept is basically the same in all cities, and only technical realisation differs due to the different technological degrees of infrastructure.

The following authorities are the end-users of the system developed within the COSIMA project.

- Stadt Koln/Amt fur Umweltschutz und Lebensmitteluberwachung (DE)
- Cork Corporation/Environment Section (IE)
- SEABO (Societa energia ambiente Bologna) (IT)
- Comune di Bologna/Settore Ambiente et Territorio (IT),
- Gemeente Amsterdam/Milieudienst (NL)

The COSIMA project has a 3 year timeframe, which started in January 1996. It was officially launched at a consortium assembly in Cork, Ireland on 25 January 1996. By signing an "Agreement of Co-operation," the mayors and official representatives of the Cities of Amsterdam, Bologna, Cologne and Cork expressed their strong commitment and support to this trans-European collaboration.

TECHNICAL DESCRIPTION

The software partners, in direct association with their partner cities, undertake the development of the application. This was divided up into the number of Work Packages shown below.

WP No.	Work Package Name
0	Harmonisation of Terminology
1	Analysis of User Needs
2	System Architecture
4	Uniform Data Model
5	Harmonised Presentation Model
6	Data Processing Infrastructure
7	Development of User Interfaces

The interdependency between the work packages can be seen in Figure 1 below.

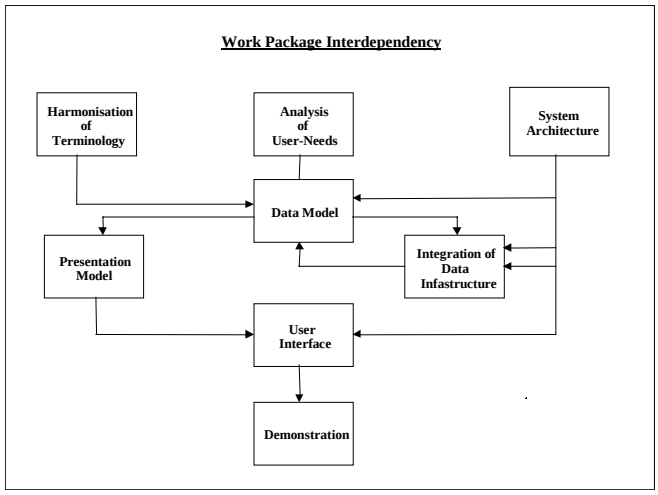

Figure 1. CSMSS Concept

System Concept

The objective of COSIMA is to develop a Computerised Sites Management Support System (CSMSS) using the expert knowledge of environmental personnel, planners and IT/DP personnel from the participating cities. The system will be integrated within the partner city's existing GIS technology, and will access spatial and non-spatial data sets distributed across existing local and wide area networks. The decisionmaker thus has a user-friendly GIS based decision support tool that facilitates the querying of information associated with a contaminated site. The decisionmaker will be provided with the necessary tools to:

- Analyse a site under investigation;
- Compare measurement data with pre-defined standards and regulations;
- Present data in a thematic format for inclusion in reports.

CSMSS-data sources include:

- Mapping agencies: topographic maps, cadastral maps (Automated Real Estate Register, ALK);
- Local councils (statistical department, planning department): City development plans, census blocks, spatial reference system, streets;
- Geolocical agencies: geological maps, soil maps;
- Environmental departments: water protection zones;
- Local water, gas and electricity-suppliers: wells, sewers, facilities;
- Site investigator/planning applicants: site information;
- Developer/contractors: measurement data;
- Standards: knowledge database.

Conceptual Overview of the Contaminated Sites Management Support System (CSMSS)

The potential users of the final system can be classified into three types.

(1) Decisionmakers who will use the system to safeguard human health and the natural built environment, including planners, environmental officers, engineers and city real estate agents;

(2) Systems experts who will manage, support and maintain the COSIMA System, including applications experts, network experts, and database administration experts;

(3) The product has the option of providing public domain data to the casual user who will have simple user-friendly tools to access this. This, however, is outside the scope of the project.

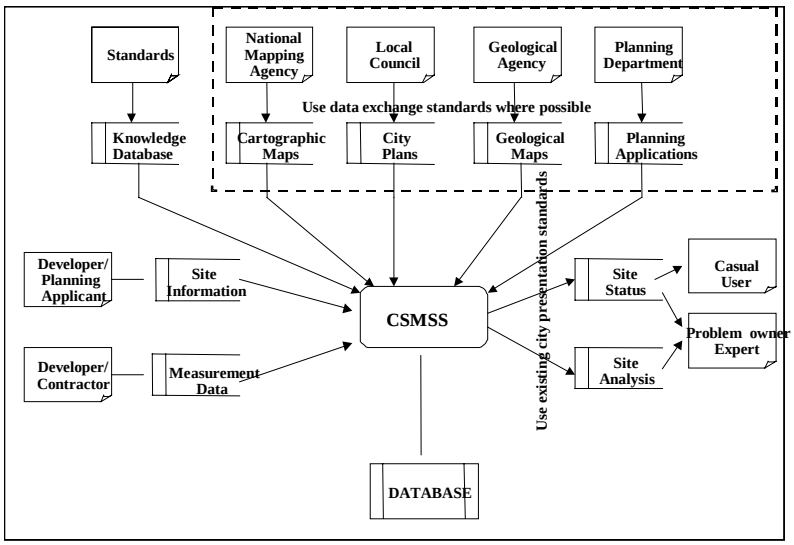

Figure 2: Conceptual overview of the CSMSS

Requirements of the CSMSS

The requirements of the system can be broadly divided into 3 categories:-

1. Introductory Requirements;
2. Functional Requirements;
3. Non-functional requirements.

Introductory Requirements

- The architecture must permit the use of existing city GIS technologies;
- The architecture must permit the integration of existing city applications which impart decisions relating to contaminated sites;
- The architecture shall permit user-friendly access to public domain information systems relating to contaminated sites;
- The architecture shall support an evolutionary development strategy that enables the continuous updating of the system.

Functional Requirements

- The architecture shall support the recording of data relating to a contaminated site;
- The architecture shall support the development of the necessary functions required to analyse a contaminated site;
- The architecture shall support the development of applications that will present output to the end- user in a visually effective manner, and which will complement the city's decisions support process;

- The architecture shall support the accurate and efficient identification of contaminated sites and its associated infrastructure;
- The architecture shall support the effective access and control of information.

Non-Functional Requirements

- The architecture shall ensure a reasonable response time to the end user;
- The architecture shall ensure the development of a user-friendly system;
- The architecture shall ensure that, where possible, software modules will be operable across the core GIS platforms;
- The architecture shall ensure maintainability of the system through standard housekeeping activities;
- The architecture shall allow small changes in enhancement, extension or adaptation without necessitating large re-development;
- The system architecture shall permit the expansion of the user base.

Risk Assessment Methodology

The methodology developed by the partner-cities involves a risk analysis of the site in question (see Figure 3 below). It involves an initial evaluation of the history of the site by examining old maps, aerial photographs and archival records as to the previous use of the site. If the results of the initial investigation indicate that a risk may exist, the investigation moves to the screening phase.

Screening Phase

In the Screening Phase, the decision is made as to what is required to be investigated and how. This phase consists of three steps:

1. Programme of Testing;
2. Actual testing;
3. Evaluation of test results and risk analysis.

If after the Screening Phase, the site is found to be a possible risk and further examination of the extent of the contamination is needed, then the investigation moves to the detailed investigation stage.

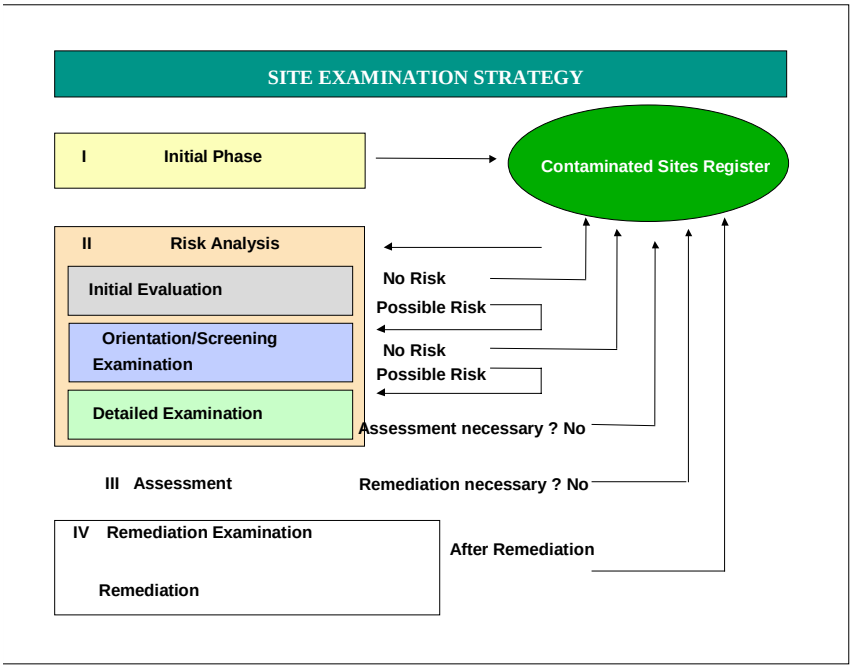

Figure 3. Site Examination Strategy.

Investigation Stage

This phase also consists of three stages:

1. Planning a programme of testing;
2. Carrying out tests which will establish the extent of the area contaminated and the levels of contamination;
3. Evaluation of test results.

Based on the results of the detailed examination, an expert evaluation is carried out and a decision on the necessity to remediate is taken. Where remediation is necessary, the levels of remediation for the contaminant are established and after remediation, these are checked before any further on-site development is allowed.

System Design and Utilisation

The COSIMA database was designed with the input of all city partners in identifying all objects and data necessary for comprehensive site management. This led to the creation of the Universal Data Model. This is the core element in the system and the "S-Designor" package was used to design the Conceptual Model using the E-R diagram method. This led to the creation of four interlinked data submodels including:

- Main Data - includes all general data necessary for the identification and registration of the suspected site;
- Site Data - includes all data concerning the site under investigation, which is needed for the "Initial Evaluation";
- Measurement Data - includes all data from on-site measurements and analysis carried out by laboratories;
- Knowledge Data - includes data on substances, remediation techniques, laws and provisions.

Table 1 shows the relationship between the sub-models and the site examination strategy.

Sub-model	Site Examination Strategy	Phase
1. Main Data	Initial Phase Risk Analysis/*Initial Evaluation*	I, II
2. Site Information	Risk Analysis/ *Initial Evaluation*	II
3. Measurement	Risk Analysis/Examinations Remediation	II, IV
4. Knowledge	Risk Analysis, Assessment, Remediation	II, III, IV

Table 1. Relationship between sub-models and site examination strategy

The decisionmaker accesses this information through a client GIS based application. The city's corporate GIS is used as the underlying GIS, and an enhanced set of GIS based tools are developed to deal specifically with contaminated sites. A client workstation is located in each of the city's relevant departments, with access to the server via a local or wide area network.

The city's system administrator manages updates to the system, and procedures are developed to streamline and validate data entry.

System Architecture

Below is a diagram describing the system architecture of the COSIMA application. Between the graphical user interface (GUI) and the data access to heterogenous data sources, the GIS engine provides a common interface for access to geodata: the "Defined Layers". It is an abstraction layer between a physical data format and functionality. Functionality with respect to access, display and query is independant from the data sources format. With "defined layers," it is only necessary to implement the functionality in the CSMSS-GUI once, and the same analysis can be performed regardless of the data source's format.
Below are screen-shot examples of the COSIMA system.

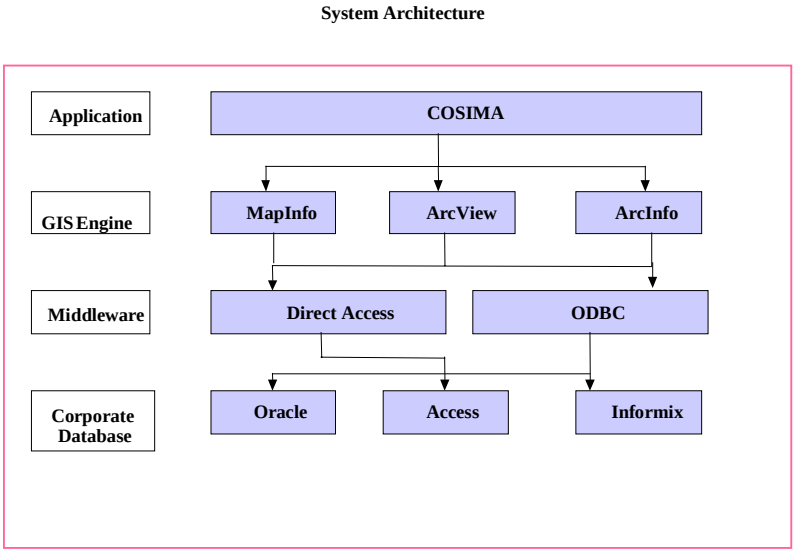

Figure 4. system architecture

Site Data can be crossed checked with Standards:

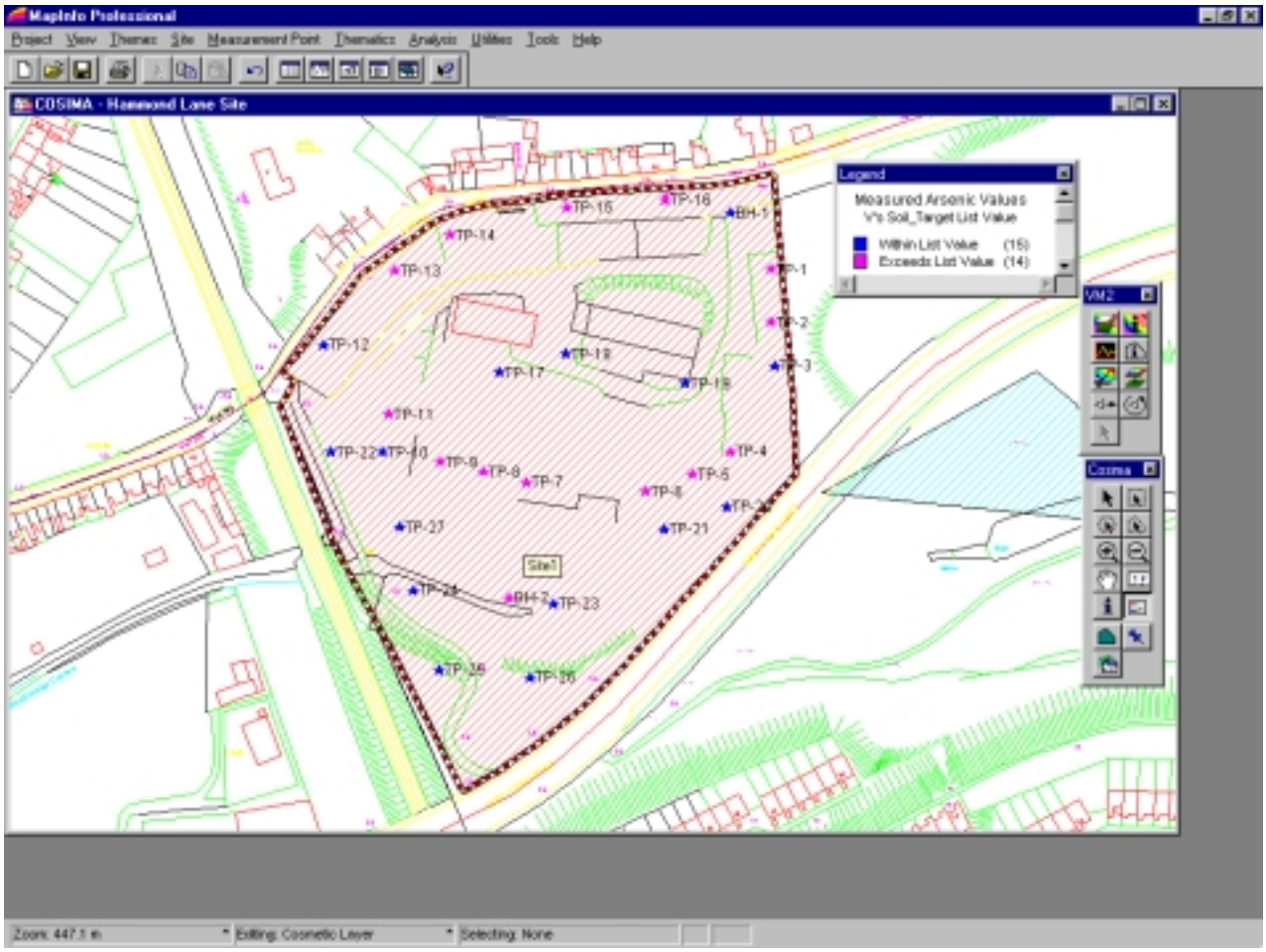

Figure 5. Thematic analysis of measurement data

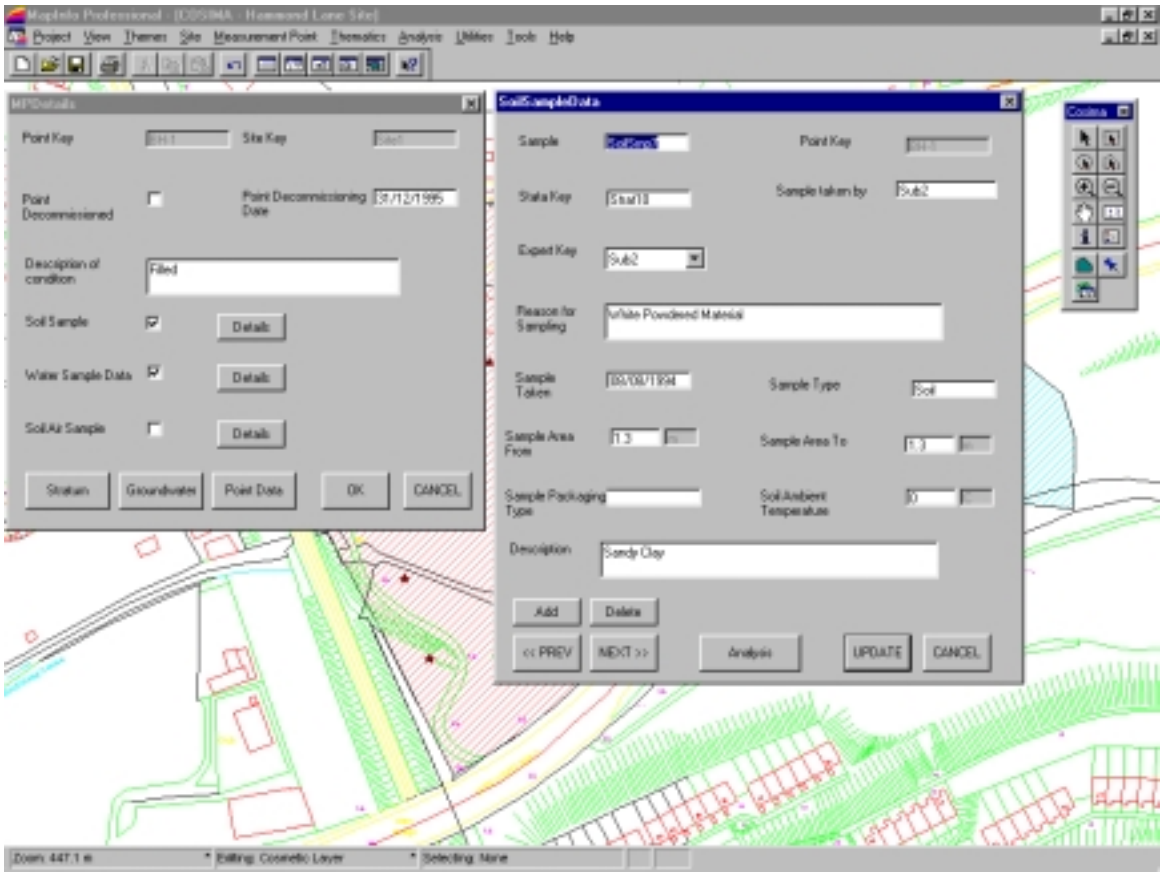

Figure 6. Site Data can be crossed checked with Standards

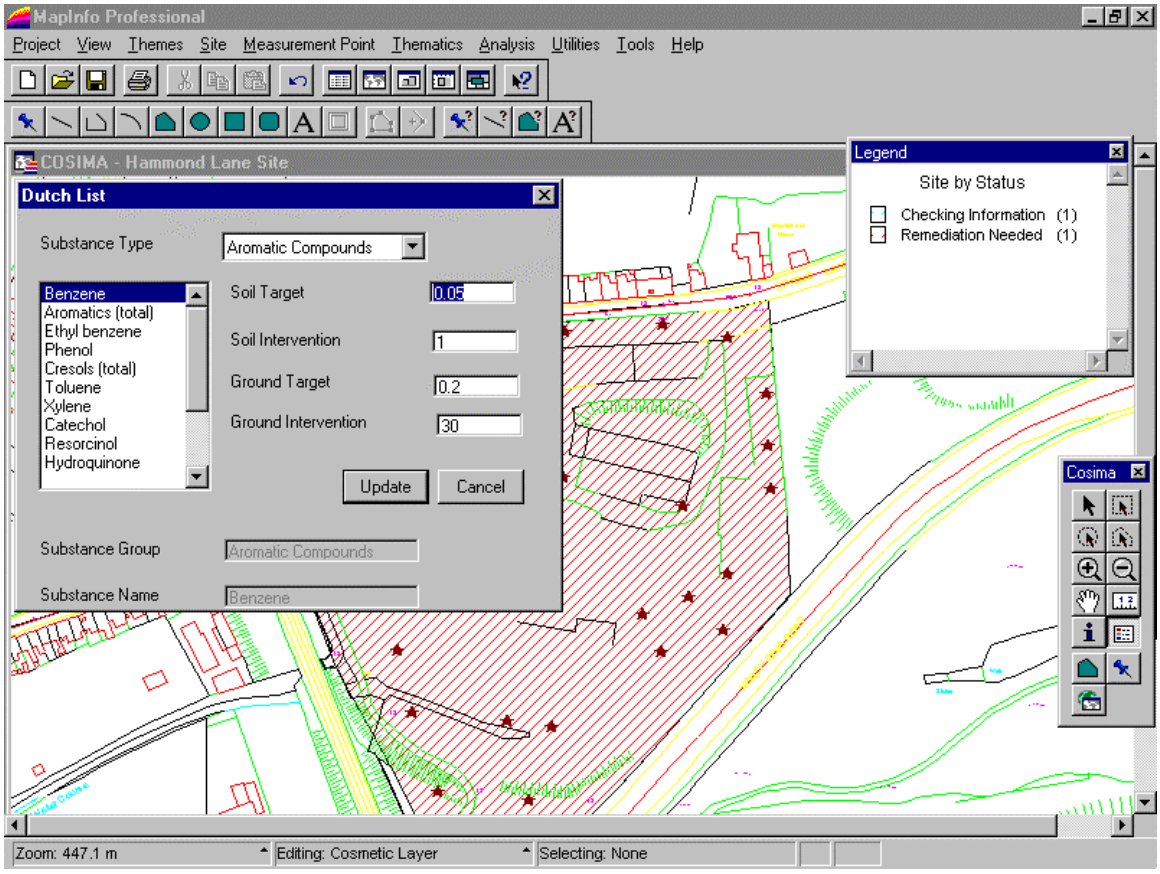

Figure 7. Site Location Map overlaidwith historical information

The Phare CORINE Inventories in CEE: A support System for Environmental Decisionmakers

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THE CORINE PROGRAMME

From 1985 to 1990, the European Commission founded and funded the CORINE programme. The objectives of CORINE (Coordination of Information on the Environment) were to gather environmental data, coordinate related activities, and improve the consistency of information on the state of environment in the European Union. These objectives have been pursued and have led to two main results:

- Agreements on procedures and methods for collection, standardisation and exchange of data at the European level;
- Establishment of an information system capable of providing policy-relevant information on the European environment.

The CORINE Information System includes several databases (European Commission, 1994a):

- Basic geographic data (coastline, national boundaries, administrative units, water patterns, transport network, settlements, etc.);
- Nature (biotopes, designated areas);
- Land (land cover, soil types, land quality, coastal erosion, etc.);
- Air (emissions to the air);
- Water (water resources, surface water quality);
- Socio-economic data (socio-economic activities, air traffic and airports, nuclear power stations, etc.).

In June 1991, during the Conference of European Environment Ministers at the Dobris Castle (Czech Republic), it was decided to extend the CORINE methodology to the countries of Central and Eastern Europe as a first step towards the integration of environmental information systems throughout Europe. The Phare Programme has provided the framework for the implementation of the three most important components of the CORINE Programme: inventory of air emissions, biotopes and land cover. In 1994, the European Environment Agency started its activities from Copenhagen (Denmark), taking over the maintenance and use of the CORINE Information System.

CORINAIR

Concern regarding atmospheric emissions in Europe has increased in recent years with the recognition that air pollution may not only be a health hazard, but also may be implicated in environmental problems, such as acid deposition and forest damage. In an attempt to control these problems, the EC adopted a range of legislation on atmospheric emissions. To support this legislation, and as a basis for further policy development, it is essential to have information on atmospheric emissions throughout Europe. Corinair, developed in collaboration with UNECE and OECD, has provided a European method for atmospheric emission inventories (European Commission, 1994b). After the creation of a database in 1985 covering the EC Member States, this inventory was extended to most countries in Europe. Results are available for 1990 (Corinair90), covering 30 countries (including the Phare countries). These include emissions of eight main pollutants (SO_2, NO_x, N_2O, NH_3, CH_4, CO_2, CO, NMVOC) in seven main categories (residential and industrial combustion, oil refining, production processing, solvent evaporation, road transport and nature) and more than 200 sub-types of sources. Large point sources (polluting plants) are also included in the database. Corinair95 has been completed for the EU countries, while the database for Phare countries for 1994 will soon be available. From 1995, the EEA has decided to update Corinair on a yearly basis in all EU and Phare countries (Kutas, 1998).

CORINE Biotopes

An inventory of sites considered to be worthy of nature conservation measures at the EC level has been completed for the CORINE Biotopes Programme. The inventory constitutes a major tool for the implementation of harmonised environmental policies in the countries of Europe. The selection of sites for inclusion in the register is based on an agreed set of criteria. Some of these sites may already have protection status under national legislation, but many are unprotected. The inventory includes the following data: site name, site location, area, altitude, habitat type and cover, motivation, human activities, list of species (flora and fauna) and their number, site description (character, quality, vulnerability, designation, ownership, documentation) (European Commission, 1991). Together with the Phare countries, this database contains more than 10,000 site descriptions. CORINE Biotopes has been completed for Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Poland, Slovak Republic and Romania. It is ongoing in Lithuania, and will start soon in Albania, Bosnia-Herzegovina, Macedonia and Slovenia (Evrard, 1998).

CORINE Land Cover

The aim of the CORINE Land Cover mapping facility is to provide information on the state and changing biophysical coverage of the Earth's surface. The programme was initiated for the EU countries in the 1980's to provide quantitative information on land cover, at a scale 1:100,000. Today the CORINE Land Cover (CLC) database covers 31 countries across Europe and North Africa. CLC is mapped by interpreting satellite images, with the results stored as a database in a Geographic Information System (European Commission, 1993). The database represents a basic tool for studies on the environment, impact assessment and regional planning on national as well as on European levels. More detailed information on CLC is given overleaf, while Table 1 gives the status of CORINE Land Cover in the Phare countries.

Table 1: Status of CORINE Land Cover in the Phare countries (1998).

Country	**Area (km^2)**	**Contractor**	**Status**	**No. of sheets**
Albania	29000	GSC	in progress	35
Bosnia-Herzegovina	51000	GZ BiH	starting 1998	38
Bulgaria	111000	Ministry of Environment	completed, 1996	105
Czech Rep.	79000	GISAT	completed, 1996	94
Estonia	45000	EEIC	completed, 1998	37
Hungary	93000	FÖMI	completed, 1996	84
Latvia	64000	LEDC	completed, 1998	44
Lithuania	65000	HNIT-Baltic	completed, 1998	42
F.Y.R. Macedonia	25000	Ministry of Urban Planning, Construction and Environment	starting 1998	22
Poland	313000	IGIK	completed, 1996	297
Romania	238000	IGR	completed, 1996	196
Slovak Rep.	49000	IG SAS	completed, 1996	55
Slovenia	20000	GZS	completed, 1998	20
Total: 13	**1182000**			**>1069**

Topic Centres

The European Environment Agency (EEA), established by the European Commission, manages the European Environment Information and Observation Network (EIONET). Institutions or organisations across Europe have been contracted as European Topic Centres to execute particular tasks identified in the Agency's multi-annual work programme. Three of these ETCs have direct links to the above CORINE databases: The European Topic Centres on Land Cover (ETC/LC), Nature Conservation (ETC/NC) and Air Emissions (ETC/AEM). The main objective of the ETCs is to produce, provide and manage specific information for environmental policy development and implementation in Europe.

Since 1997, ETCs have been extended with support from the EC DGIA Phare Programme towards Central and East European countries with the creation of the so-called Phare Topic Links (PTL). With the set-up of three PTLs, this European network for land cover, nature conservation and air emissions information exchange has now been extended to about 30 countries. Figure 1 shows how these initiatives are inter-linked.

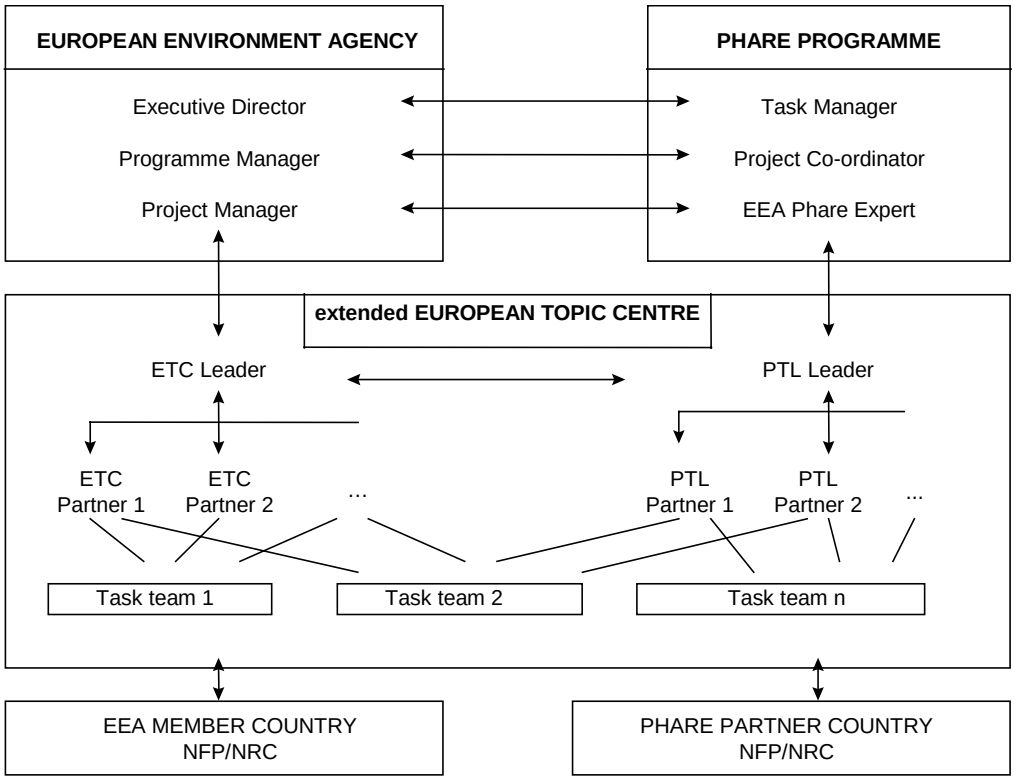

Figure 1: Institutional connections within the CORINE Information System

TECHNOLOGY OF CORINE LAND COVER (CLC) MAPPING

The basic aim of the CORINE Land Cover Programme is to provide an inventory of the Earth's surface features. Computer assisted visual interpretation of satellite images has been the approach chosen to serve as the mapping methodology. The choice of scale (1:100,000), with a minimum area to be mapped (25 hectares) and a minimum width of linear elements (100 metres) represents a trade-off between cost and detail in land cover information. The nomenclature includes 44 classes in five groups: artificial surfaces, agricultural areas, forests and semi-natural areas, wetlands and water bodies.

Landsat's Thematic Mapper data has been the most widely used satellite imagery during the course of the Programme because it provides good area coverage, and sufficient thematic and geometric details at reasonable cost. Recent, new high-resolution satellites with a middle infra-red channel (IRS-1C/D, SPOT-4) certainly increases the possibilities. Figure 2 provides the workflow of CLC mapping while Table 2 reviews the most important technical parameters of the database.

Land Cover Mapping at the 1:50,000 Scale

Standard CLC maps are especially useful at the European level. To satisfy regional or local needs better, more details are needed both in terms of geometry as well as in terms of the thematic content. Several initiatives exist to extend the CLC methodology to a working scale of 1:50,000 and even 1:20,000 (ETC/LC, 1997a). Within the framework of the Phare Programme, an experimental project has been executed at the scale of 1:50,000 for 120 map sheets in four countries: the Czech Republic, Hungary, Poland and Slovak Republic. Four hectares was the size of the minimum mapping unit as a consequence of using integrated SPOT PAN and Landsat TM satellite data (compared with 25 hectares at a scale 1:100,000). International teams of experts have extended the standard nomenclature with level-4 classes representing the landscape conditions of the above four countries (Feranec et al., 1995). The number of level 4 classes was about twice that of the level 3 classes.

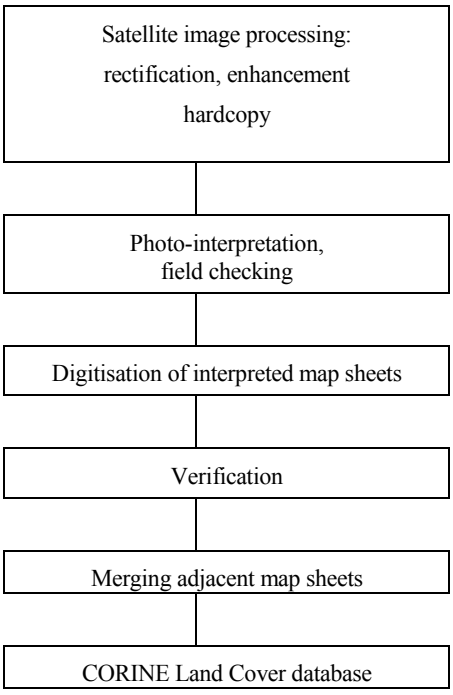

Figure 2: Flowchart of CLC mapping.

- Method: computer assissted satellite photo-interpretation
- Ancillary data: topographic maps, vegetation maps, land use statistics, etc
- Working scale: 1:100,000
- Minimum mapping unit: 25 hectares
- Minimum linear feature width: 100 m
- Nomenclature: hierarchically structured in 3 levels: 44 classes for level 3
- Cartographic projection: Lambert azimuthal equal area
- Various projections in country databases
- Implementation: national teams
- Supervision: Land Cover Technical Unit
- Overall classification reliability: better than 85 percent
- Geometric accuracy compared to topographic map: <100 meters RMS

Table 2: Basic characteristics of the CLC database.

The experimental project proved that CLC mapping could take place on a larger scale. One of the ongoing activities of PTL/LC is to further extend the level-4 nomenclature to include all Phare countries. A new version of the CLC nomenclature at a scale of 1:50,000 for the Phare countries was finished in May 1998, within the framework of PTL/LC activities. This nomenclature includes 104 land cover classes. The main benefits of the extended nomenclature and the 4 hectare minimum mapping unit compared to the standard CLC mapping are:

- Greater thematic detail in the „artificial surfaces„ group, which has the strongest impact on the environment;
- Agricultural categories better support agrostatistics and the need for habitat mapping;
- Better differentiation of forests and semi-natural vegetation and of wetlands, which is important for nature conservation and biotope mapping;
- Decreased percentage of heterogeneous agricultural classes, owing to the use of the smaller minimum mapping unit.

UPDATING AND CHANGE DETECTION

Updating of data is a central question to any database collection which includes features that change in time. CLC can fulfil its aims only if the database is updated regularly. The proposed average frequency of update for the CLC database is once every 10 years. This doesn't rule out changes that may take place more rapidly in certain areas (e.g. urbanisation). With the accessibility of land cover data for more than a single date, one has the possibility to analyse land cover changes and to make predictions for the future. CLC mapping is a labour

intensive methodology, requiring skilled photo-interpreters. Because of the nature of nomenclature and the rules of interpretation, updating also can not be automatic. Due to the fact, however, that land cover changes are generally slow, there is no need to repeat the interpretation during the course of updating, only to recognise changes that have taken place between one update and another. With the right hardware, this process is more than evident to a photo-interpreter who is familiar with the CLC methodology. Therefore updating would be significantly cheaper than re-producing the basic database.

The updating process is based on computer-assisted photo-interpretation (CAPI) technology, with simultaneous use of the basic CLC data, the corresponding satellite image map, and the new satellite image map (Perdigao and Annoni, 1997). The updating procedure usually reveals errors in the original database that first should be corrected, in order to avoid detection of false changes (PTL/LC, 1998; Büttner et al., 1998).

Once we have produced the CLC database for two different dates, change detection is an automatic procedure. The change database can be visualised by printing evolution maps and can be summarised using change indicators (ETC/LC, 1997b).

One of the tasks of PTL/LC is to produce a retrospective CLC database dating back to the 1970's for six Phare countries (Bulgaria, Czech Republic, Hungary, Poland, Slovak Republic and Romania) and to analyse the changes which have taken place during the twenty year period (PTL/LC, 1998).

APPLICATION OF CORINE LAND COVER DATA

The examples in Table 3 illustrate the most relevant applications of the CLC Hungary database. We can conclude that CLC data, when combined or integrated with other data sets in a GIS environment, constitutes geo-referenced data of basic importance to environmental analysis, catchment modeling, regional planning and crop monitoring.

Table 3: Examples of CORINE Land Cover applications in Hungary (1997-98).

Application Domain	**User**	**Uses**
Administration	Somogy and Szolnok counties	County base maps in GIS format
Agrometeorology	Meteorological Service	Database of arable lands
Catchment management	Office of the Prime Minister	GIS base layer map of the Lake Balaton catchment area
Catchment scale phosphorus pollution modeling *(similar studies in Slovakia and Romania)*	Phare Multi-Country Programme in cooperation with the Phare Danube River Basin Programme	Modeling run-off and diffuse phosphorus pollution in the Zagyva river catchment
Crop mapping and yield forecast	Ministry of Agriculture	Masking out non-agricultural areas
Environmental modeling (science)	IACR Rothamsted (UK)	Carbon cycle modeling
Environmental modeling (practical)	Ministry of Environment	Modeling effects of acid rain
Floodplain management	Water Research Institute	GIS base layer map
Regional planning	Institute for Regional Development (VÁTI)	Base map
Planning for sustainable agriculture (in preparation for EU accession)	Ministry of Agriculture	Elements of a multi-layered GIS

CONCLUSIONS

The results of the CORINE Programme in Central and Eastern Europe have been integrated into the environmental information system of the European Union. Due to the clearly defined, relatively simple technologies and good project management, uniform and harmonised databases on air emissions, biotopes and land cover have already been compiled for most of the Phare countries.

Examples of the applications of Land Cover data have shown that this data can also be used at a national level and can foster multi-country cooperation on various problems related to the environment. There is a clear and declared interest from the Hungarian government to apply the CLC methodology further, compiling a recent database at a scale of 1:50,000 and producing a retrospective database for period of the 1980's.

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ECOMANAGEMENT
An Open-learning and Counseling Service

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OBJECTIVES

Relationship to the Objectives of the Telematics Applications Programme

More and more consumers are buying "green products," while more and more industries are expected to produce with respect to the environment, if they wish to remain competitive. New services and new jobs are being created to train and counsel managers and employees of interested enterprises to develop a sound environmental management approach. These services rely on traditional methods with a few counsellors and trainers being able to take into account the industrial process, national law and European directives at the same time.

However, a great deal of time is wasted seeking the support and services of different enterprises. Within the ECOMANAGEMENT project and accompanying telematic application, we propose to facilitate the work of these counsellors and trainers and to open these services to enterprises far from industrial centres. The project is focused on the development of new services on an existing telematic network leading to the competitiveness of any consortium at a world level. These elements meet the first aim of the Telematics Applications Programme, namely the:

- Promotion of the competitiveness of European industry;
- Stimulation of job creation through the development of new telematics services.

These aims will be met through the dissemination of good practice in environmental management (EN 5.2), and through the distance training of environmental managers and operators in small and medium-sized enterprises (SMEs) (ET 1.4, EN 5.4, UR 6.1). The project will also contribute to EU policy in the area of environment and training, which meets the second aim of the Telematics Application Programme.

THE PROJECT'S STRATEGIC APPROACH

Implementation of Environmental Management in SMEs

The telematic services proposed within the ECOMANAGEMENT project allows SMEs to access the training and counselling services currently developed under the "LIFE Programme." These training and counselling services include:

- **Step 1;** The head of an SME makes an environmental diagnosis with a counsellor and defines the required objectives;
- **Step 2;** The manager in charge of implementation will be trained and counselled to implement the environmental plan, to collect data, to conduct urgency actions, and to train operators to improve environmental behaviour;
- **Step 3;** In order to obtain the EU's environmental logo, they will further follow procedures with the help of a **counsellor.**

The provided services under ECOMANAGEMNT consists of:

- A virtual space for communication (FAQ, Forum, etc. ..);
- A training space;
- A counselling space.

Tele-training and Tele-counselling thus allows the delivery of the same services to companies far from main industrial centres, training centres and counsellor offices, across France, Greece, Germany, Luxembourg and Spain.

THE ECOMANAGEMENT APPLICATION

The following pages presents a global and clear view of the objectives and goals of the ECOMANAGEMENT project, and include introductions to "The EcoGuide", the Ecomanagement architecture, training and counselling modules, and the Ecomanagement partners.

The EcoGuide

EcoGuide

WHY ecomanagement ?

ENVIRONMENTAL MANAGEMENT IS AN INCREASING ISSUE FOR SMEs

All organisations are or will be concerned with environmental issues. They need to:

- Comply with more and more complex regulations
- Reduce waste and generalise recycling;
- Meet customers' expectations or demands;
- Prove „citizenship" and contribute to a sustainabl growth.

SMEs need to overcome specific difficulties in order to cope with these issues, because they are short in time and in expertise to decide and implement an environmental management system.

ecomanagement aims at providing them with the required skills and methodological tools.

WHAT'S ecomanagement ?

ecomanagement is an Internet-based service that delivers tele-training and tele-counselling related to environmental management.
It provides:

- Training modules for a better understanding of environmental impact and issues;
- A methodological module to implemen a certification, (ISO 14001 or EMAS);
- Tele-sessions with a trainer and/or consultant;
- Databases, (information, resources, appointments management);
- Appropriate and customised access and subscription levels.

ecomanagement is mainly designed for managers concerned with or in charge of environmental issues. It can also be used to rise awareness and train other staff members.

THE ECOMANAGEMENT ARCHITECTURE

Figure 1 shows the ECOMANAGEMENT architecture.

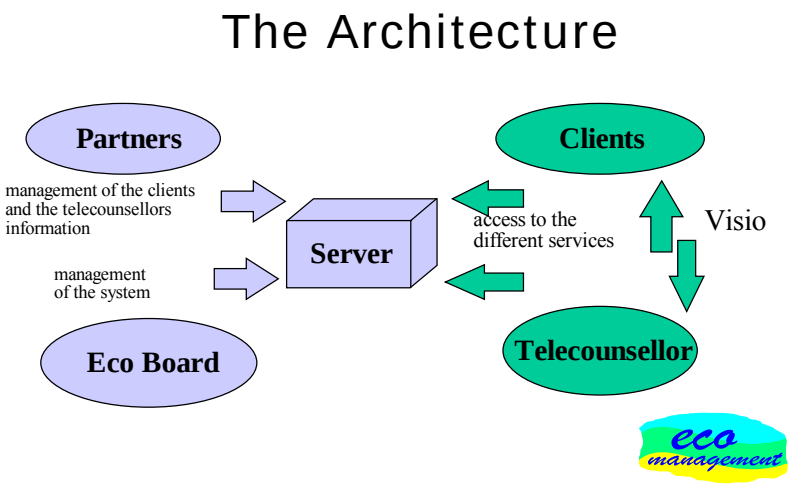


Figure 1: The ECOMANAGEMENT architecture.

Training and Counseling Modules

Modules can be downloaded by authorised users from the Internet-based ecomanagement Server. (See Figure 2 below).

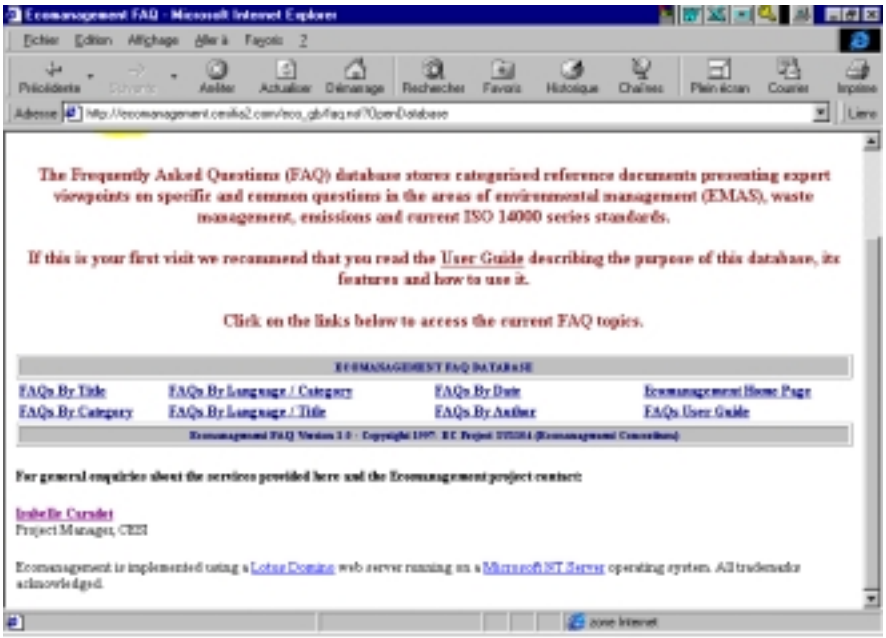


Figure 2: The Ecomanagement server.

Internet Services

The following functions are available on the Internet, however, their access is limited according to pre-defined roles including: administrator, designer, tele-counsellor, and user:

FREQUENTLY ASKED QUESTIONS
Database containing answers to most frequently asked questions about waste management, ISO 14001, etc.

MEMBERS DATABASE
Information about the members of **ecomanagement** including consultants, experts and clients

EXTERNAL SERVICES
Links to external services available over the Web

APPOINTMENT BOOK
Allows the booking of an appointment for a session with a consultant or an expert

CONSULTANT CALENDARS
a chance to view a consultant's calendar before booking an appointment

FAQ FORUM
Discussion forum for consultants and experts for the development of questions and answers for the FAQ database

NEWSGROUP
An open forum area allowing all members of **ecomanagement** to participate in discussions

TRAINING DATABASE
Training materials produced by the **ecomanagement** Consortium for downloading

COMMENTS
Feedback forum to give views about the **ecomanagement** project and services

COUNSELLING LOG
Log database for recording details of meetings and work completed for clients

EMERGENCY CONTACT DATABASE
Contact details for an on-call consultant for emergency consultation and support

NEWSGROUP ARCHIVE
Archive of old discussion topics previously held in **ecomanagement** Newsgroup.

Tele-counseling

The tele-counselor provides guidance and support by helping in the choice of appropriate modules, and by following up the training path. These modules (see below) are available in English, French, German, Greek and Spanish.

3 BASIC MODULES

These deal with the main impacts of industrial activities on the 3 basic components of the environment.

- WATER AND ITS POLLUTION
- AIR AND ITS POLLUTION
- SOIL AND ITS POLLUTION

1 METHODOLOGICAL MODULE

This provides a complete guide for both the user and the telecounselor to plan and implement either ISO 14001 or EMAS certification.

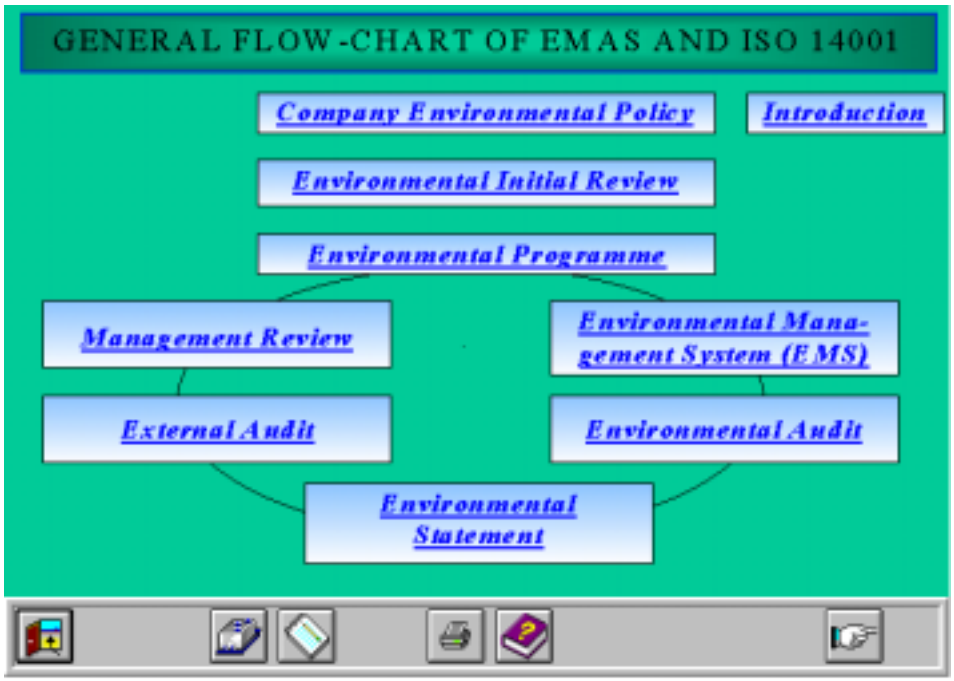
- DEFINITIONS AND NORMS
- STEPS FROM ASSESSMENT TO CERTIFICATION
- TOOLS : CHECK-LISTS, METRICS AND TABLES

5 SPECIALISED MODULES

According to users' needs and to the activities of their company, these provide more specific knowledge and data, which can be updated to take into account the evolution of the company, local regulations or specific technological processes.

- AIR AND ENTERPRISE
- WATER IN FARMING INDUSTRY
- WASTE MANAGEMENT
- PLASTIC PROCESSING INDUSTRY
- ENVIRONMENTAL MANAGEMENT

↳description of an environmental management system
↳expected results and benefits
↳comparison of ISO 14001 and EMAS, (Environmental Management Auditing System)



How Does Tele-counseling Work ?

Regular Sessions

During the first session, the tele-counselor presents his/her role, the general approach and tools. The user exposes his/her expectations, problems and objectives. According to his/her previous environmental background and experience, they identify training objectives. The tele-counselor recommends a training path, (steps, contents and duration.) During the following sessions, they evaluate progress. The tele-counselor answers questions, brings additional information or knowledge and validates the step. Then they can start the following step.

Tools

Forms are designed to help describe and record:

- Training objectives and expected results;
- Activities to be carried out to achieve these objectives;
- Available resources for every objective;
- Evaluation of results and satisfaction;
- Dates and duration of sessions.

Forms are nominal and accessed to with a password. Thus there may be several users in the same firm. The user and the tele-counsellor can share forms and screens, see and hear one another and take the lead, if both are equipped with PRO SHARE or NET MEETING.

THE ECOMANAGEMENT PARTNERS

BELGIUM
UMH (UNIVERSITE DU MONS HAINAUT)

FRANCE
CESI
CNED (Centre National d'Enseignement à Distance)
FEDERATION DE LA PLASTURGIE
OFFICE INTERNATIONAL DE L'EAU

GERMANY
TÜV AKADEMIE RHEINLAND

GREECE
FORMHEL

SPAIN
INSTITUTO CATALA DE TECNOLOGIA

UNITED KINGDOM
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EXPERIENCES FROM IMPLEMENTING THE APPLICATION

While implementing the application, we encountered several obstacles, while several lessons were also learned.

In terms of obstacles, limited Internet access hindered uptake. Even today, many SMEs are still not fully equipped. Although SMEs showed their interest to the product and its relevance, many were still put off by the complexity of the tools. We also realised that the counseling aspect of the project had more impact, in terms of the needs of SMEs, than the training aspect.

Among the lessons learned, the first was that new technologies are not as widespread as first envisaged. Therefore, a combination of distance and face to face counseling can work, and that the Ecomanagement product can serve as a support to face to face training. As far as the subject is concerned, concern for environmental problems is not a uniform issue among SMEs across Europe. For these reasons, probably more specific training modules will be developed. The three modules originally developed were meant for beginners, though in fact we should re-target more environmentally aware persons/SMEs, and treat several further specific activities/problems. In terms of transferability, the Ecomanagement product offers an architecture and tools which can be adapted to any subject for open learning, the basis being counseling and training.

CONCLUSION

Compared with occasion of the project's launch three years ago, the ECOMANAGEMENT concept remains innovative, maybe not in terms of offer and market, but in terms of reality, needs and practice. Although this might not be true for the American continent, it is the reality in Europe.

Twenty-One: Disclosure and Dissemination of Multi-media Documents on Sustainable Development

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OVERVIEW

The Twenty-One project brings together environmental organisations, technology providers and research institutes from several European countries to make documents on environmental issues - in particular on the subject of sustainable development - available on CD-ROM and on the Internet. These documents exist in a number of different media (paper, electronic documents, audio-visual materials), formats (HTML, word processed, desktop published), and in different languages. Many are not available through standard publication channels.

This diversity of media, formats and languages impedes the distribution of documents through normal channels, and makes it hard to search for and retrieve targeted material on specified subjects. The Twenty-One project ensures all these documents can be made available on CD-ROM and on the Internet. The project has developed search engines that can locate the required information, and uses automatic translation tools to make foreign-language texts available. Authors and editors gain an economic advantage by the increased distribution of their documents, while users find documents more available and more easily accessible.

Under Twenty-One:

- Paper documents are scanned and converted into electronic format;
- The document structure is analysed automatic, and the text content disclosed using OCR (Optical Character Recognition) and linguistic processing;
- Fuzzy matching is used during searching to make the system robust against spelling errors in documents and queries, and to compensate OCR errors;
- Linguistic analysis of documents makes it possible to search for relevant phrases (e.g. sustainable development), not just for individual words;
- The application of cross-language information retrieval allows for flexible searching in four languages, namely: French, English, Dutch and German.

OBJECTIVES

The main objective of Twenty-One is to develop domain-independent technology that improves the quality of electronic and non-electronic multi-media information, and which makes it more readily and cheaply accessible to a larger group of people. At the outset, Twenty-One will prove this technology in the field of ecology and sustainable development. However, the generic characteristics of the distinct software modules allow for its easy application outside the domain of environmental information exchange.

The technology developed by Twenty-One facilitates access to information by readers who are not native speakers of the language in which the information is provided. The project result is a software demonstrator that enables users to enter queries in one of four selected European languages, specifically Dutch, English, French and German, and to retrieve (multi-media) documents. The core of the system consists of an index in four languages that has been built and automatically translated by the software. The envisaged demonstrator further allows users to communicate interactively with the providers of the documents. The demonstrator uses both CD-

ROM and the Internet, and its de facto applications (such as WWW, E-mail, etc.). The periodically distributed CD-ROM is used for rapid access to static document bases, whereas Internet will be used for dynamic data and document bases. In addition, the Internet will be used for interactive communication with all parties involved in the dissemination and the transaction model.

The Twenty-One information transaction model, also called the Galilei model, forms an important prerequisite to employing the technology developed within the project. The information transaction model allows different environmental organisations to exchange information, that is, to publish and retrieve different information objects. As such, the information transaction model can be viewed as a socio-technical system. This term originates from organisation theory and refers to systems where emphasis is laid on the inter-dependencies between technical equipment and the (groups of) people using this equipment.

Although the information transaction model constitutes an important framework for the success of the Twenty-One project, the main emphasis in this paper lies on the technology designed for efficient and effective document disclosure and retrieval.

PROJECT ORGANISATION, CONTEXT AND TIME SCHEDULE

Twenty-One is a project funded under the EU Telematics Applications Programme, Information Engineering sector. The project partners are from academic circles (including the University of Twente and the University of Tubingen), and commercial software companies, namely Highland Software Systems (UK) and Getronics Software (NL). In addition, Twenty-One includes sub-contract research organisations, namely DFKI (D), Rank Xerox Research Center (F), and TNO-TPD (NL), together with a number of non-profit environmental organisations, Environ Trust (UK), Friends of the Earth (B), Klima-Bündnis (D), MOOI Foundation (NL), VODO (B). The name 'Twenty-One' refers to Agenda 21, the document resulting from the UN conference on sustainable development in Rio de Janeiro in 1992. The duration of the project is 36 months with the starting date being March 1996. According to plan, the project will launch its main software products in July 1998. As a consequence, this paper reflects the work in progress.

TECHNICAL AIMS AND ACHIEVEMENTS

This section contains an overview of the technical aims of Twenty-One project. While this paper largely reflects work in progress, some modules have been designed and implemented under previous projects, and therefore it is already possible to point out some accomplishments.

The main technical product of the Twenty-One project is the so-called *Twenty-One Demonstrator* (to be delivered by project close). The basic functionality of the Twenty-One Demonstrator allows: (a) end-users easy and cross-language access to a multi-lingual and multi-media information base, and: (b) publishers to submit and disclose their information at very low costs.

The Twenty-One Demonstrator includes two crucial sets of software that:

- Discloses multi-media information;
- Retrieves multi-media information (accessible with current state-of-the-art Internet browsing applications, such as Netscape) from remote servers or from a local CD-ROM. The core of the Twenty-One retrieval software consists of a search kernel supporting several query modes and interface languages.

The Demonstrator's functions will be the *disclosure, maintenance* and *retrieval* of multi-media information. *Disclosure* represents the process of the automated attachment of features to information objects so that they can be easily found. These features in many cases will consist of index terms. *Maintenance* is the set of procedures that keeps the database consistent and up-to-date. This topic is not further addressed in this paper. *Retrieval* refers to the functionality of the system to find relevant information on the basis of a user's queries.

Design Guidelines and Principles

At the outset of the project, a number of design decisions were taken which should facilitate the development of the project software and minimise budgetary risks. As such, the following design decisions constitute a framework within which the designers, engineers and representatives of the user group agreed to cooperate.

- Reuse and extension of existing advanced technologies;
- A generic and modular, component-based architecture;
- Use of open platforms and de facto standards;
- Incremental and cooperative design;
- Evaluation planning and quality assurance.

Global System Characteristics

The aforementioned design assumptions constitute the basis for the development of the Twenty-One Demonstrator, embracing disclosure as well as retrieval functionality. The global functionality of the modules can be summarised as follows:

- Multi-media handling;
- Document conversion;
- Advanced disclosure techniques;
- Domain-tuning: Sustainable Development;
- Targeted at various publishing media;
- Cross-language retrieval/multi-linguality;
- Automatic hyperlinking.

RELATED TECHNOLOGIES, EXPLOITATION AND FUTURE PLANS

The technology with Twenty-One has been designed for efficient and effective document disclosure and retrieval. Further enhancement of this „product“ could be achieved by relying on emerging technologies, such as image recognition, multi-dimensional graphic display of information spaces based on 3-D technology, and so-called intelligent agent technology. The Twenty-One technology is widely applicable. The software packages Twenty-One Publisher and Twenty-One Retrieval can assist all kinds of knowledge workers with their information needs. Examples of applications are electronic publishing (through the WWW), document information management, and workflow management. Possible user groups are, among others, publishers, researchers, marketing managers, and private information consumers. The bottom-line in the exploitation of the Twenty-One technology will be the demonstration of its problem-solving potential to any audience, but with Twenty-One technology, stakeholders should be able to work better, or reduce the ‘time-to-market’ for information products.

CONCLUSION

In this paper, an overview has been given of the Twenty-One approach towards electronic publishing via the Internet and/or CD ROM. By not relying on poor quality indexing, but by carefully coupling state-of-the-art multi-media processing, human language technology and various search techniques, a much more adequate environment for the dissemination of information can be realised. The employed technology seems highly supportive for the needs of the target user groups, and it is to be expected that, as a result of its use within the domain of sustainable development, it will fulfil a crucial role in triggering both publisher and end-users, in this and similar domains, to use it. Both in terms of quantity, and in terms of quality, Twenty-One will contribute to a higher level of information exchange.

Sponsor	European Commission, Information Engineering Sector of the Telematics Application Programme
Duration	36 months, 1996-1999
Partners	Getronics Software (NL), DFKI (D), Environ Trust (UK), Highland Software (UK), Friends of the Earth (B), Klima-Bundnis (D), Rank Xerox Research Centre (F), MOOI Foundation (NL), TNO-TPD (NL), University Twente (NL), University Tuebingen (D), VODO (B).
WWW	http://twentyone.tpd.tno.nl/

Development of the EIONET, the European Environment Information and Observation Network

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INTRODUCTION

In 1990, the European Council passed legislation establishing the European Environment Agency (EEA) as the environmental information centre for the European Union. At the same time it was deemed that the EEA be a small nucleus of a large network, which was named the **European Environment Information and Observation Network** (EIONET).

The main purpose of the EEA and the EIONET is to report on the state of Europe's environment so that the European Union and the Member States have a solid basis for developing legislation. Hence, the EEA's main customers are the EU's Member governments and their decisionmakers. The EEA regulation also charges the EEA with the responsibility to ensure that citizens are properly informed about the environment. The *Dobris Assessment,* the first holistic state of the environment report was published in 1995 (1), and its follow-up, *Europe's Environment: The Second Assessment* was released in late June, 1998. This and other reports are also available at the EEA's website, http://eea.eionet.eu.int/

Producing such colossal overviews relies heavily on the establishment of an effective telematic network – the so-called EIONET. This means that the EEA necessarily accumulates expertise and know-how on telecommunication and networking. These are now recognised as vehicles for further developing new kinds of products and services. Indeed, the first review of the EEA and EIONET made by the European Council in 1997 determined that it shall become an electronic reference centre for environmental information. With the rapid advances in Internet, such as push technology and powerful information locators, there are very good prospects for this. Beyond the horizon, new digital satellite vision holds a promise for totally new types of environmental information services.

THE EIONET: AN ONION MODEL

The EIONET has already evolved considerably during its short life. It consists of four main categories of nodes: i) A National Focal Point (NFP), which is typically a small unit in a Member State's environmental administration that coordinates European activities. (There are NFPs in all EU, EFTA, and Phare countries); ii) National Reference Centres (NRC), which are major research institutes that collaborate with the NFP to provide the information to Europe-wide databases; iii) European Topic Centres (ETC), which are special contractors to the EEA and coordinate activities in thematic areas. Currently there are ETCs for air quality, air emissions, soil, inland waters, marine and coast, nature, land cover, waste, and cataloguing of data sources. Each ETC has a number of partners; iv) In the Phare countries, Phare Topic Links provide the same function and extend the ETCs.

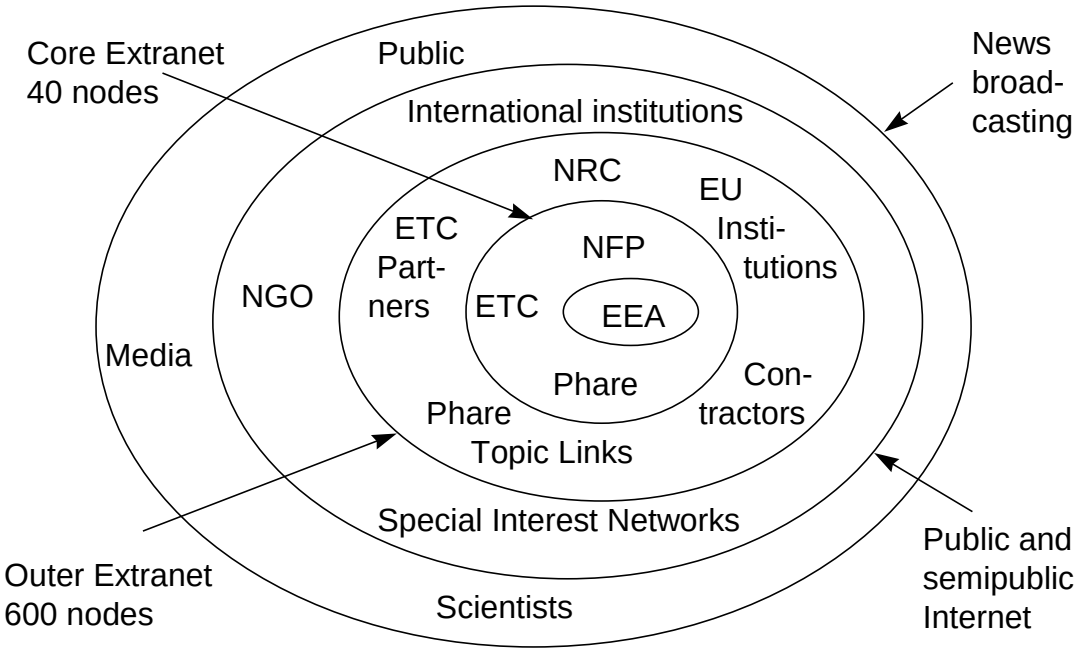

Figure 1. The EIONET onion structure

The EIONET consists of layers represented by a core Extranet, an outer EIONET, semi-public networks, and open information dissemination. Figure 1 shows this structure (for abbreviations, see text).

There are no less than 600 nodes officially nominated to serve as part of the EIONET, though actually less than 200 actively participate. Mapping this diverse organisational network into an effective telecommunications structure, which takes into account the needs of users, working group dynamics, and the necessary security measures, has been a major challenge. As a result, a layered model, as shown in Figure 1, with different rules for the different zones, and the most widely adopted technological standards (i.e., Internet), have been adopted for EIONET.

The core of the EIONET is an Extranet that connects the NFPs, ETCs, and Phare NFPs with EEA. By definition (3) an Extranet is a username/password protected collaborative network of information suppliers and consumers on the Internet. The main functionality of the core EIONET is document management. The content is dominated by drafts and final reports on the state of the environment, information on project coordination, addresses, meetings, and meta-information. It has been built by the EEA and its contractor, Finsiel SpA., in 1995-98 with the support of European Commission's DGIII IDA Programme (4) and that of DGIA. The EIONET that now consists of 40 physical nodes is one of the pioneering Extranet projects among European institutions.

The outer EIONET, which also is an Extranet (see again Figure 1), has a somewhat different group of users and functions than the core. It mainly consists of working groups at the national level and within the partners of ETCs. Document management again is important, but the needs for database management, especially the opportunity to upload extracts from operational databases located at NRCs to data warehouses at NFPs and ETCs has become important. However, currently these services are still being shaped.

EIONET is also an Internet player, actively promoting Special Interest Networks (5) such as BALLERINA (6) on the Baltic Sea environment area, and collaborating with international institutions with their network-based efforts, such as the project on the Clearing-house of the Convention on Biological Diversity (7). Although all the finished documents that have been produced within EIONET are made available through public websites (2), the public dimensions of EIONET still await their full implementation during 1998-2000. Beyond the present Internet of passive web sites, EIONET is looking at emerging technologies for actively pushing and broadcasting environmental news to the widest possible audience.

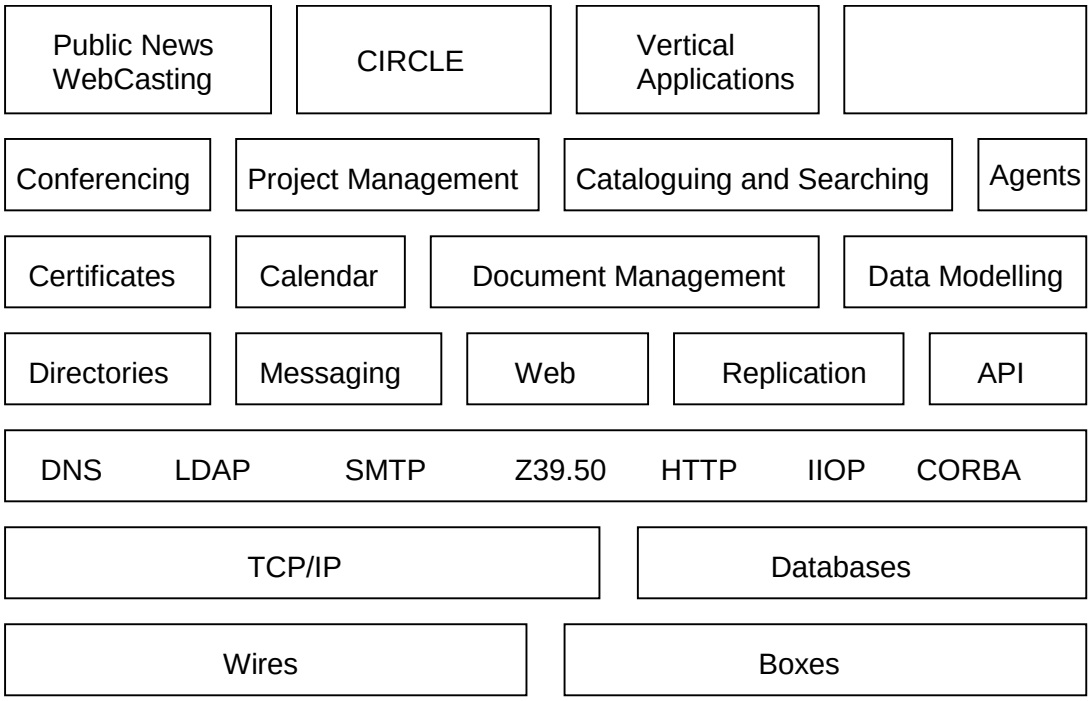

Figure 2. The layered architecture of EIONET's services.

SUPPORTING GROUP COLLABORATION

The functionality of the EIONET is provided by the full range of Netscape server technology on Unix. In order to achieve a fully-functional network, the services will have to be built with a layered approach so that more advanced forms of communication build on top of the basic layers (see Figure 2). At the top of the services there is a groupware package called CIRCLE (Centre for Information Resources for Collaboration on Environment). It ties all the other services together, and provides shared group collaboration areas for projects, which are called Interest Groups. CIRCLE is a generic service that has been developed by European Dynamics S.A. (8) for the Interchange of Data between Administrations (IDA) Programme (4). It is being installed on all EIONET servers. Figure 3 shows the document management functions of CIRCLE.

A few aspects of these layered services are worth discussing here. Electronic mail has become a major contributor to information overload lately. Therefore, more structured forms of communication such as discussion forums and project homepages where documents are uploaded are being implemented. A full-blown distributed directory service across all the hundreds of EIONET organisations is also essential. In document management, the webmaster has been bypassed entirely, and users themselves upload documents to Interest Groups on CIRCLE servers.

Of the vertical applications being built on top of the EIONET platform, the most central is the Catalogue of Data Sources (CDS), which consists of a data directory, address database and a multilingual thesaurus (9). It serves as the key link to all the other data sources on the EIONET.

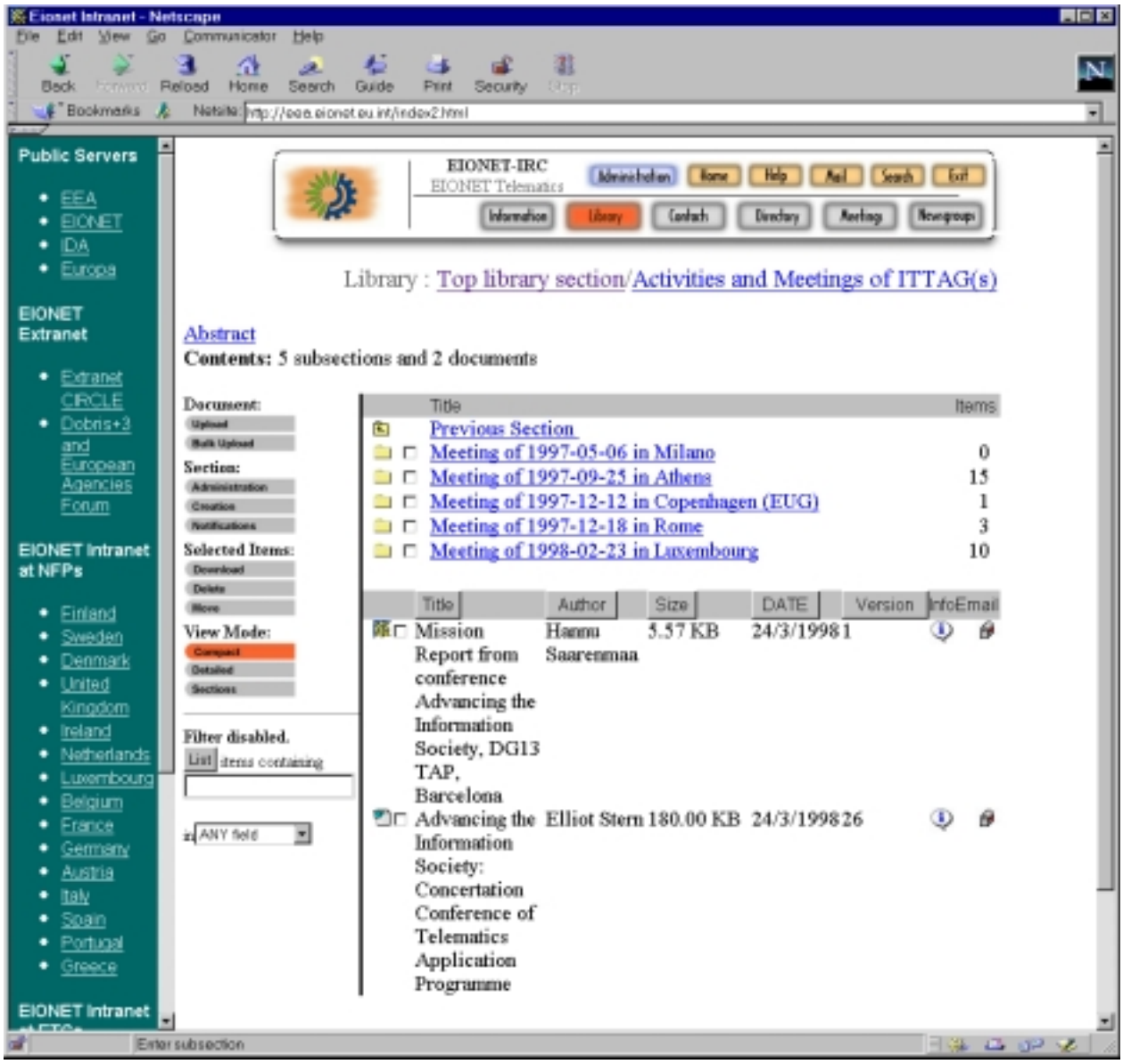

Figure 3. A screen from EIONET showing the document management functions of CIRCLE.

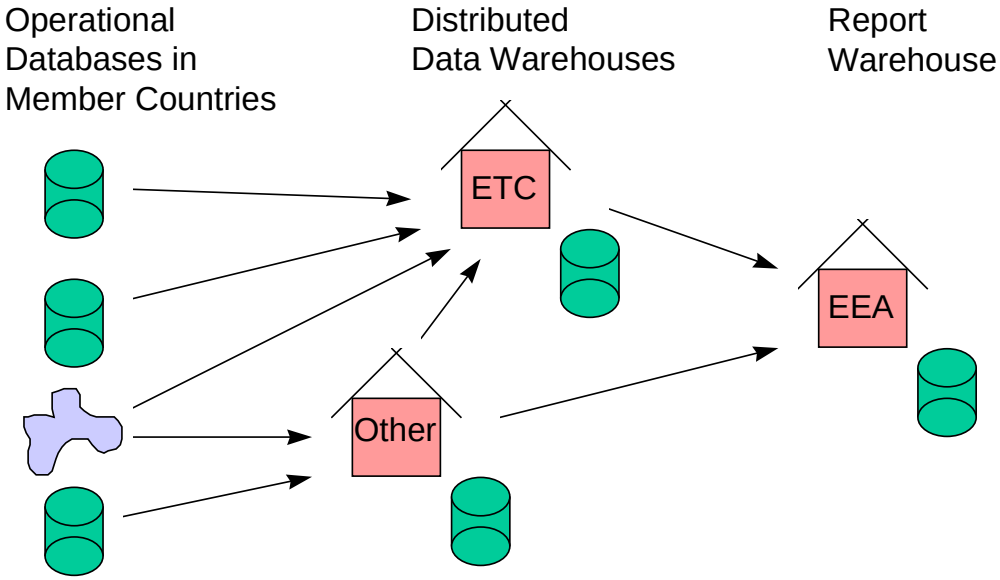

Figure 4. The distributed data warehouse architecture of the EIONET.

DATAFLOW AUTOMATION - TOWARDS ONE-STOP REPORTING

The current state of online databases on the EIONET is not very advanced – only a few are publicly available, such as prototype web front-ends for the CORINE land cover and biotope databases (see 2; also on CD-ROM). Unlike some services like the U.S. EPA's "Envirofacts" (10), there is not yet a central database located on EIONET. Instead, a distributed data warehouse system is being established (see Figure 4). This is done to alleviate the problem that in Member States, the same people will have to report the same or slightly different data repeatedly to various data collection systems, such as those of Eurostat, the European Commission, EEA, OECD, and various legal conventions. For historical reasons, overlapping dataflows have been set up on an ad hoc manner, but now need to be connected. The data warehouse functionality of EIONET servers should streamline this by making the EIONET server the single place for data reporting. The various users of data could then access it from there. This approach will give good possibilities for automating dataflows in small steps. The EEA is also working on projects that in future may employ intelligent agents to locate and retrieve data from the EIONET and to distribute this to its users (11).

EIONET - AN INTEGRATIVE PLATFORM

Environmental issues are cross-cutting and the Maastricht Treaty demands that sustainability be taken as a guide for all economic activities. This means that users of the EIONET who study environmental impacts increasingly will need data and information from adjacent economic sectors such as energy, transport, forests, agriculture, etc. Lots of sectoral networks have begun to be created in Europe, and many of them are migrating to an Intranet/Extranet operational mode. These developments are particularly relevant to the EIONET, because if there is a well operating network on a sector adjacent to EIONET, it may be possible to tap into its dataflows instead of creating a redundant reporting system on EIONET. However, the danger that overlapping networks will be born will have to be monitored carefully, and for this reason, for instance, the new network for the Clearing House of the Convention of Biodiversity should be hosted on EIONET. The current convergence of technology to Internet will make it increasingly easy to integrate different networks. The solutions chosen for EIONET, Extranet and group collaboration on CIRCLE, are very generic and could easily be duplicated on other networks. In essence, we need to clone EIONET to other economic sectors.

EIONET also can provide a platform for new telematics applications. There is a large user base, well-developed authentication services, and shortly there will be a database that can be used for automatically generating state of environment syntheses.

CONCLUSION

EIONET started life as a closed network but is increasingly opening up to new partners. We are still taking the first steps in opening up the information sources on environment and connecting to the real sources of information. In future these connections will be reinforced and increasingly automated.

The best available environmental information is not always with governments, but with museums, research groups, NGOs, etc., for which a place must be found in the EIONET. Open access to environmental information is the best guarantee that improvements in the state of environment will be achieved. When information is released, it will create positive pressure from those citizens concerned for the environment towards those placing stress on environment. It will also lead to increased quality control of the information itself. New forms of electronic democracy are being created while discussing the state of environment.

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(3) http://whatis.com/
(4) *Europe's Environment Network (IDA EIONET).* IDA Report 4, p. 7. 1997. European Commission DG III Interchange of Data between Administrations Programme, Brussels. See also http://www.ispo.cec.be/ida/ida.html
(5) http://www.csu.edu.au/links/sin/sin.html
(6) http://www.baltic-region.net/
(7) http://www.biodiv.org/
(8) http://www.eurodyn.com.gr/
(9) http://www.mu.niedersachsen.de/system/cds/
(10) http://www.epa.gov/envirofacts/
(11) http://www.mcc.com/projects/infosleuth/

CDS - Catalogue of Data Sources

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BACKGROUND

The work of the ETC/CDS is guided by the European Environment Agency (EEA) to provide up to date, harmonised, reliable information on the state of the environment relevant on a European scale. To achieve this, the EIONET network (European Environment Information and Observation NETwork) is being built, consisting of approximately 600 institutions. The focus lies on the nine media oriented European Topic Centres as well as on the contribution of 18 National Focal Points and increasingly the PHARE countries.

The ETC/CDS is built as a consortium of 11 partners based in Austria, Germany, Italy, Spain, Sweden and The Netherlands. The central task is to conceptualise and implement a locator system (meta information system) for European environmental information. The subtasks consist of developing software for the collection (WinCDS) and retrieval (WebCDS) of environmental metadata, establishing a multi-lingual European thesaurus (GEMET), and terminology and coding. In parallel, selection criteria to establish and fill a database of metadata relevant for the European Environment Agency were also suggested and agreed upon.

THE CDS DATAMODEL

Before starting this work, agreements were necessary on how to commonly describe and exchange this environmental metadata. Through co-operation with different initiatives inside and outside the EEA network, a proposal on a common data model was achieved and software development was undertaken. Mandatory fields in line with the international GILS, GELOS and DUBLIN CORE metadata initiatives were agreed upon in November 1996. The upcoming international meta data standard ISO 15046-15 will be supported as well.

The CDS datamodel distinguishes between the core level and level 1 and level 2 annexes. The core level consists of 13 mandatory fields which represent a brief description of the data source and the location of the information. In level 1, detailed information on spatial, temporal and technical aspects of the data source is attached. The core level and level 1 form the basis of the CDS software which is currently in use within the EIONET. The CDS is also offered to European Union Member States to support their national metadata initiatives and to other users. The level 2 annex gives the opportunity to define customised additional requirements.

ETC/CDS promotes different levels of metadata integration in order to be able to communicate with comparable national and supranational initiatives. The EEA and the ETC/CDS offers it's customers and partners two options. As a smallest common denominator they are requested to use the same mandatory fields, while a medium level of harmonisation would be to utilise the ETC/CDS datamodel and modify it within their own application. The ETC/CDS software itself is offered free of charge and participation in future development is appreciated. The Standardised General Mark-up Language (SGML) has been selected as the standard input/output format to achieve the seamless transfer of metadata between different applications.

PRODUCTS OF THE ETC/CDS

Different tools enabling and supporting the work of data collection and dissemination have been developed and are maintained.

The General European Multilingual Environment Thesaurus (GEMET) is the indexing, retrieval and control tool for the CDS. It is conceived as a "general thesaurus", aimed to define a common general language. It is available as version 2.0 and now includes 5000 descriptors in 9 languages, arranged in a classification scheme made of a group-hierarchy and themes. Definitions for the descriptors are supplied by the terminological experts. It will be extended to all 13 European languages by the end of this year.

The WinCDS is an ACCESS based software for metadata input. It is built upon the data model version 2.0 and allows the description of the locator records, indexing with GEMET, searching and printing of results, as well as import and export of databases. Due to the open development environment it can be modified for different purposes.

The WebCDS is the Java-based retrieval system for the metadata collected with the WinCDS. It provides global

access to the CDS database via the World Wide Web. It now also serves as a web-based input and update tool for the EEA's and other partners' databases.

INFORMATION AVAILABLE FROM CDS SERVICES

There is a growing need for the EEA and it's customers to establish a comprehensive overview of environmentally relevant information on the European scale. Through past collection missions, a basic stock of information is already available in the CDS database. The following information can be found in detail:

- Information from ETC's;
- Information used to write DOBRIS+3 and *The Second Assesment'98*;
- The complete inventory of the EEA web pages;
- General meta information from Member Countries (currently under way).

In order to paint a complete picture of the available environmental information in Europe, obviously more sources need to be incorporated and documented. These sources include:

- Other partners from within the EIONET (some NRC's, MCE's);
- Specific national meta information derived mostly from national environmental information systems;
- The European Commission and the DG's including EUROSTAT;
- EU Parliament;
- Conventions;
- NGO's and other organisations working in the environment field (e.g. regional agenda 21);
- Selected private data/information providers.

Wherever possible, direct access to these sources should be supported. The appropriate means of collecting the latter sources is rather a decentralised process, leaving most data and responsibility with the data provider.

To achieve a complete and up to date data repository, the sources of each report written and published by the EEA must be documented in the CDS. Doing this, and maintaining a general collection process as described above, the size of the information base will grow but will never be complete and will always demand update.

Crucial for the success of all these efforts is the organisation of an effective and targeted collection of metadata from the EIONET. At this time, the instruments are up and running, and the data collection is underway. Relevant data from the EIONET partners is collected, harmonised and made available for the work within the network and for the information needs of the public. In the first stage, data from the ETC's and the EEA are incorporated into the system. This will be extended shortly to the National Focal Points (NFP's).

STRATEGIES FOR DATA ACCESS

The WWW plays a key role in accessing and disseminating metadata. Modern concepts of data retrieval using JAVA tools have already been implemented in the WebCDS and will be extended in the future. Cooperation with the community of earth observation data providers and users has started and offers an opportunity to combine the accessibility of environmental metadata with earth observation metadata. Furthermore, it supplies the tools to inter-operate between distributed catalogue systems. Catalogue inter-operability is a key concept in integrating related information sources from different providers. Graphical spatial searches for metadata throughout the Web will be a future enhancement of the CDS through this cooperation and through our own efforts.

In future, users will not likely stop at a point where data is described. Wherever possible, access to raw data needs to be supported. The concept of distributed data and unified access leads to the need for implementing a repository with WebCDS being the entry point to information services, performed either locally or distributed.

ACHIEVEMENT IN THE HARMONISATION OF NATIONAL SYSTEMS

Since the beginning of the project, there has been strong and increasing interest in CDS among the member countries of the EU. Initially compatible with Austrian and German developments, several countries have since expressed interest and willingness during recent years in adopting CDS as their national metainformation system (Belgium, England & Wales, Italy, Ireland, Luxembourg, Switzerland). While Switzerland has chosen the CDS as national system; England & Wales, and Ireland modified and extended the software to meet their needs. The bottom line in harmonisation is formed by the common use of the mandatory fields within the core data. This is the key to exchanging data within a wider network.

The role of the ETC/CDS to service European countries in meta information aspects, will be strengthened within the framework of the European Environmental Reference Centre - to come within the EEA's next multi-annual work programme, starting in 1999. Regarding the EEA's activities to integrate the PHARE countries in their work programme, the ETC/CDS offers it's experiences in the field of accessing harmonised, distributed environmental information to these new partners.

For further information please access: **http://www.mu.niedersachsen.de/cds** while more information on the technical and architectural development and extension of the CDS can be found in the REMSSBOT presentation given by Paolo Gallo in Session 3.

Expanding the EIONET: A CEE case study

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ABSTRACT

This paper first briefly overviews national and international legislative frameworks that basically influence the activities of the Hungarian Ministry for Environment and Regional Policy (MERP) in the field of environmental information management. Then it is shown how Hungarian efforts to improve the environmental information system connect to the EU's EIONET network.

The paper secondly aims to indicate the large scope of tasks to be undertaken for setting up a standard application for the MERP and its regional authorities. It is illustrated how the ESRI products provide a reliable basis for GIS processing of related data. The Integrated GIS of the Ministry was funded by the Phare assistance programme, and was implemented within the framework of a combined project. The Arc-Info/Arcview/Oracle environment was selected for realisation of the project in a client-server architecture. It is composed of three sub-systems as follows: environmental protection, nature conservation, and a register. The system serves as an inventory for analysis, modelling and decisionmaking concerning the issues of environmental protection and nature conservation.

Thirdly, the paper offers a brief outlook and indicates the importance of collaborating with data owners, communicating information to the public on the state of the environment, and what can integrated environmental and economic information systems mean from the environmental stakeholders' point of view.

LEGAL FRAMEWORKS AT INTERNATIONAL AND NATIONAL LEVEL

EU-Legislation

The main elements of EU-legislation influencing the activities of the Ministry for Environment and Regional Policy in the field of environmental statistics and information are as follows:

- *94/808/EC Council Decision of 15 December 1994* adopting a 4-year development programme (1994-1997) relating to the environmental component of community statistics (under constant renewal);
- *Council Regulation (EEC) 1210/90 of 7 May 1990* on the establishment of the European Environment Agency and the European Environment Information and Observation Network of the Council of the European Communities (modification is under preparation);
- *93/464/EEC Council Decision of 22 July 1993* on the framework programme for priority actions in the field of statistical information 1993 to 1997 (renewal is constant);
- *85/338/EEC Council Decision of 27 June 1985* on the adoption of the Commission work programme concerning an experimental project for gathering, coordinating and ensuring the consistency of information on the state of the environment and natural resources in the Community;
- Practical Steps towards the implementation of the Communication from the Commission to the Council and the European Parliament on Directions for the European Union on Environmental Indicators and Green National Accounting (*COM(94)670 final*).

Hungarian Legislation

The major components of Hungarian legislation concerning MERP activities in the field of environmental statistics and information management with some specifics and explanations can be summarised as follows:

- *Cabinet Decree of 2339/1996. (XII. 6.) on the Tasks of the Development of an Environmental Information System in the Field of Environmental Statistics.*

Following an earlier Cabinet Decree, environmental data systems were overviewed from an OECD and EU requirement point of view, and a proposal prepared for the Government on the development of an environmental information system which (in the framework of the Integrated Environmental and Economic Information System):

- is able to merge environmental data systems;
- can relate human activities, the state of the environment and societal responses, and target areas of environmental policy;
- combine results in an environmental-economic database which can provide valuable usable information for decisionmaking, environmental policy, and the general public.

In the Annex to this Decree, an implementation plan was included which covered a 6-year period, and aims to seek the improvement and satisfaction of OECD/EU data demands, in harmony with Hungarian tendencies and objctives. In order to perform these tasks, it is necessary to develop both the field of statistics and the other components of the environmental information system. The huge amounts of basic data that constitute environmental statistics come from outside statistical sources such as environmental monitoring and measurement systems, scientific experiments, and different kinds of inventories etc. It is necessary to ensure this development becomes inseparable from the technical and methodological evolution of data collection and information systems.

- *National Statistical Survey Programme (NSSP)*

This Programme is updated annually by a Government Order. Within the NSSP, there are several environment-related data collections (direct or indirect) supervised by the National Statistical Office and Ministries.

- *Act LIII of 1995 on the General Rules of Environmental Protection*
  This Act contains three sections that deal with environmental information systems and the provision of information (see Annex for detail).

MERP STRATEGY FOR THE DEVELOPMENT OF AN ENVIRONMENTAL INFORMATION SYSTEM IN HUNGARY

The MERP's long-term concept is to establish a multi-targeting and multi-objective unified environmental information system. What exactly does this mean? Firstly, it does not mean the establishment of one enormous system, but rather the rearrangement of existing sub-systems and management of their imminent and artificial contradictions and counteractions. In order to reach this ultimate target, the following strategic steps must be taken (see also Figure 1).

- First, a national centre linked to well-equipped regional centres within regional authorities should be established (to this end a pilot project financed by Phare was launched and completed in 1996, see below for further detail).
- Secondly, the national centre should serve as a repository of all central databases and main contact points to the international community. In Hungary, this contact point is represented by the UNEP/GRID Budapest office that was inaugurated in April 1997.
- Thirdly, institutional settings should be seen in relation to information systems and procedures already in use, or planned by other ministries and other relevant organisations, and institutes.

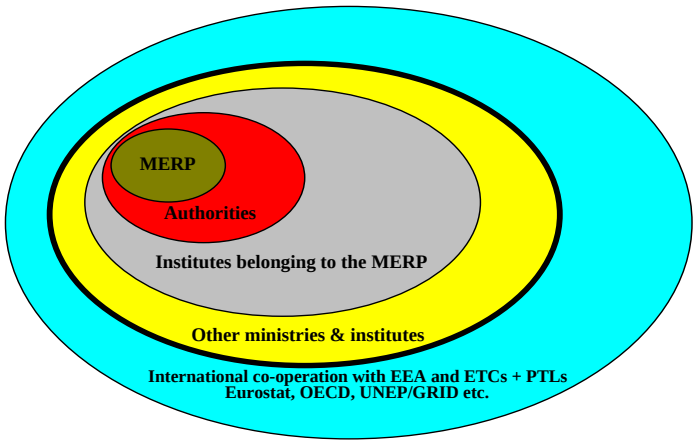

Figure 1. Shell-structure of environment-related data owners and users

SETTING UP STANDARD APPLICATIONS: A CASE STUDY

Preliminary Concepts

The idea behind improving the information infrastructure of the Ministry (MERP) and its regional authorities dates back to the late 1980s. The opportunity for its realisation became evident in the early 1990 thanks to the funding of environmental projects in Hungary through the European Community Phare Environment Programme. This Programme targeted four priority areas: strengthening environmental management capacities; air pollution abatement; municipal solid waste management; and nature conservation and habitat reconstruction.

The large scope of the task required sophisticated preparatory work. Its main aspects included;

- The detailed examination of systems and applications available prior to the project;
- Determination of priority issues to be handled by the new application;
- Definition of the optimum balance between priorities to be solved and the funding available;
- Preparation and announcement of tenders for the realisation of projects.

Implementation

The above mentioned issues had to be coordinated by the MERP and its 22 regional authorities for environmental protection and nature conservation. As a matter of fact, a considerable number of related projects funded from diverse sources have already been previously realised. However, none of them brought the desired results in setting up and implementing a system that would have offered a solution to the urgent need among central and regional authorities for having a common, more or less standard application. Though providing valuable advice as to how to set up a nationwide environmental information system, they were essentially held back at the level of system design.

Therefore, the highest priority of this project was the implementation of an integrated system according to the instructions defined during the system design, and that would serve to provide substantial help in the daily routine work of the staff of the authorities.

The main objective of the development and installation of the Integrated GIS was to elaborate an information system with GIS functionality efficiently supporting both official and scientific fields of activity within the authorities, and providing the best possible support for their requirements concerning the collection, processing and analysis of data.

Given the finite amount of financial assistance, the most cost-effective solution for implementing a system at all sites had to be considered. The best option was to set up an information centre at each of the agencies involved with the MERP. These were the so-called Thematic Information Centres (TICs) suggested to serve as pilot sites equipped with a high level hardware and software that can also be regarded as models for other authorities.

Those TICs selected for environmental protection were based in the vicinity of Lake Balaton. The Central Transdanubia Authority (Székesfehérvár) together with two other regional authorities are responsible for environmental quality in the Balaton catchment area. Such tasks require the collection, processing and analysis of a huge amount of data using data assets in a unified, integrated system. The TIC for nature conservation is based in the Hortobágy region because of the considerable value of sites and species living in the area, and staff experiences in digital processing of nature conservation data.

Within the framework of a related project, different scales of topographic maps have been digitised. Those features to be captured and attributes to be processed were defined by the MERP. The processing of data proceeded according to the traditional methods of obtaining clean line-work, linking attributes, and eventually, processing topology. Features having a common boundary were processed as regions. Data sets are provided in Arc/Info format.

Systems Integration

The ultimate aim of the development of such a system for environmental protection was to integrate the handling of data pertaining to different so-called professional (or expert) systems, and to feature the results of their analysis on maps supporting decisionmaking procedures.

Two major aspects of the development of the system have to be emphasised: satisfying the requirements of cooperation needs with other authorities, while the functionalities of the application developed must be accessible for other regional authorities.

Environmental Protection

Taking into consideration these two requirements, the environmental protection TIC supports the following activities undertaken by regional authorities:

- Improvement of environmental data capture;
- Advanced handling of environmental data;
- Complex interpretation and statistical analysis of environmental data;
- Ensuring the handling of georeferencing data;
- Supporting decisions on environmental rehabilitation by improving the accessibility of data needed;
- Taking official measures based on reliable assessments, and;
- Improvement of public awareness concerning the environment through more efficient dissemination of environmental information.

The professional data systems to be integrated into the sub-system of environmental protection are as follows:

- EMIR (Information System for Air Emission);
- VEHUR/HAWIS (Hazardous Waste Information System);
- VIFIR (Hydrogeological Information System);
- VM (Water Quality Data Management and Distributing System);
- SzFKAT (Cadastre of Sewage Water Sources);
- SHATIR (Computer-based Hydrological Data Processing, Storage and Information Distribution System);
- ZAJ (Noise).

To develop a system ensuring the integration and integrated analysis of the above professional systems, three major tasks had to be tackled (the solutions selected are in parenthesis *in italics*):

- The systems were developed using different software and therefore had different data structures, and where an immense amount of tables and data to be handled (300 and 1500, respectively), had to be integrated into one unified system. (*Their full integration was realised through their import from dBase into Oracle tables using FoxPro applications*);
- Objects representing legal entities (e.g. companies) had different identifiers in different sub-systems. In order to ensure simultaneous query of different kinds of pollution discharged by the same object a uniform identifier system was needed. (*The problem of integrating object identifiers was handled through elaborating several interrelated registry tables with a fundamental "table of objects" register. This provides every object with a unique identifier and registers their X, Y, Z co-ordinates for spatial representation*).
- In order to present the results of queries and statistical analysis of data on maps the related objects have to be georeferenced (*Georeferencing of the objects can be made by entering the coordinates directly into the table of objects register or registered indirectly through the georeferencing tool of the application using a special on-screen georeferencing technique*).

Nature Conservation

The professional systems to be integrated into the subsystem of nature conservation are as follows:

- Module of taxonomy;
- Module of nature conservation areas;
- Background data for nature conservation,
- Module of biological observation;
- Land management system, and;
- Forest management system.

Integration of the above sub-systems allows the spatial analysis of the relationship between different kinds of pollution records discharged by objects and biological observation data. This analysis can be realised within the nature conservation sub-system. It begins with the selection of the appropriate Oracle View set up and represents the result of the query made in the environment protection sub-system. Loaded onto a map within the nature conservation sub-system, it can be associated with the result of a query concerning biological observation data through thematic overlay/logical queries. The result can be illustrated in the nature conservation sub-system.

EIONET LINKS

Given that the main purpose of the EEA and its EIONET network is to report on the state of the environment at the European level, so national governments are responsible for producing reports on the quality of the environmental conditions at the national level.

Nevertheless, it is necessary to bring together data owners, data providers, and data communicators in a continuous process at both the national and international level. These two levels share different data requirements, however, we should also take into consideration the needs of the general public, and decisionmakers and policymakers when disseminating information. It is obvious that different levels of data aggregation are necessary to satisfy information demand. Therefore, it is very important to know what is the future perspective and the evolution of information users' demands. We can evidently stimulate this process using new developments both in computer techniques such as networking, and in the systematisation of our knowledge as indicators for different types of frameworks (e.g. OECD's PSR model or EU's DPSIR model).

Environmental Indicators and National Accounting

Environmental indicators and "green accounting" enable interaction between the environment and the economy. They are aimed at improving the quality of development, and could even be viewed as a precondition for it. Their progress is also aimed towards improving sustainable development and to help understanding of the impact of policies, attitudes or simply lifestyle. Indicators are therefore a kind of progress chart for "joint projects." In a market economy governed by initiative and creativity, the main vehicle of change is the awareness of individual operators, whether they are consumers, producers or inventors.

The European Union has made such a joint project one of the "quasi-constitutional" cornerstones of its identity. It must therefore give itself the right tools for the job that describes a framework and program, common to all the Member States of the EU, for setting up a linked set of environmental indicators and national accounts.

A conceptual framework was founded on the basis of the EU directly related to the 5th Environmental Action Programme, giving priority to measuring the impact of economic activity on the environment, and describing the costs and effects of measures designed to improve that impact.

A programme comprising stages linked one to another, from the creation of the basic indicators to their incorporation into an accounting framework consistent with the major macro-economic aggregates, aimed to optimise cooperation between the Member States and between Eurostat and the European Environment Agency.

Rather than proceeding to the modification of national accounts in order to calculate a greened GNP, the creation of a separate framework is proposed for the establishment of an environmental-economic information system. This system would be the result of two complementary approaches:

- 'Satellite' accounts alongside national accounts and closely linked to them, some in physical and some in monetary terms, that will themselves provide a powerful analytical tool and in which the new concepts can be tested;
- The calculation of physical indicators and indices related to the pressures of human and economic activities on the environment.

Even if progress in these two directions differs in their time scale, they should lead to a common database on the physical environment covering the main policy areas. Such a database could not be produced without strong collaboration with national institutes in the Member and EU Accession States, besides cooperation with international organisations.

The Commission splits its work programme into six strongly interrelated actions which have to be undertaken in close coordination:

- Creating a handbook on Green Accounting;
- Developing a European System of Environmental Pressure Indices;
- Developing Integrated Environmental and Economic Indices (see Figure 2);
- Developing Environmental Satellite Accounts;
- Research on damage evaluation and monetisation techniques;
- Ensuring horizontal co-ordination.

The first and the last actions are of a more coordinatory and managerial nature. The cornerstones are the second through to the fifth actions.

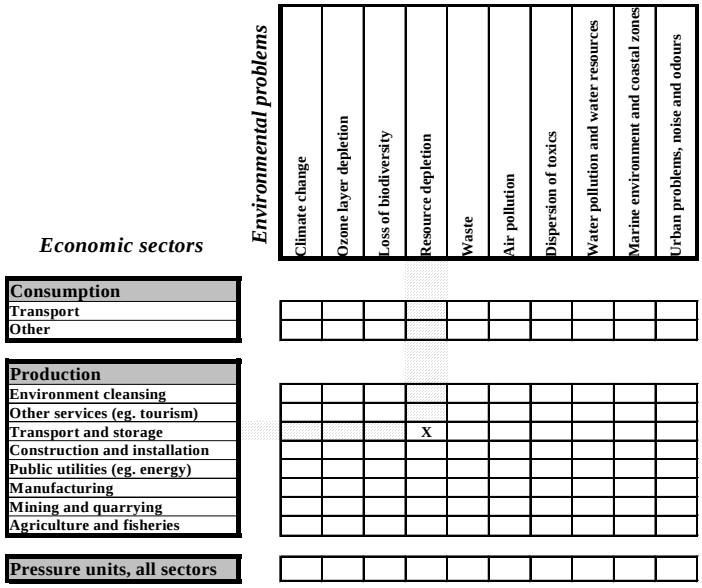

Figure 2 The European System of Integrated Environmental and Economic Indices

Each cell in Figure 2 describes the contribution of an economic sector to an environmental problem, expressed in pressure equivalents. For example: the sector "Transport and storage" contributes by X to the "Resource depletion units". Such units are aggregations of single pressures on the basis of scientific consensus or expert assessments. This figure illustrates only the top aggregation level of a more detailed so-called "Emission structure".

The integration of the environmental and economic considerations taking the form of Environmental Indices and Satellite Accounts lead to a comprehensive system that is not only understandable by experts but by the general public too. One main advantage of the integrated system proposed will be its possible extension to other aspects such as unemployment, social and health considerations. The other benefit of the system is that it can provide aggregated and detailed information about cause-effect chains between human activities and the environment. The production of different kinds of reports on the state of the environment should be based upon this integrated system because it is able to manage data coming from both private and state-owned business sectors together with data on environmental conditions. The environmental reporting activities must be extended to the business sector on a voluntary basis to assess the environmental performance of economic players.

APPENDIX

Excerpts from Act LIII of 1995 on the General Rules of Environmental Protection, concerning the environmental information system and provision of information:

Section 49

(1) The Minister shall establish and operate a monitoring network, the National Environmental Information System ... for the monitoring of the state and use of the environment, and the measurement, collection, processing and registration of data on the utilisation and loading thereof.".

(2) The Information System shall be organised and set up in such a manner and with such a territorial density that on the basis thereof

a) the changes in the utilisation, loading and the state of the environment can be determined quantitatively and qualitatively and can be compared internationally - in a form that can also be evaluated together with social and economic relationships and from the aspect of the impacts on the health of the population;
b) the causes of the environmental impacts can be established with satisfactory accuracy (including also detailed breakdowns required for the establishment of the causal relationships of the damage);
c) the hazards posed to the environment can be recognised as early as possible;
d) the regulatory responsibilities can be fulfilled and the official measures can be taken by the authorities;
e) it can be used for planning.

(3) The regional tasks necessary for the operation of the Information System shall be fulfilled by the regional environmental protection authority [Section 65, subsection (1), paragraph a)].

(4) The costs of data provision, as specified in legal rules, shall be borne by the party obligated to provide the data concerning the impacts on the environment.

Section 50

(1) Users of the environment shall measure the environmental loading and the utilisation of the environment caused during its activities in a manner specified in legal rules, or shall substantiate and register it with technological calculations, and shall make its records available and/or shall provide data to the authorities with jurisdiction and competence.

(2) The organs of local governments and the state responsible for environmental protection shall make the data they obtained and necessary for the Information System available to the Information System, in accordance with the contents of government decrees.

Section 51

(1) The findings of studies funded from the state budget and pertaining to the state, the utilisation and the use of the environment shall be treated in accordance with the legal rules on data of public interest.

(2) On the basis of the data collection, the Minister shall submit a report annually to the Government on the trends in the state of the environment in the country.

(3) Municipal local governments shall inform the population about the trends in the state of the local environment as required, but at least annually.

QUARTET PLUS: Using Transport Telematics to Reduce Travel Time and Environmental Pressure

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INTRODUCTION

Recent progress in telematics technologies is today enabling their large scale practical application at reasonable cost and effort. Prototypes of information systems for users as well as advanced systems of traffic control and management are in fact already operative in many cities with positive results. New proposals and technologically innovative applications are emerging almost daily, and thanks to these innovations, the problems of transport and traffic management can begin to be successfully tackled both in dynamic conditions and in real-time. To achieve this would certainly represent an important contribution to the reduction of congestion and pollution, and increase the convenience and comfort of mobility in any city.

Telematics technologies certainly have the potential to achieve this objective: they enable data collection concerning conditions across whole transport and traffic networks, they generate information from this data, and can transfer it to operators and users, keeping them constantly informed. This can allow the users to decide whether to make a journey, which is the most convenient means of transport and, which is the best route to reach the destination (in other words, it allows the demand to adapt to the current supply). At the same time, it makes it possible for transport operators to know the real situation of the transport and traffic network, predict its evolution and, consequently, determine the most appropriate management strategy (adapting the supply to the demand).

QUARTET PLUS

Improvements to the overall travel and traffic situation require a rational *top-down process* which will modify the structure of the demand for public transport and, where necessary, limit the growth of traffic demand, directing it towards the most appropriate times and routes for each mode. The presence of control systems on the other hand for the management of the resulting traffic and public transport demand is also needed.

The extensive evaluation activity performed by QUARTET PLUS[1] aimed to verify quantitatively this principle. An effort was also made to provide answers to certain fundamental questions concerning the operational potential, in the short and long term, of telematics applications under the following scenarios:

- With regard to the management of traffic and public transport (from an operator's point of view) are there really significant margins for the overall improvement of the performance of current systems? Through which methods and technologies?
- Taking into account the complexity of the problem and the enormous number of users in a large city, is it possible to "inform them" in such a way as to positively influence their behaviour? Once again, with which methods and, above all, with what operating results?
- Lastly, recalling that the real world in which we are operating is one of competition between different users for the limited resources available (i.e. a highly reactive and unstable environment), is it possible that dynamic information could in fact worsen the overall situation, e.g. by saturating the transport modes and routes considered most convenient, and/or by creating a general increase in demand?

In this article, a synthesis of the experimental results obtained from the demonstration programmes carried out as part of QUARTET PLUS is presented, and an attempt is made to provide some initial elements on which to base replies to the questions posed above.

[1] Quartet Plus Project (TR1044), *Validation of a European Urban and Regional IRTE based on Open System Architecture*, involved six European sites: Athens, Gothenburg, Stuttgart, Turin, Toulouse and the UK Midlands. It is a project funded under the European Commission's Telematics Application Programme for the period 1996-1998.

METHODOLOGY

Optimising Management and Control Actions Against a Constant Demand

Within QUARTET PLUS, a series of experiments were carried out to test the potential of telematics in optimising management. For comparison purposes, the travel times for public and private transport were measured along major city arteries under different regulation conditions. Different technologies and different scenarios were evaluated in three of the Quartet Plus sites.

In evaluating the benefits of private traffic, tests were carried out with "floating cars" driving along selected routes ranging from 4 to 6 kilometres in length and compared with travel times recorded for public transport vehicles taking into account whole service lines. Efforts were made to ensure homogeneous traffic conditions for the different scenarios and to provide a sufficient sample to give over 95 percent confidence in the results. Results showed that an increase of about 17 percent in the average speed of private vehicles along the artery at peak time was measured in two of the QUARTET PLUS sites (Toulouse and Turin).

At the same time and in the same urban areas, attention was given to improving public transport (by giving priority to public vehicles). This was one of the most tested applications. Improving the quality and efficiency of public transport is generally felt to be one important factor that will attract more travellers to public transport. Gains in travel time, ranging from the 5-10 percent category and the 14-15 percent category were observed in Toulouse, Turin and Gothenburg, depending on the technology used.

The gains measured demonstrate that important benefits for users (both those travelling with private cars or public transport) are achieved through telematics systems providing better and coordinated control without affecting demand.

Parallel control trials were also implemented to evaluate whether giving priority to public transport negatively affects the efficiency of the traffic network for private vehicles. Resulting comparisons made of travel times for scenarios with and without public transport priority showed differences as low as 1 percent - not statistically relevant for flows crossing the priority public transport routes.

Direct benefits to the public transport operator from such an increase in average speed (and the reduction in the number of vehicles necessary for the same service) were calculated. In one example, the pay-back period for whole investment would be just over two and a half years. Under the same scenario, if the passenger time saved were translated into money terms, the investment (which, as we have seen, also benefits private traffic), would pay for itself in just a few months (to be exact, 131 days).

As the effect for private traffic was a reduction in waiting time at traffic lights and greater efficiency in travelling conditions, this also meant a decrease in exhaust emissions and fuel consumption. As an example, a reduction of around 5-6 percent in carbon monoxide emissions was estimated at different sites for one system.

It can be confirmed therefore that optimised telematics management produces quantitatively significant benefits. But the tests show also that, with the appropriate control strategies, the benefits are sufficiently high to provide economic justification to the investment involved. Even taking into account the public transport operator alone, the pay-back period is only a few years. Finally, these large-scale experiments have confirmed that the advantage enjoyed by public transport is not at the expense of private traffic. With the correct application of telematics, there are advantages to be enjoyed by all.

Influencing Demand (Integrated with Management)

The benefits described in the previous section were obtained without influencing the demand (in fact, particular attention was paid to ensure that demand was kept constant). As telematics also have the means to influence demand, by recommending routes to private traffic and the best lines for public transport, the real advantage of this action was verified by additional field trials.

A series of tests (Origin and Destination experiments) were carried out to measure all the components of the travel time for a sample of trips between certain Origin and Destination points, both for private traffic and public transport. For this test, use was made of "floating vehicles" and passengers who had to make journeys in different parts of the city on different days, between origins and destinations extracted at random.

Compared scenarios were: i) those in which the system was not operated and where travellers chose the best route for reaching their destination according to their own knowledge and with the support of a map of the city, and; ii) those in which all the functions of the telematics system were activated and travellers followed the best route recommended by the trip planning function (pre-trip information), and then followed the indications provided by the VMS panels (Variable Message Signs for on-trip information). In other words O/D experiments aimed to assess the benefits due to the integrated effect of controlled management and information given to travellers.

All the necessary precautions were taken to ensure statistically significant results were obtained. Different areas of the city were chosen with different system penetration levels. The sample sizes were chosen to ensure 95 percent confidence in the results.

Benefits varied according to the O/D pair surveyed. They were normally high and tended to result during peak periods. This phenomenon could be explained by the actual lack of real-time information, which was important in peak hours when cities were affected by unpredictable congestions.

Since the benefit depended on the penetration level of the system equipment along the surveyed routes, a detailed analysis was performed by extrapolating the expected impact in a fully controlled network scenario.

In terms of tangible benefits to users, the application of large scale integrated management (control, routing, information) showed a reduction in average travel time as high as 20 percent. Additional trials showed that this benefit rises up to 21.6 percent if time searching for a parking place and the time to reach the final destination on foot is considered, (since these times are reduced by the detailed real time information given by the system). The effect of the system can be even greater, demonstrating the importance of information), if only travellers who are unfamiliar with the city are only considered.

It was also demonstrated that the reduction of pollutant emissions results from the routing strategy as an additional effect to the control system only. Local effects on emission reductions are as high as 18 percent (of which, 12 percent are due to the environmental routing, 6 percent to better traffic control) while global effects to the order of 7-8 percent were calculated (1.5 percent due to environmental routing, 6 percent due to better control).

For the same scenarios trials were also performed for assessing the impact of the systems on travellers using public transport. For this purpose a suitably large group of "test" travellers travelled from given origins to assigned destinations using public transport. While in the base scenario, they chose the best route according to their experience and knowledge, during the "system-on" scenario, they followed the optimal route recommended by the dynamic route planners, i.e. the best route according to current and predicted travel times on the network arcs.

Also in this case collected data were processed in order to extrapolate the impact in a scenario where the system controls the entire transportation network. Different methods were used to confirm the results, which at 100 percent penetration, has thus been fixed at 19 percent travel time reduction by using public transport.

All results mentioned in this section are the results of extensive field trials performed at the different QUARTET Plus sites and were also confirmed directly by all users that were approached by the project at all sites by means of user groups, user fora and user panels.

Telematics' Role in Modifying Demand

After verifying the effectiveness of telematics for the same levels of demand, the question was posed as to whether telematics can also help, when required, to transfer demand from private to public transport or achieve other positive modifications, such as the reduction of unnecessary trips, or the movement of trips to non peak periods.

These possible effects were also examined. It is, in fact, extremely difficult to verify in a statistically significant way any switch in demand induced by telematics systems such as those adopted in Quartet Plus. Even when applied on a large scale, they do not influence the whole population, and produce effects which may, in the short term, be easily masked by other factors, such as economic issues. It was therefore necessary to make an indirect evaluation from an analysis of user preferences, the reactions to variations introduced in the system, and user perceptions of the service quality. For this purpose, reference was made to the responses and behaviour of the user panels, and to specific surveys designed to assess user reactions.

Open surveys were used to evaluate opinion concerning the impact of two technologies designed to improve the perceived quality of service through information provision in Turin: panels at bus/tram stops, and on-board information. The former provided users with forecasts of the arrival times of vehicles, the latter informed passengers, by voice and visually, of the next stop. In both cases the survey results were very positive. Responses confirm that the majority of users (75 percent) found the telematics systems useful and approved of the cost to the public authority. They also indicated that a high percentage would be willing to pay individually for a public transport information service.

In Gothenburg, a questionnaire distributed to 400 users indicated high appreciation of the quality of the information service for public transport (with an average score of 8/10). 85 percent considered the service useful and "worth spending public money for." Users also stated that the information provided helped to reduce stress, allow better time management and hence a more efficient journey.

At the Torino site, an independent market research company produced a report on the analysis of the user panels and provided further interesting statistical data concerning actual travel behaviour. In the Turin trials, between January and October, the percentage of recorded trips made by panel members on public transport increased by 3 percent.

In Gothenburg, a similar modal shift (2 percent) to public transport was claimed by users in interviews. This would seem to indicate the increased attraction in using public transport, which could be due to the effects of the information system, or possibly the 'promotion' of the system to those surveyed. The result is certainly in line with the users' general perception of a clear improvement in public transport, but obviously needs to be confirmed by longer term behaviour. The public's appreciation of the information systems was, in general, high and the average user stated that he/she would use public transport more often if precise real time information were available (even upon payment). Users demonstrated also high appreciation and use of the corresponding Internet services. They were tested at various sites, and with very positive results. In general the number of hits are impressive.

In the cities of Athens and Gothenburg, the Internet information services had considerable success. In Athens, practically all users (97 percent) reported that the information was easily understood and also useful as respondents claimed a high awareness of the pollution issue. 67 percent claimed they would often follow an alternative route proposed on the basis of environmental criteria, rather than pass through the centre of Athens. Many of Gothenburg's users stated that the information made it possible to reduce waiting time (by influencing the time of departure) and helped to organise a more efficient trip. A small survey performed in Stuttgart showed that 17 percent of respondents claimed they would be willing to switch from using their private vehicles to using the "park and ride" service as a result of the information they obtained via Internet; another 8 percent claimed they would switch from their private cars to public transport.

From the point of view of pollutant emissions, it has to be noted that a modal shift toward public transport determines a reduction of pollutant emissions of at least the same percentage. This means that where a shift of 3 percent in favour of public transport is measured, a local reduction of up to 21 percent can be achieved.

In conclusion, neither the user surveys nor the panel, although positive, can provide definite quantitative data in the assumption that telematics contributes to a switch in demand from private to public transport. They do however show that it is possible to modify the public's perception of service quality and to increase the convenience of its use (as well as its performance). Both are conditions which make changes in demand possible.

COST BENEFITS

Multi-modal information provides a basis for business-oriented services to citizens. Within Quartet Plus, this opportunity was deeply explored by MATTISSE (the UK Midlands site), where a complete business case-study was conducted with the aim of assessing the integrated system by different potential user groups. The case-study gave very promising forecasts for the revenues from such a service. Estimates on the likely potential of MATTISSE's information services for revenue generation are based on respondents' "stated intentions" concerning their use of the services, and should be treated with some caution given the limited amount of information available to respondents at the time of the interview. The Internet service with the proposed fee structure, would attract fewer users, and would generate much less initial revenue than either telephone or public terminal revenues from a smaller number of users. The service likely to generate the most revenue would be public terminals, though this may be offset by the relatively large direct costs of providing such a service to a large enough number of locations.

While the MATTISSE case-study gave very promising forecasts for revenues from such services, on the contrary, the three sites, which during Quartet and/or Quartet Plus were testing individual route guidance systems (the traditional, first candidate for such traffic management services) all decided not to proceed with such systems (Stuttgart, Athens, Torino).

Some comparatively long-term scenarios were produced for large-scale telematics implementation. Even using conservative estimates of impacts, they show that transport telematics, in a proper scenario, can produce, at affordable cost, better efficiency, increased safety and reduced emissions and, in general, very high benefits for operators.

The socio-economic analyses of Integrated Telematics Scenarios demonstrate that telematics systems consisting of traffic information and control telematics applications can, by a reasonable integration of measures in the private and public transport sector, lead to an improvement of traffic operation and environmental impacts in both transport systems in metropolitan areas. For all scenarios, benefits exceed costs.

For the Stuttgart and Gothenburg Greater Areas, long term socio-economic studies were carried out, both comparing a basic scenario consisting of conventional traffic information and control systems with two Integrated Telematics Applications Scenarios; one more oriented toward public transport, the other more oriented to private transport. The benefit-cost ratio resulted greater than 1 for both scenarios in the Stuttgart Greater Area (Mobin),

with the public transport scenario showing the more favourable ratio of 3.3 when compared with 1.7 for the private transport scenario. These results correspond with those of the Gothenburg project (Tosca), which gives a clear preference to the public transport scenario. The analysis of a virtual Quartet Plus City Scenario, consisting of all telematics applications validated in the six cities resulted in a benefit-cost ratio of 3:0 and 2:0 respectively.

All the impacts considered in the socio-economic assessment appear very conservative with respect to the results of the field trials. Indeed, the previous sections have considered the possible benefits (in terms of travel time saved) to be as high as 20 percent, which were then translated into emission benefits (network wide) to be as high as 10 percent.

On the other hand, it must be considered that:

- Within the socio-economic assessment, long term gains for large scale networks have been considered, which would be affected by average effects (the Torino results are valid for medium to high congested networks) and by compensation-migration effects (the demand would react to the new situation);
- Gains shown by the experiments in Quartet Plus are very high indeed and it would be more realistic to make more conservative assumptions in the models;
- The results obtained in Torino refer to a "fully equipped city"; in the socio-economic assessment more conservative hypotheses on the level of equipment were made.

Moreover the above results assume fixed demand; in the long term, this hypothesis cannot be true, since the demand will react to the new network capacity (an average saving of 20 percent in on-board time in congested situations implies an equivalent increase in available network capacity). Thus, the conclusion of the socio-economic assessment indicates that the "Public Transport" oriented scenarios are only worth consideration. The new capacity obtained through transport telematics must be used to accommodate a better Public Transport system. From this point of view, the socio-economic assessment and the field trials give the same answer.

For the Torino site, the economic benefits of traffic-light priority were calculated, both for users and the public transport system. The analysis took into account the real situation (traffic, demand, operations) of a selected service line and of the corresponding arterials, considering all costs involved in the installation of the system in terms of installation, tuning, maintenance and communication. Benefits were considered for the users of public transport and private mobility in terms of travel time savings, and for the public transport company in terms of using less employees and vehicles.

Based on the above premises, the balance equation of the investment gives a theoretical return time on the investment of 131 days! If the benefits for the individual users (time savings) are not considered, only the economic benefits for the public transport company due to the reduced number of vehicle shifts and driver shifts would remain. In that case, the investment return time would be 1,296 days. That is, in approximately three and a half years the investment would be repaid. If, on the other hand, only the (estimated) quota corresponding to the considered service line is considered, the investment return would occur in approximately two and a half years (922 days).

Also, for the French sites of Toulouse and Pau, the socio-economic evaluation of possible benefits ensuing from an extension of the bus-priority systems was performed. First year rates of return of 20.7 percent and 19.4 percent respectively were extrapolated. Improvements to the system would permit the fleet to be reduced by one bus would take the rate of return to 22 percent.

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EFFECT: Local Air Quality Prediction and Effective Traffic Demand Management

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INTRODUCTION

EFFECT is a project funded under the European Union's Fourth Framework Programme. It stands for "Environmental Forecasting For the Effective Control of Traffic". The project commenced on 1st January 1996 and will finish on 31st December 1998. The partner cities in the project are Leicester (UK), Maidstone (UK), Gothenburg (SE) and Volos (GR). A project web site is based at http://www.effect.gr

Each of these cities were chosen because of the availability of particular expertise, available infrastructure and contrasting conditions. With a population of 120,000, Volos is Greece's third largest port and is situated between its sea and mountains. These factors, combined with the traffic conditions, have given rise to concerns over air quality, resulting in a political desire to improve the situation. Volos' Mediterranean climate is in stark contrast to the Scandinavian city of Gothenburg with its population of 430,000. Gothenburg, one of the leading cities in the field of air quality management, also hosts the ARENA transport/IT test site. Leicester has a long history of using state-of-the-art traffic control systems and has received political support for implementing management strategies within the 470,000 population conurbation. Maidstone, with its 120,000 population, also has an advanced traffic control system and is currently implementing a county-wide strategic pollution monitoring system under the LIFE funded MIST Programme.

OBJECTIVES

The objective of the project is to predict poor local air quality in real-time and then to instigate effective traffic demand management strategies (TDMS) to reduce pollution levels in particular problem areas. This is being achieved through the implementation of local Environmental Management Boards (EMB – a consultation forum for assessing the acceptance of alternative strategies), and the innovative integration of air quality modelling with real-time information on traffic flows, pollutant concentrations and meteorological conditions to highlight pollution "hotspots." Each of the partner cities has a different emphasis within the project and acts as either a development (validation) or demonstration site.

The overall system comprises a number of modules, as shown in Figure 1.

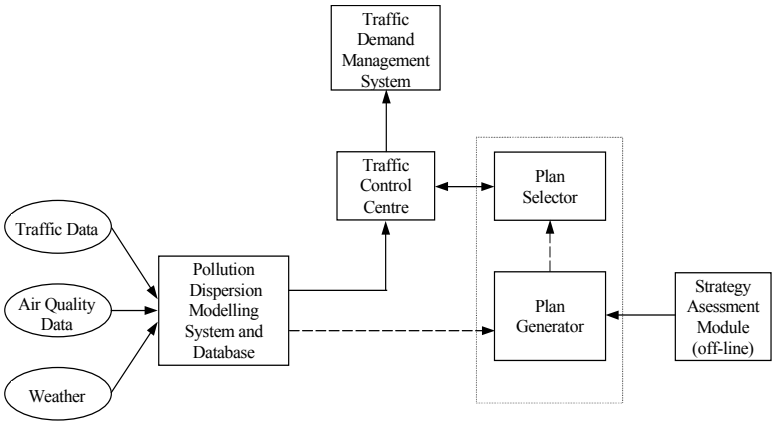

Figure 1: Overview of the EFFECT system

The following list describes the components being developed or demonstrated at each site:

- **Gothenburg** – complete demonstration of the EFFECT system integrating the existing Air Quality Monitoring with the ATT systems of the ARENA test site.
- **Leicester** – development and demonstration of real-time traffic and roadside air quality monitoring systems linked to air quality modelling.
- **Maidstone** – demonstrate the transferability of Leicester developments. Development and demonstration of off-line Strategy Assessment Module and the EMB.
- **Volos** – demonstrate the transferability of EFFECT EMB in a limited traffic control environment including modeling of demand management strategies.

The availability of traffic data and air quality modelling lies at the heart of the system. In the two UK sites, the traffic data is obtained from the demand-responsive SCOOT (Split, Cycle and Offset Optimisation Technique) urban traffic control system. In Gothenburg, the ARENA traffic monitoring and modelling system is used. In Volos, a fixed-time urban traffic control system is used in conjunction with flow counters.

The air quality modelling in all four sites is being carried out using the AIRVIRO system marketed by SMHI in Sweden. The Eulerian Grid Model is used for the prediction of gaseous particle dispersion, except in Volos where the Gaussian Model is deployed. A Street Canyon model is also available. The EFFECT system architecture will allow the use of any other similar air quality model.

THE AIRVIRO SYSTEM

At the heart of the system is a computerised map containing the topography and land-use across the area. Next, AIRVIRO requires information about the major sources of air pollution in the area. These fall into three main categories – point sources, area sources and line/road sources.

Point sources include factories, offices, shops, and large residential blocks where all emissions are concentrated in a small area, such as a chimney or stack. Dynamic and static information is collected for each source. Dynamic information includes formulae that describe the emission as a function of outdoor temperature or as a function of day, week and time. Static information covering chimney height, exhaust gas temperature, coordinates, etc. describes the exact location of the source, but does not affect the level of emissions being produced. In Leicester, the Pollution Control Group had a high response rate to questionnaires that were sent to factories and companies with chimneys that they felt produced significant emissions.

Area sources are used to describe emissions which are assumed to be evenly spread over a wide area. These are usually housing or industrial estates where it would not be practical to include every chimney as an individual point source. The information needed is similar to that for point sources. The Energy Team in Leicester City Council had access to information about typical domestic heating sources in housing estates and seasonal fuel consumption figures, and was then able to give an indication of emissions according to weather conditions.

The information required to define road sources includes the physical location of each road and the flow profile and classification of the vehicles on each road. This information can be obtained from a traffic model or from direct observations. Emission factors for the vehicles (idling, accelerating, cruising and decelerating) are also needed, and were obtained from relevant research literature. In Gothenburg, the coastal sea lane is also an important line source.

The road network data was obtained from a TRIPS traffic model in Leicester, a CONTRAM model in Gothenburg, and a SATURN model in Maidstone and Volos. The traffic model gave the information on the location of the roads, the number of vehicles in the peak and off-peak periods, and the speed limit of the roads. The roads were then (manually) assigned a particular road-type, e.g. inbound radial. Each road-type was then defined in terms of the typical daily and seasonal flow profile. This was based on actual traffic counts from representative roads. Local vehicle registration details were obtained and a typical vehicle fleet assigned to the road-type. The vehicle fleet definition took into account the type of vehicle and the fuel used. Standard emission rate information for the different vehicle types was then applied.

Once the AIRVIRO system was established, it was then possible to carry out air quality modelling to assess the effect of the various traffic demand management strategies developed in the project. However, it is not possible to be totally confident about the accuracy of the concentration figures produced unless some air quality and meteorological monitoring is also undertaken.

Air Quality and Meteorological Monitoring

As stated above, it is also advisable to collect and store real-time air quality and meteorological data so that predictions can be compared with actual levels. The four sites in the EFFECT project use the AIRVIRO system to perform this function. There is a wide range of monitoring equipment used at project sites. The air quality monitors fall into two categories – high precision, high cost sensors in urban background sites, and low precision, low cost sensors deployed at roadside sites. The former cost about ECU 10,000 per pollutant monitored, whilst the latter, also at ECU 10,000 will pay for the monitoring of both CO and NO_2 by the latter. A PM_{10} component is being developed. It is at the roadside that levels are at their highest, and average factors of over three (roadside versus background) for CO and NO_2 have been observed.

Meteorological monitoring is also advisable, as weather conditions are well known to have an important impact on air quality. A meteorological mast was used measuring vertical and horizontal wind speed and direction (at 12m) together with air temperature (at 2m and 10m to assess vertical air movement). As a result, a database of local weather conditions is built up. It is possible to carry out air quality predictions for various weather scenarios.

Traffic Demand Management Strategies (TDMS)

As stated previously, the traffic demand management strategies are being developed using the SATURN traffic model in conjunction with AIRVIRO. They will be demonstrated in Maidstone and will also be transferred to and demonstrated in Volos. The EFFECT PLUS project is providing TDMS for Leicester, whilst Gothenburg will use ARENA with EFFECT for TDMS. These strategies may include holding traffic outside the city, metering, gating, advisory diversions or closing roads. Information will be given to the drivers using tools such as Variable Message Signs, radio broadcasts using RDS/EON (radio data system/enhanced other network) technology and PROMISE 2 terminals.

The appropriate strategy will be selected by the traffic control system operator based on the available air quality modeling information and their own experience of traffic conditions in the network. The effectiveness of the implemented strategy can then be assessed using modeling if monitoring has also been carried out.

Real-time Links Between Traffic Monitoring and Air Quality Modeling

It was stated above that the AIRVIRO system is given information about the average daily and seasonal flow profiles of the traffic. However this information is only as good and up-to-date as the model that generated it. It would clearly be better if the traffic data were continuously updated to reflect on-street conditions "now." Consequently, one aim of the EFFECT project was to provide a link between the traffic control system and the AIRVIRO system. This link was developed for the Leicester SCOOT system and then transferred to Maidstone and Gothenburg for demonstration. Thus, instead of using the modelled values, AIRVIRO can produce air quality predictions that are based on actual traffic levels. The results of these predictions are updated and displayed every hour. Work on the development of live traffic models is proceeding in Gothenburg with the CLEOPATRA project, and in the UK with the UTMC R&D programme to enable alternative TDMS's to be assessed.

THE EMMA/EFFECT CYCLE

In Leicester, the EFFECT project is being carried out in conjunction with another EU-funded project called EMMA. This stands for "Integrated Environmental Monitoring, Forecasting and Warning Systems in Metropolitan Areas" (see also presentation paper given in the "Air Quality Management" section of these Proceedings). The focus of EMMA is on predicting air quality and providing information to the public as well as to network managers. The UK Meteorological Office provides 60-hour weather forecasts direct to the AIRVIRO database to enable 24 and 48 hour air quality forecasts to be made. This tie-in with EFFECT means that if the air quality conditions are known for the following day, then appropriate demand management strategies can be selected to reduce the impact of a potential air quality problems.

EMMA uses the weather forecast together with the enhanced AIRVIRO database to forecast tomorrow's pollution levels. The forecast is used by the network manager to select an appropriate TDMS, including regulatory restrictions (e.g. the closure of roads, such as occured in Paris in October 1997). The forecast is also broadcast by radio during the afternoon and evening when people return home. Given this information, they can choose how or when they will travel into the city the following day. In addition, the forecasts are available on the Internet at http://www.mdx.ac.uk/emma. The next morning, EFFECT will predict the current pollution levels, allowing the network manager to review the TDMS for the afternoon if necessary. In January 1998, a particulates episode was predicted, and radio broadcasts and variable message signs were used to advise travellers. The following day, public reaction was monitored. Surveys were carried out on the A47 Leicester Environmental Road Tolling Scheme

corridor and in the city centre using both on-street and telephone questionnaires. The surveys revealed that over 30 percent of those questioned were aware of the problem, with 14 percent taking some action. Over 50 percent were already committed public transport users. Figure 2 describes the overall process which rolls forward from day to day.

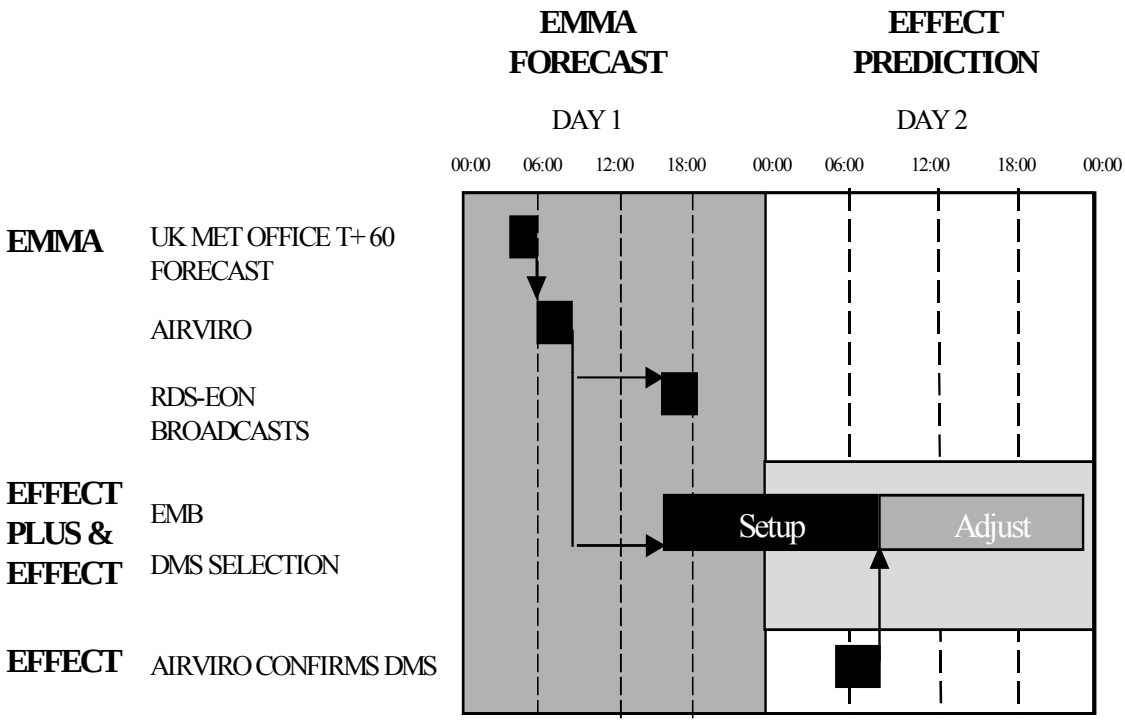

Figure 2: The EFFECT/EMMA cycle

DISCUSSION

Appendix I seeks to summarise the key elements described above. Level A illustrates that the map grid locates data within the emissions database which also takes account daily and seasonal variations in the rates of emissions, e.g. am/pm peak traffic flows; daily and seasonal heating patterns. Level B shows that the air circulation patterns and the differing effects of surface roughness (open space, estate or street canyon) are taken into account when the Eulerian Grid or Gaussian Model dispersion calculations are made. The meteorological data allows the model to assess the mixing height (crucial when temperature inversion is anticipated), which controls the envelope within which the dispersion takes place. When this mixing height varies during the day, pollution concentration levels will respond by decreasing or increasing. A strong weather front will often remove much of the airborne pollutants by wind or rain. Level C emphasises that each initial Air Quality Map produced by the models shows the relative concentrations of modelled pollutants at rooftop level (near ground level over open spaces). In the city centre, the street canyon effect has to be considered, to assess the likely concentrations at pavement level (these can be several times greater by, say, a factor of three). With time, the database of background information will allow the model to be calibrated to provide predictions of pollution levels, rather than just comparisons between levels. Research suggests that NO_2 levels increase with vehicle speed, whilst CO generally reduces until a critical speed is reached, after which there is a small increase. PM_{10} appears to follow the CO pattern and produces many of the Winter episodes. The chemical reactions between NO_2 and O_3 affect the ratio of these gases and the total levels vary throughout the day. Background monitoring can assist in prediction. Air quality models such as ADMS, EMMA, NILU and REGOZON can provide predictions for Ozone. Since each pollutant has differing effects on health, the network manager has many competing factors to reconcile when selecting a traffic demand strategy. Currently, many opt to reduce the total pollution level.

Both short and long-term TDMS techniques are being explored. These include raising public awareness; provision of pedestrian and cycle networks; 'woonerf' protected housing areas and traffic calming (to slow or divert traffic); priority for peak traffic flows (am/pm); metering and gating of traffic flows with or without bus priorities (which relocate queues and then control the flow of traffic); corridor or area control, or linking of traffic signal operation; 'park & ride' by bus or rail; pedestrianisation; controlled parking or access zones; and advisory diversions using variable message signs.

CONCLUSION

This paper has outlined some of the key factors involved in the monitoring and prediction of local air quality to provide effective traffic demand management. Clearly the extent to which TDMS can be implemented depends on the existing conditions (air quality and traffic congestion, resources available etc). However, a useful start can be made by installing a basic air quality monitoring network together with a simple local meteorological mast. These will lay the foundations for future development, whilst also assisting in the raising of awareness among the public and network managers. Adding a simple air quality model will allow basic "what if" analyses to be made. As an understanding of the interaction of the various factors is developed, then the system can be enhanced using the EFFECT and EMMA concepts to provide more sophisticated tools. Whilst precision measuring instruments may accurately record conditions at a measuring station, one must appreciate that high-precision accuracy in predicting air quality levels elsewhere is not achievable no matter how much is invested. In the end, the information has to be tailored to the needs of the end-user, which generally requires considerable simplification (i.e. radio or television broadcasts will offer Good, Poor or Bad). However, the work in the EFFECT and EMMA projects has indicated that worthwhile improvements in air quality can be achieved by proper management of the city environment.

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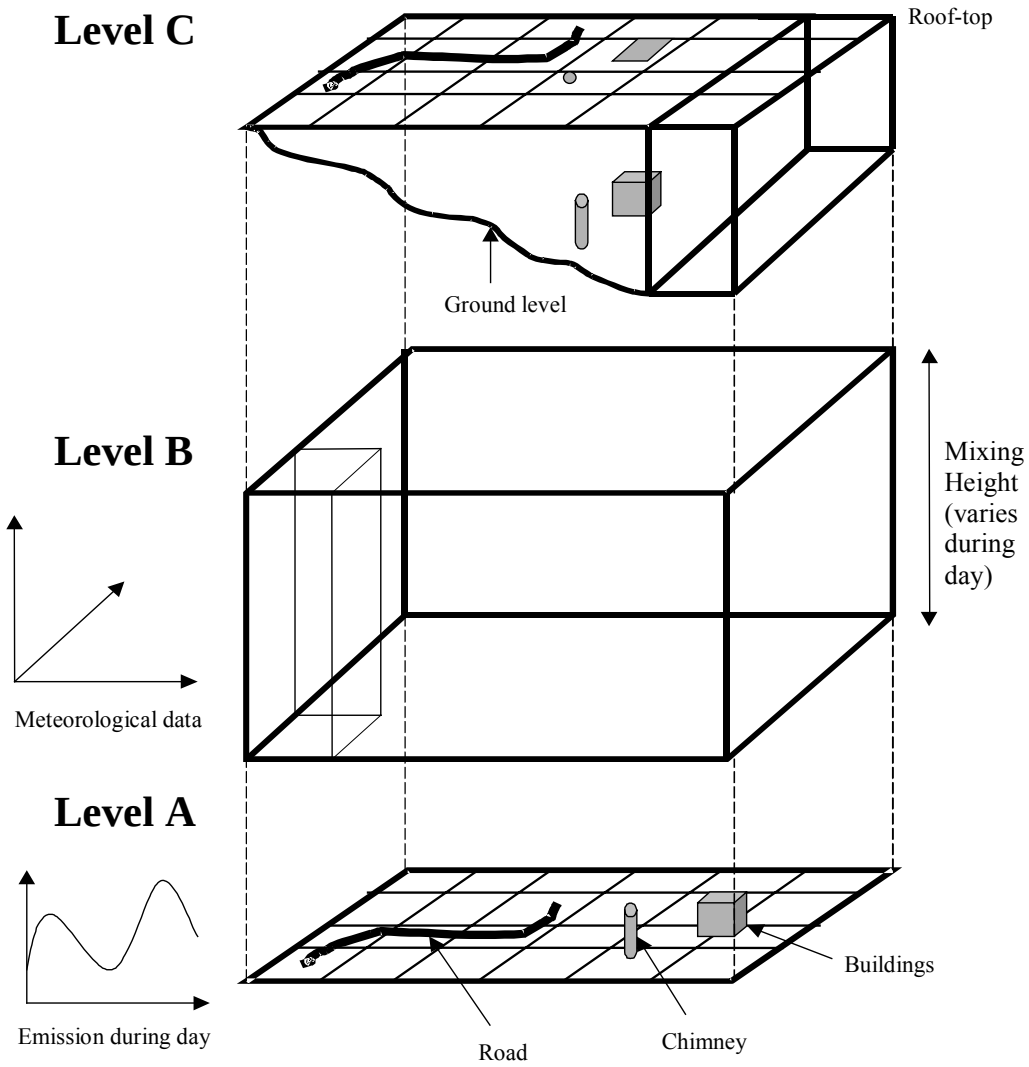
APPENDIX I



The POLIS Network

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OVERVIEW

POLIS, the European network of cities and regions for transport telematics and telematics for the environment plays an important role in promoting the benefits and concrete implementation of telematics among local and regional authorities in both Western and Central and East European Countries. The overall goal of sustainable transport and attention to user needs are two main features characterising the activities and projects carried out under the umbrella of the POLIS network.

The following presentation will focus on providing:

- Some background information on the POLIS network and an overview of its recent activities, namely cooperation with Central and East European local and regional authorities and the involvement of POLIS in the environmental domain;
- Some remarks on public authorities' achievements and requirements with regard to telematics applications for transport and the environment;
- The CAPE project.

BACKGROUND

POLIS represents an association that was established in 1989 and which has grown to include over 50 cities and regions from 16 countries in Eastern and Western Europe. POLIS' members share a common objective to reduce the burden of traffic and congestion in urban and rural areas through the introduction of advanced technological solutions, namely through telematics applications. Such an objective can not be separated from the willingness to protect the environment and the overall goal of achieving sustainability in transport.

POLIS serves primarily as a networking mechanism for those local and regional authorities who share the same objectives and are willing to cooperate and share experiences at the European level. The aims of POLIS include therefore:

- Awareness raising and facilitating the exchange of expertise, thus maximising the benefits of cooperation and minimising the waste of resources due to the duplication of activities;
- Supporting local and regional authorities in implementing common solutions;
- Disseminating relevant results not only among its members but as widely as possible through conferences, seminars, newsletters, information services among others;
- Contributing to the harmonisation of activities as a result of cooperation and sharing of experiences and outcomes among users, industry operators, researchers and public authorities at the urban, regional and European level;
- Acting as a common voice for European cities and regions;
- Cooperating closely with other networks of European cities.

NETWORKING STRATEGY

POLIS aims to establish large-scale cooperation on urban transport and environmental telematics issues, namely by constantly surveying needs and priorities, and by facilitating projects involving European local and regional authorities. POLIS focuses on both the technical and political aspects related to the implementation of telematics at the local and regional levels by supporting consensus forming and promoting good practices, thus fostering pan-European cooperation. The cooperation between the public and the private sector is also of paramount importance for the different transport telematics applications as they move from pilot phases into more mature, near-market stages. Nonetheless, POLIS has always maintained its main focus on the needs of end-users, which facilitates public acceptance of advanced technologies.

POLIS' members have mainly focused on the following transport topics:

- Optimisation of traffic management;
- Advanced travel and traffic information;
- Freight logistics;
- Demand management;
- Public transport prioritisation;
- Strategies to reduce the need to travel;
- Rational use of energy in transport.

An important number of POLIS' members are also involved in implementing project solutions in the area of environment telematics. The main sectors of activity have been:

- Air pollution (monitoring/modelling: forecasting/evaluating);
- Contaminated sites (analysis and documentation, management and remediation);
- Public information systems and decision support systems;
- GIS applications.

POLIS PROJECTS

POLIS' members started working together in the DRIVE II Programme of the European Commission and continued under the 4th Framework Programme - Telematics Application Programme, within which POLIS' members coordinate and participate in six major urban projects. Consequential to the common approach adopted toward transport problems shared by POLIS members, many of them are also active in the environment telematics sector, and not surprisingly mainly in projects tackling air quality and contaminated sites management.

POLIS is also the coordinator of the Urban Transport Telematics Fora, aimed at bringing together representatives of different interest groups looking to progress on common ground. Since 1996, these events are part of the "EDC" project, an horizontal dissemination action funded by DG XIII of the European Commission involving four major networks of local authorities in Europe. By 1998, POLIS as a network was serving as the coordinator of four interesting projects funded by DG VII and DG XIII:

- European Local Transport Information Service on European sustainable urban and regional transport practices aimed at the provision of a decision-support tool for consultation by different users, thus facilitating the exploitation of proven solutions to urban transport problems. With the provision of online interactive dialogue facilities, the service aims to establish an additional framework for networking.

- CARISMA Transport intends to bring together key actors to achieve consensus on issues related to the interconnection between long distance transport networks - in particular the TENs and local/regional transport networks.

- CARISMA Telematics aims at stimulating the deployment of the most promising telematics applications in cities and regions to overcome the common financial, institutional, legal and political problems faced to reach the widespread deployment of near market applications which have already been proven to meet the needs of users.

- CAPE - Coordinated Action for Pan-European Transport and Environment Telematics Implementation Support, 1998-1999. Building on the results of this conference, the status and priorities for Environment and Transport Telematics in the EU and CEE region, the key issues and constraints, and the organisational and legal framework for telematics implementation will be surveyed under CAPE. This will be followed by a best practice guide based on the above priorities, and conferences and workshops facilitating the uptake of results through awareness raising and capacity building.

RECENT ACTIVITIES

POLIS offers support to the Environment telematics for Water and Air Pollution Management (ENWAP) group by:

- Identifying user needs;
- Involving new actors;
- Investigating barriers;
- Establishing good practice;
- Consolidating "end products";
- Transferring experience;
- Supporting dissemination.

POLIS has undertaken a series of activities to identify priority areas in Central and Eastern Europe, while a survey carried out in the framework of the EDC project served to provide precious background information (see Figure 1 below) regarding the role played by telematics in local and regional authorities in the EU Member States.

The workshop organised at the 12th POLIS Annual Conference in Munich gave an opportunity to establish close contacts between Western and East European local and regional authorities. The strong interest in the activities of POLIS demonstrated by East European local authorities and the increasing share of East European members within the network has led to the hosting of a POLIS seminar in Bucharest at the end of June 1998, with the aim of bringing the network closer to its members and of giving members further opportunities to meet and interact.

Achievements and Requirements of Public Authorities

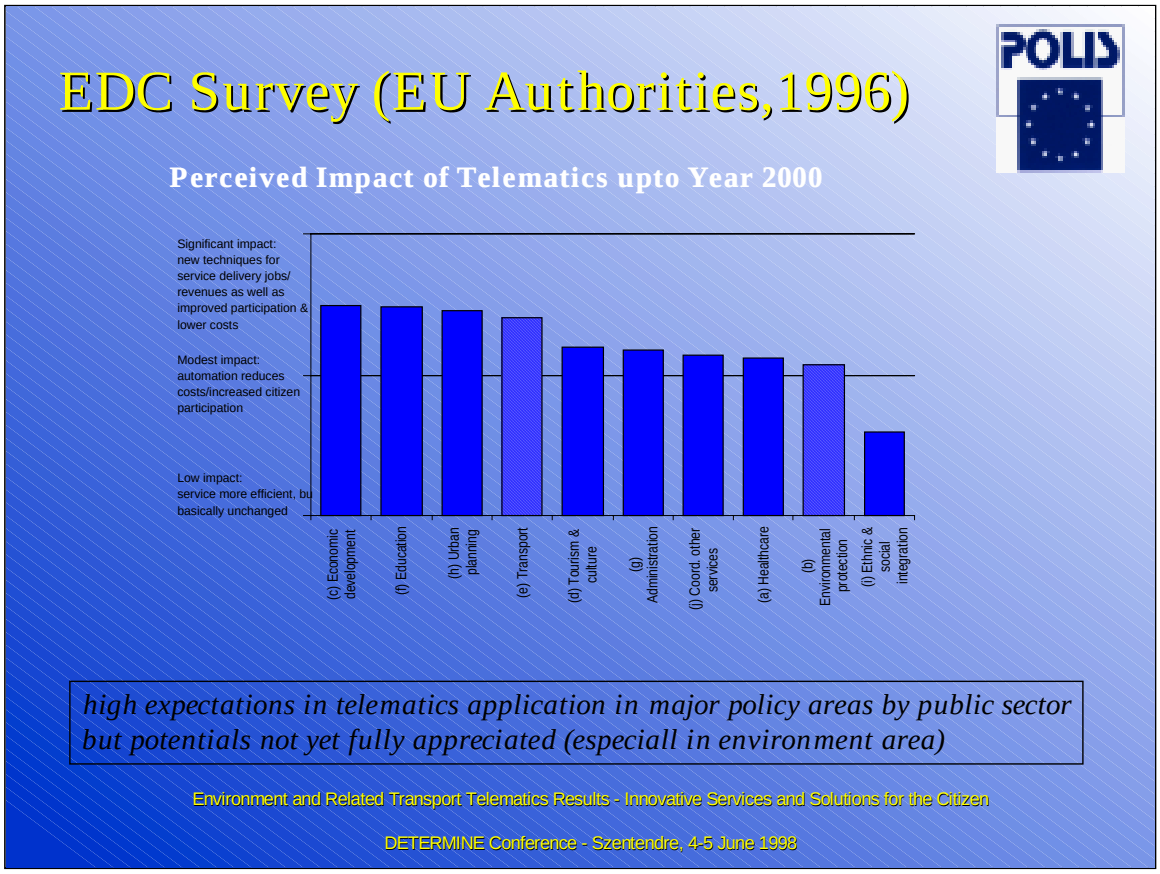

Figure 1. EDC Summary of EU Authorities on perceived impact of Telematics

At the first POLIS East-West seminar in Chisinau (Moldova), the issues listed in Figure 1 were considered to be those areas upon which telematics would have an impact in Central and East European cities and regions. Note transport lies fourth while environment ninth in terms of priorities. This situation was confirmed more recently by a survey carried out by POLIS in preparation for its East-West workshop organised in November 1997 within the framework of the POLIS Annual Conference held in Munich.

The experience of POLIS shows that there are common areas of concern shared by local authorities in the EU and in Central and Eastern Europe. Nonetheless, it has to be underlined that priorities differ. In fact, while EU authorities are often equipped with the basic infrastructure and know-how, their interest is mainly in the area of integration and optimisation of systems. In Central and Eastern Europe, the pressure exerted on the environment and the level of expertise and technology availability places the primary concern on achieving a clear understanding of the practical benefits of telematics systems and on implementing the most efficient, low-cost telematics systems available.

THE CAPE PROJECT

POLIS is extending its work in the environment and transport telematics field to reach:

- Public authorities in Central and Eastern Europe and former states of the Soviet Union who have an immediate need for efficient, low-cost transport and environment telematics systems;
- Public authorities in the EU not fully aware of the potential of advanced telematics for improving environmental management.

POLIS serves as the coordinator of the CAPE project and works with the following partners:

- International Society for Environmental Protection: A non-profit organisation pursuing the objective of stimulating the exchange of knowledge and information on environmental issues;
- The Regional Environmental Centre for Central and Eastern Europe: A non-profit, international organisation assisting in solving environmental problems in CEEC through facilitating dialogue and cooperation, exchanging information, promoting public participation in the environmental decisionmaking process;
- Rupprecht Consult: A newly founded company specialising in research on European telematics issues;
- Gestionnaires Sans Frontières: A non-profit organisation providing technical expertise in the transport area for the South-East European region;
- Prague Project Institute - Babtie: A private consultancy specialising in transport infrastructure planning and communication systems in transport and environmental impact assessment

The objectives of the CAPE project focus on the following issues:

- Dissemination of telematics-based solutions to environmental and transport-related urban and regional problems;
- Access to results from successful projects through training activities;
- Consensus-formation on key issues of environmental and transport management;
- Involvement of new authorities in European RTD programmes;
- Establishment of links between local authorities in the EU and in Eastern Europe.

Specific measures to attain the overall objectives include:

- An analysis of the status and priorities of environment telematics implementation in the EU and status of telematics implementation in eastern European cities in both the environment and transport sectors;
- an inventory of best practice in the areas of environment (EU and CEEC) and transport telematics (CEEC);
- A contribution to consensus formation among public authorities through two focused user fora meetings on environment telematics;
- Telematics training workshops for CEEC local authorities in the areas of transport and environment telematics (two focusing on transport and one on the environment);
- An Internet web page disseminating the results of the above activities, accessible under http:/www.rec.org/teleamtics/CAPE

Expected Rules for the Participation of CEE Countries in the FP5-IST Programme

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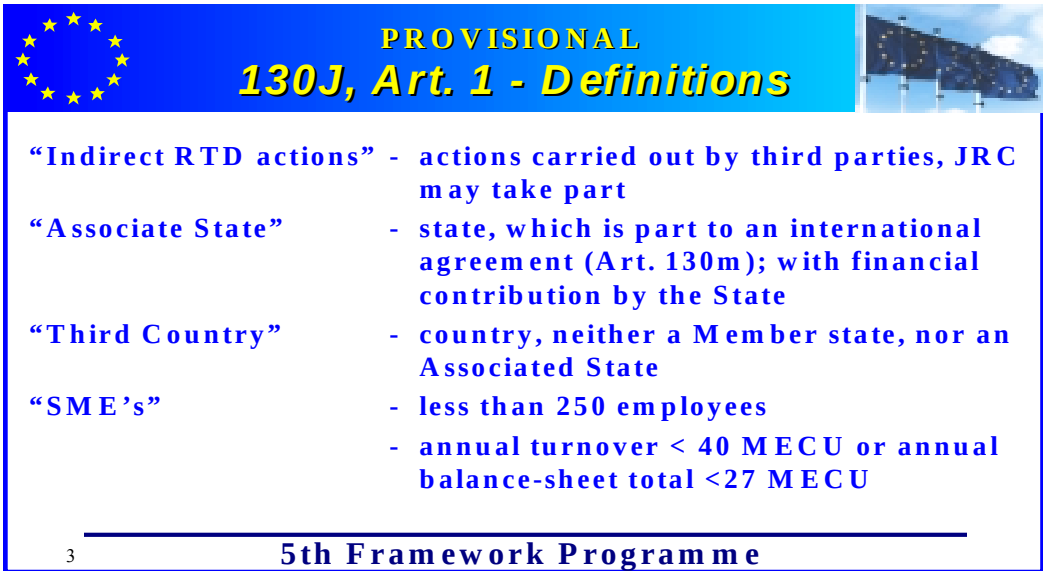
INTRODUCTION

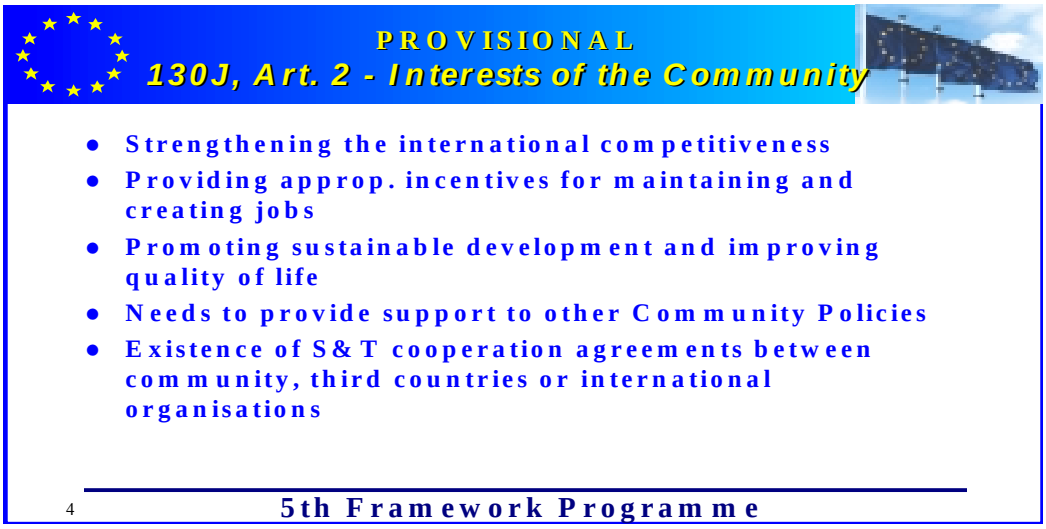
International Research and Technological Development and Demonstration (RTD) cooperation under the Fifth Framework Programme (5th FP) of the European Union will be pursued in two forms. On the one hand, through the "International Co-operation" (INCO) Programme, and on the other, through the specific thematic programmes, such as the "Information Society Technology" (IST) Programme. More background information on the Fifth Framework Programme can be found in the "Environment Action in the Information Society Research Programme" paper on p. 6, which was given at the conference opening

Following the conclusions of the Luxembourg European Council in December 1997, it was proposed that the EU Accession countries (including ten of the Central and East European countries) would be offered association with the 5th FP in the same way as certain EFTA countries are currently associated with the 4th FP. This opportunity to accelerate the integration of EU candidate countries into the scientific and technological community at European level and their preparation for accession to the EU, is envisaged as one of the instruments of the pre-accession strategy to be applied to the candidate countries. Association is expected to be highly beneficial for the candidate countries themselves and for the European Community, which will profit more consistently from the high scientific potential present in these countries. The association is also important for the support of the economic development of the candidate countries.

Through the powerpoint slides included below, and based on the current state of discussions, this presentation addresses some of the main rules for the participation of enterprises, research centres and universities as proposed under Article 130J of the EC Treaty, but which are yet to be adopted by the Council. Furthermore, basic selection criteria will be outlined, as well as - the current state of play - conditions for participation of legal entities from Member States, Associated States, candidate countries, and for CEEC's not in the pre-accession phase. All information provided within this presentation must still be considered **provisional**, as corresponding Council Decisions have not yet been taken.


5th FP - Structure
Rules for participation
Legal reference
Art. 130J, EC Treaty
(yet to be approved by Council/EP)
2
5th Framework Programme


PROVISIONAL
130J, Art. 1 - Definitions
"Indirect RTD actions" - actions carried out by third parties, JRC may take part
"Associate State" - state, which is part to an international agreement (Art. 130m); with financial contribution by the State
"Third Country" - country, neither a Member state, nor an Associated State
"SME's" - less than 250 employees
- annual turnover < 40 MECU or annual balance-sheet total <27 MECU
3
5th Framework Programme


PROVISIONAL
130J, Art. 2 - Interests of the Community
Strengthening the international competitiveness
Providing approp. incentives for maintaining and creating jobs
Promoting sustainable development and improving quality of life
Needs to provide support to other Community Policies
Existence of S&T cooperation agreements between community, third countries or international organisations
4
5th Framework Programme

PROVISIONAL
130J, Art. 4 - Number of participants in indirect RTD actions

(a) at least two mutually independent legal entities established in two different Member Sates or in a Member State and an Associated State

OR

(b) at least one legal entity established in a Member State or in an Associated State, and the JRC

OR

(c) one or several legal entities established in a third country, or international organisations, acting in cooperation with minimum number of legal entities, as required from (a) or (b)

5 5th Framework Programme

PROVISIONAL
Art. 6 - Third Countries and intern. organisations

(1) Any legal entity established in a European Country or Mediterranean Partner country may take part in indirect RTD actions;

- on a project by project basis;
- in conformity with interests;

WITHOUT financing

(2) Legal entities established in other third countries may participate, provided

participation is of substantial added value;

6 5th Framework Programme

PROVISIONAL
Art. 10: Selection Criteria

- scientific excellence;
- community added value;
- potential contribution to furthering economic and social objectives of the community;
- innovative nature of the proposal;
- prospects for disseminating/exploiting the results;
- effective transnational cooperation;
- effective and efficient management and;
- any additional criteria set out in the specific programme

7 5th Framework Programme

PROVISIONAL

Association to FP5

- In FP4: option offered to EFTA countries of EEA, and to Israel
- In FP5: option also offered to candidate countries (all eleven, i.e. PECO + Cyprus)
- Principle agreed by Member States and EP
- Special aspects: finances, comitology

8 5th Framework Programme

PROVISIONAL

Association to FP5: Rules for candidate countries

- Contribution to FP5 budget: GDP-related but with rebate (diminishing over 4 yrs)
- For PECOs, PHARE can supplement the countries' own contribution
- Can choose not to associate to Euratom FP
- Observership in committees

9 5th Framework Programme

PROVISIONAL

Association to FP5: Rules for candidate countries (I)

- Further aspects: reciprocity, IPR protection, tax exemption of EU grants
- Legal form: additional protocol to existing Association Agreements
- Partial association: not recommended (no rebate offered)

10 5th Framework Programme

PROVISIONAL
Association to FP5: Rules for candidate countries (II)

- Project-by-project participation always possible (see 130j rules)
- Hence, a candidate country's organisation can be part of a proposing consortium in any case (except "minimal" consortium)
- If entry into force occurs *no later than* at time of evaluation decision by Commission, the project can get complete financing

11 5th Framework Programme

Current state

- Out of *eleven* candidates, *ten* have already requested association
- Exploratory talks have been held
- Request formulated for negotiation mandate
- First draft of additional protocol made

12 5th Framework Programme

Time schedule

• Mandate request adopted by Comm.	• End of May 1998
• Mandate approved by Council	• before summer
• Protocol text agreed with candidates	• September-October
• Protocol signed	• After adoption FP5
• Entry into force	• ASAP afterwards

13 5th Framework Programme

PHARE Multi-Country Programme for Environment

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INTRODUCTION

Mr. Borissov summarised the history of the Phare and Multi-Country Programme for Environment (MCP) before elaborating briefly on some of the future opportunities for funding through the "new" Phare Programme (see Figure 1d). Below are the overheads used for his presentation, including examples of previous Telematics projects Phare has funded (see Figure 1c.). Figure 2 shows how the MCP Environment facility fits into the Phare/Commission framework, and Figure 3, how MCP Environment has supported networking in Hungary. As regards new opportunities, Phare's activities are shifting from the Multi-country level to a national level through so-called Horizontal Programmes, particularly as focus shifts towards the accession process and investments are related to harmonisation with the EU acquis (70 percent). Around 30 percent of funds will be directed towards institutional strengthening and capacity building. Funding can be offered for projects that show direct linkages with the accession process, Agenda 2000, and which meet the areas outlined in the Commission's Communication on CEE country accession (see paper J. Jörgensen p. 5). Examples to date have included the so-called "approximation facility." Direct funding of a telematics application is less likely, however, that is not to say the development of an application with national relevance would not be supported. Approximately ECU 3bn per year will be made available through Phare by the year 2000.

HISTORY
- Started as PHARE
- Became Phare
- Now includes 13 countries
- The New Phare Orientation

Figure 1a.

GUIDING PRINCIPLES
- Demand driven
- Three or more countries participating
- Should have wider regional impact
- Should address issues, which are more effectively dealt with on multi-country than national basis
- Programming cycle

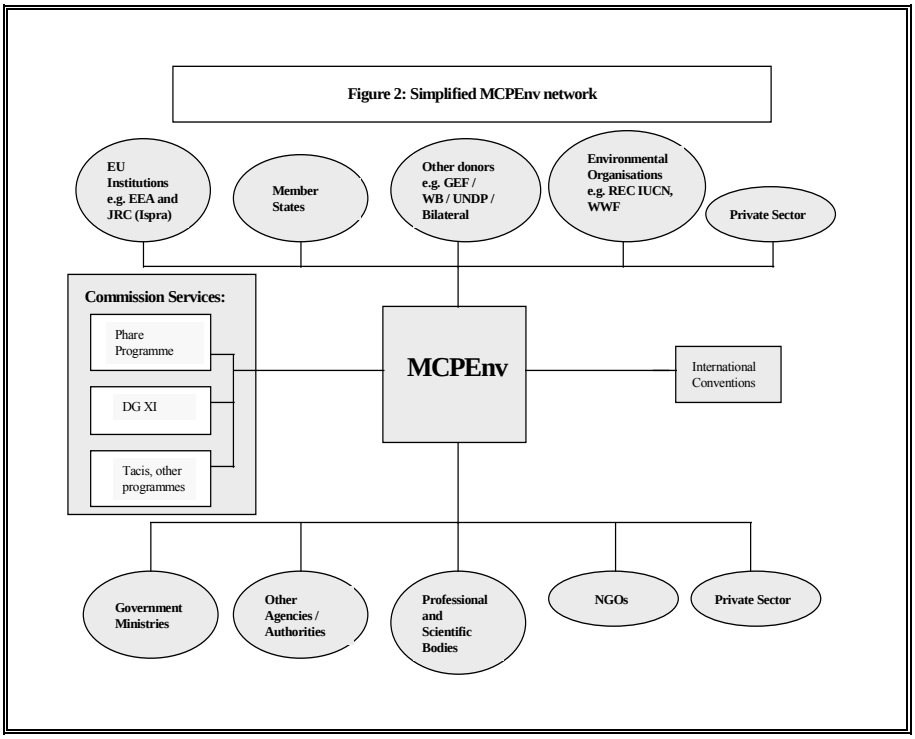
Figure 1b.

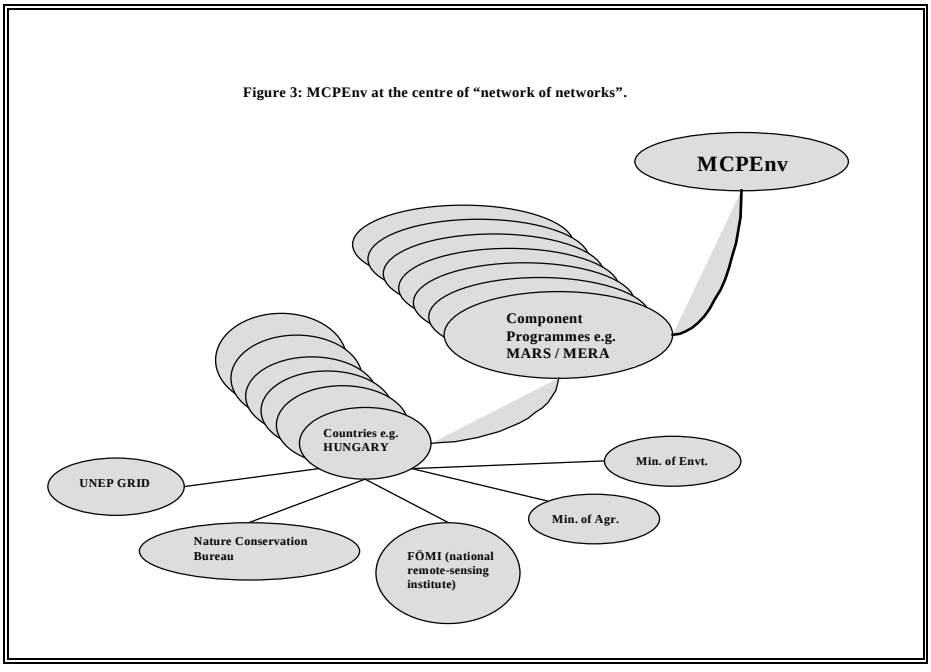
SOME "TELEMATIC" EXAMPLES
- Danube Emergency Warning System
- Black Triangle Air-Pollution Monitoring System
- Cooperation with EEA
- Topic Links, EIONET

Figure 1c.

THE NEW PHARE
- Programme for accession
- Orientation to national level activities
- Accession driven instead of demand driven
- Immediate perspectives for the Multi-Country Programme

Figure 1d.





ECOS-OUVERTURE

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OBJECTIVES

- To encourage cooperation between local and regional authorities in the EU and Central and East European countries (CEECs) through the undertaking of joint projects based on the exchange of experiences or the transfer of know-how;
- To encourage decentralisation and devolution through building capacity at the regional and local level;
- To improve the capabilities and working methods of local/regional authorities in the CEECs and in disadvantaged regions of the EU in the field of social and economic development;
- To create clear examples of regional or local development which, by their exemplary nature, serve as models for the region or neighbouring regions in the promotion of best practice;
- To prepare for EU expansion, reinforcing the strategies of pre-accession among the local authorities of the CEECs by learning about community policies, in particular structural funds.

SPHERES OF COOPERATION (see Table next page)

- Local and regional administration - improving the working methods and/or tools of local and regional authorities;
- Local and economic development - the improvement of support services for the modernisation and development of small and medium sized enterprises (SMEs) and creation of long term employment;
- Local and regional planning and management of urban and rural services;
- Environmental protection

ELIGIBILITY CRITERIA

- Partnerships may contain partners from the EU Member States, including:

Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, The Netherlands, Portugal, Spain, Sweden, UK)
and the Phare countries:
Albania, Bosnia-Herzegovina, Bulgaria, The Chech Republic, Estonia, FYROM, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia.

- Each partner must be a local or regional authority of the EU or of the CEECs, under control of a local or regional authority, or an organisation acting in the public interest. The lead partner will normally be the appropriate local or regional authority.
- The minimum number of partners is two. At least one partner should come from the EU, at least one partner from one of the Phare countries.
- All partners must submit a signed letter of commitment.
- Application forms must be official, including both the Summary and Main application forms and must be complete.

Local & Regional Administration	Local Economic Development	Local & Regional Planning and Management of Urban and Rural Services	Environmental Protection
Modernisation of administration Organisation Administrative, technical and financial management of local and regional bodies	Design of local economic development strategies and implementation methods	Planning and development	Protection and management of natural areas.
Finance and budgeting	SME development and SME support services	Management and development of urban services (gas, electricity, energy waste)	Pollution control; water, air, ground: waste management
Decision -making procedures in local and regional authorities	Tourism strategies and development Promotion of Culture Economic development with sectoral focus	Transport and traffic management	Cleaning and recovery of polluted sites
Relation with the public (e.g. information provision in a democratic system)	Strategies for sustainable employment creation and tackling unemployment	Promotion and valoristation of historic and urban heritage	Regeneration of urban areas
	Economic Planning and industrial conversion Redevelopment of industrial sites	Urban and social health policies	Energy efficiency
	Development of specific local potential		Renewable energy

BUDGET AND PROJECT DURATION

Each project selected will receive a maximum of ECU 50,000 from Phare. This covers activities within both the territory of the concerned CEEC and EU countries, provided that the benefit of actions is directed towards the CEEC partner(s). Activities and expenses must reflect the focus of the project, i.e. transfer of know-how to the CEEC partner(s)

Phare co-finance is limited to 80 percent of the overall eligible expenditure. The remaining part of the budget i.e. a minimum of 20 percent of the eligible expenses will have to be provided by both CEEC and EU partners in cash and/or as "in kind" contributions, e.g. staff time. Each project should be carried out within 12 months.

PRIORITIES AND SPECIFIC SELECTION CRITERIA

- The lead partner is based in the CEEC;
- More than one CEEC partner is included in the consortium;
- The focus is upon a theme clearly relevant to the CEEC partners;
- A demonstration effect in the targeted CEEC regions should be included by proposing methods and actions to transfer the know-how, information and generated results beyond the CEEC region or municipality the project is focusing on e.g.. by inviting representatives of adjacent CEEC regions or municipalities to take part as observers at relevant events.

- Partners are included who have not yet participated in Phare funded ECOS-Ouverture projects

- The project must ensure the true transfer of know-how to the CEEC partner(s), through cooperation on a specific issue, on a local/regional authority's roles, organisation and management as practised in the EU

- CEEC partners are the principal beneficiaries of the Micro Projects. Activities should therefore be directed towards the needs of these partners.

- Eligible activities may for instance include the following:

  Exchanges and study visits;
  Expert advice;
  Provision of expert staff;
  Project related assistance;
  Training;
  Feasibility studies;
  Economic development and trade initiatives;
  Fairs
  Exhibitions;
  Information exchange;
  Preparation of materials and the acquisition of equipment for demonstration purposes.

The Micro Project facility will not support general twinning activities or general study and exploratory visits

Micro Projects are considered an initiation of larger scale projects, notably under the ECOS-Ouverture Mainstream Project facility. Micro projects may, however, also support the exchange of experience or networking projects which can be funded under the Phare CBC Programme or Phare national programmes.

The ECOS-Ouverture Micro Project facility supports projects which are not eligible for assistance under other programmes, but which are complimentary to the activities of other programmes (Phare BPF, Partnership, Democracy, Lien, COOPME and JOP). Projects will not be selected if they overlap with other projects financed under the Phare Programme.

DEADLINE FOR CURRENT CALL

Monday 15 June 1998

APPLICATION FORMS ARE AVAILABLE AT:

http://europa.eu.int/comm/dg1a/phare/

Click on the Programme type and then on Cross Border.

Panel Discussion Summary (day two):

Priorities for CEE Environment Telematics Initiatives under the 5th RTD Framework Programme

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INTRODUCTION

The objective of the second day's panel discussion was to identify a list of environment research priorities or target areas which might be served by new Telematics projects in Central and Eastern Europe (CEE) under the forthcoming 5th Framework Programme (FP). A selection of current and long-term national research and development priorities for Telematics applications in the environmental sector were presented, complemented by an overview of CEE environment priorities, policy measures and state of the environment problems.

The session was chaired by Johannes Mayer, who serves as Head of the Department of Information, Documentation and Library at the Federal Environment Agency in Austria. With Austria being a relatively new member of the European Union, experiences related to increasing involvement in Commission research activities and working with the EU's Framework Programme could be related. Mr. Mayer's experience in the Telematics field helped steer the course of the discussion with regards to the kind of projects that might be funded under the FP, particularly, in light of the Convention on Access to Environmental Information and Public Partnership in Environmental Decisionmaking that was signed shortly afterwards in Aarhus, Denmark at the Environmental Ministerial Conference. Mr. Mayer also stressed the necessity in maintaining a link between research projects and environmental policy priorities. The session was co-chaired by Jerome Simpson of the Regional Environmental Center for Central and Eastern Europe and DETERMINE project manager.

SPEAKER PRESENTATIONS

Speaker presentations were limited to five minutes in order allow time for a full discussion involving the conference floor. Two separate summaries concerning the key environment priorities, and potential Telematics projects for CEE were compiled during the course of the discussions as issues were raised by the presenters and participants. These are presented in the two tables overleaf.

Following Mr. Mayer's introduction, Gerald Fancoj of the Regional Environmental Center for Central and Eastern Europe set a platform for discussion by presenting the results of a current REC survey on environmental policy priorities and environmental expenditures in eight CEE countries, and related environmental problems (see Appendix). The report was complemented with a survey of the demand for environmental technologies according to the key priority areas outlined above, typically air, water, and wastewater. According to Mr. Fancoj, the greatest end-users of environmental technologies are municipalities, followed by the power generation sector. One of the technologies likely to be most in demand over the coming years are monitoring technologies, as emphasis shifts to enforcement of emission standards.

In addressing priority research issues, Adrian Pascu, of the Office for European Integration, Ministry of Research and Technology, Romania defined Information Society building as one of the most important goals of the Romanian R&D national programme, particularly since it is seen as a significant means for modernising the economy, stimulating competitiveness, and improving quality of life. Investment in information communication technologies currently stands at about USD 15 per inhabitant in Romania, with a world ranking of 41st in terms of IT development. Investments in telematics systems currently covers five key modules, including Health, Citizen and Public Administration, Environment, Transport and Industry, and Science, Culture and Education. Within the Environment sector, monitoring and forecasting of environmental quality, and management of natural and man-made emergencies and prevention of risks (using satellite imagery, remote sensing, and real-time sensors) were listed as key priorities. Mr. Pascu also emphasised the need for the development of specialised software and hardware systems in monitoring and forecasting environmental quality. Synergy with the 5th FP was also listed as a clear objective in harmonising future activities with those of the Commission's.

Vilmos Bognar, of the National Committee for Technological Development, Hungary, briefly presented Hungary's environment related research priorities. Among these were transport pollution prevention, wastewater treatment, and noise reduction. These can also serve as areas for the development of new Telematics applications. According to Mr. Bognar, the better management of national funds and closer cooperation between different institutions is crucial to effectively meeting these needs and also ensuring the successful implementation of the 5th FP in CEE.

Jaroslav Solc, of the Prague Environmental Information System (IOZIP), Department of Environmental Protection, Institute of Municipal Informatics of the City of Prague, Czech Republic, offered his perspective on the anticipated trends for accessing environmental information in the coming years. Sector specific references, based on the most commonly accessed and requested environmental information at the Institute of Municipal Informatics included air, water, and waste management data. Among the typically used access media are: Internet, CD-ROM, and hardcopy publications. Mr. Solc stressed the EU Directives on Access to Environmental Information and the forthcoming Convention on Public Access to Environmental Information are likely to be key milestones in assuring improved public access to environmental information in CEE which must be corresponded to by the development of appropriate Telematics technologies. Mr. Solc interpreted this trend as having a decisive impact on the uptake of the 5th FP in CEE, though potential Telematics applications were not listed.

Bogdan Kobus**,** representing the State Inspectorate for Environmental Protection, Jelenia Gora, Poland, outlined the environment priorities in the transboundary Black Triangle Region of Poland, and their relationship to Telematics. The Black Triangle Region has suffered considerably from the likes of acid rain, and air quality protection continues to be an environmental priority in this part of Poland. Telematics has helped to deal with the problem and can continue to do so in the future. Among the environment and research priorities identified for Poland were: energy saving systems, air quality monitoring and forecasting, water and waste management, areas which can also be served in the future by the Telematics research programme.

In concluding the panel discussion presentations, Agata Miazga, of the Regional Environmental Center for Central and Eastern Europe presented a general overview of the characteristics of local authorities, local environmental priority issues and constraints in CEE. Based on a survey conducted among municipal authorities in Hungary and Latvia, the major environmental priorities identified are: municipal waste, sewage, air pollution, and noise from traffic. In addition, in the case of Latvia's smaller municipalities, landscape degradation and quality of drinking water were regarded as priority environmental problems (see Appendix). Ms. Miazga stated Telematics is often targeted for use and application at the local authority level, and while in EU countries, municipalities are well established and have capacity to deal with environmental problems, in CEE, environmental issues are just one of the many priority issues requiring attention. Local authorities are relatively new to environmental responsibility, with measures for environmental protection having previously been undertaken by their respective State government. In many cases unclear roles and responsibilities still exist for municipalities. According to Ms. Miazga, tight budgetary constraints prevent sufficient funding for environmental issues, not to mention funding for new technologies such as telematics. It is therefore difficult to evaluate at this early stage the potential telematics applications which might be developed under the new research programme in response to local level needs. In closing, Ms. Miazga mentioned the term itself, Telematics, as confusing to local authorities in CEE which in itself might serve as a constraint to its further uptake, an opinion echoed by other participants during the discussion. Mr. Wolfgang Boch of the European Commission DGXIII-C later responded that the Union has recently celebrated 10 years of European Telematics research in Barcelona (February 1998) and it is likely that the term telematics is to disappear and might be absorbed under FP5 by the term "Information Society Technologies".

FLOOR AND PANEL DISCUSSION SUMMARY

Mr. Mayer summed up the presentations by drawing a parallel between the environment priorities for CEE identified in the REC's survey presented by Gerald Fancoj, and those priorities central to the EU accession process identified by Jesper Jörgensen of the European Commission Environment Directorate during the opening of the conference on the previous day.

The potential Telematics project areas thus identified from speaker presentations within these priority environment areas, and for different stakeholder groups, which were later complemented by the conference floor, are listed below:

CEE Environment Priorities & Potential Telematics Projects
Air Pollution & Prevention
- transport pollution reduction technologies
- monitoring and forecasting equipt.
- energy saving systems
- emergency handling systems
- modeling applications
Water Management
- wastewater treatment technologies
- ensuring water quality
- emergency handling systems
- monitoring and forecasting applications
Waste Management
- waste incineration support systems
- landfill management applications
- hazardous waste treatment systems
Noise Reduction

Potential Telematics Projects among Different Stakeholder Groups
Public Level Access
- **a**pplications improving the availability of environmental information at the local level
- increased use of telecottages, kiosks
Experts
- applications facilitating access to information on the state of the environ- ment
- improved computer based systems
- applications providing good/clear information
Decisionmaker Access
- Telematics facilitating cooperation
- applications offering opportunities for virtual workshops and datasharing
- information on the state of environment

Summarising that CEE countries were on the "right track" in terms of environmental priorities, Mr. Mayer observed that problems experienced by CEE countries are similar to those occurring in Austria and elsewhere in the EU. With regard to potential Telematics applications Mr. Mayer, stated that high costs are often involved in the development of Telematics systems, and consistent with EU guidelines, it is crucial to maintain their policy relevance throughout the course of project. He also mentioned observing the necessary administrative guidelines, and ensuring that services are directed towards citizens as much as possible in order to secure and justify future decisionmaking support. Mr. Mayer then opened the discussion to the floor for comments and reaction.

Zigmas Bigelis, Director of the Center for Information Technologies at the Joint Research Center, Ministry of Environmental Protection in Lithuania, highlighted the necessity to improve the management of bureaucratic institutions both as a potential Telematics project, and as a main priority pertinent to the success of future Telematics projects.

Mr. Mayer responded by stating that bureaucratic obstacles are inevitable despite increased awareness of environmental problems and use of Telematics solutions among public authorities. As a potential area for a Telematics application in itself, he suggested not only to concentrate on the electronic means of communication while dealing with the authorities, stressing the importance of personal, human interaction in the decisionmaking process.

Raising a more generic area concerning Telematics application in CEE, Markus Spring of the Munich Department of Environment, City of Munich questioned telecommunication costs and their impact on the performance and use of Telematics projects. In response Mr. Mayer suggested active lobbying for more intelligent European telecom policies, citing once again the North American approach as a good example.

Affirming Mr. Mayer's statement Ms. Miazga briefly outlined Polish conditions where some elements of price reduction have already been introduced enabling broader access to the Internet for the general public.

Staying with the broader telecommunications issue, Nigel Robson, of ARTTIC and the Telematics support project, ANIMATE, suggested further investment and development of infrastructure as a priority for the 5th FP. Mentioning the continuous fall of new technology prices, he recommend the use of newer and more sophisticated solutions to resolve existing constraints.

Supporting Mr. Robson's statement, Johannes Mayer described the United Nations Environmental Programme network (UNEPNet) initiative for creating satellite links between different United Nations institutions and CEE countries as an example of a creative approach to communication problems. Suggestions from the floor further recommended the development and use of digital communication through Integrated Services Digital Networks (ISDN) which is already available in some regions.

Maria Kazmukova, Senior Consultant in Air Quality of the Prague City Development Authority, Czech Republic, mentioned increasing Telematics support in the area of waste management, stressing the need to increase investment in the area. Mr. Mayer responded by comparing the West European experience in this matter as being similar to that of CEE and by stressing the opportunity for future cooperation as relatively few Telematics projects have targeted the waste management issue.

Wolfgang Boch of DGXIII-C offered a Commission and TAP perspective to the discussion. Referring to the goals of the second day's discussion, he urged participants to correlate different objectives and programmes when looking at relevant funding opportunities. He also indicated that when discussing opportunities for cooperation in the next FP, to concentrate specifically on the development of new innovative approaches to environmental management, as the 5th FP is not intended as a funding source for technology transfer or improvement of basic infrastructure. Through the 5th FP, the European Commission also wants to upgrade know-how, excellence, and facilitate further development of capacity in terms of human experience through new applied research projects.

Concluding the panel and floor discussion, Johannes Mayer summarised the priorities identified in the environmental field and for the TAP under 5th FP from the table presented on the previous page. In light of Wolfgang Boch's comments, while these do present a short list of more general environment priorities (this in itself perhaps a result of the relatively brief introduction to the field of Telematics as a research programme for many conference delegates), under the 5th FP, new research projects might be launched between the EU and CEE in order to address and solve these problems. Mr. Mayer closed by suggesting any further thoughts or ideas pertaining to environment telematics research be submitted to the European Commission, DGXIII-C, referring to the Reply Form that was available in the ENTAG Report; "Needs and Options for Environment Telematics Research at the Turn of the Millenium".

A number of other significant issues were raised by conference delegates prior to the meeting through their registration forms, which prompted participants to list key questions relating to the topic of discussion. These are listed as follows:

- The need for a common meeting ground between priority research areas and environmental priorities;
- Clearly involving the research community in helping to deal with the environmental problems and priorities outlined;
- What scope exists for funding the development of environmental information systems at the local level, and expanding those already at the national level?;
- How do research institutes plan to facilitate access to environmental information over the coming years in line with EU Directives for example?;
- Are user surveys conducted when undertaking technology projects as to gauge the need for them? Are they consistent with national environmental priorities?;
- Is there scope to set up partnerships between research bodies and local authority institutes? Is there a need to facilitate dialogue between stakeholders?

APPENDIX

1. Gerald Fancoj: REC Survey of Environmental Policy Priorities and Environmental Expenditures in Eight Cee Countries, and Related Environmental Problems

Environmental Priorities

Key Areas

- Air pollution control (especially emissions from the energy sector and heavy industry)
- Water and wastewater projects (especially sewage treatment)
- Waste management (hazardous waste management, municipal waste disposal)

Breakdown of environmental expenditures by media, 1996 (mln USD)

Country	Environmental Expenditures	Share in Expenditures		
		Air Pollution	Water and Wastewater	Waste
Poland*	1308	53%	37%	9%
Czech Republic*	1185	58%	32%	9%
Hungary*	385	16%	55%	12%
Slovakia*	232	43%	44%	12%
Slovenia	150	71%	9%	18%
Estonia	77	25%	67%	8%
Lithuania	31	8%	83%	6%
Latvia	27	6%	88%	4%

Source: 1996 Statistical Yearbooks of the surveyed countries
* Data on expenditures by media are for 1995

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Summary of Demand for Environmental Technologies

Key Areas:

- Waste-related technologies
- Energy
- Water and wastewater

*Summary of Demand for Environmental Technologies**

Country	Media			
	Air	Water and Wastewater	Waste	Energy
Poland	moderate	high	high	high
Czech Republic	moderate	moderate	moderate	moderate
Hungary	moderate	moderate	high	high
Slovakia	moderate	high	high	moderate
Slovenia	moderate	moderate	high	moderate
Estonia	moderate	moderate	moderate	high
Lithuania	high	moderate	high	high
Latvia	moderate	moderate	high	high

 based on a survey with end-users (industries and municipalities), environmental businesses and government officials

Major end-users of environmental technologies

- Municipalities (especially water/wastewater and waste)
- The Power and Energy Sector (especially air and energy)
- Chemical Industry (especially air and energy)
- Other Industrial Sectors

- **2. Agata Miazga: Municipal Priorities in Environment and Telematics.**

Local Environmental Priority Issues and Constraints in CEE

"Innovative Services And Solutions For The Citizen"
International Conference
Szentendre, June 4-5, 1998

Agata Miazga REC

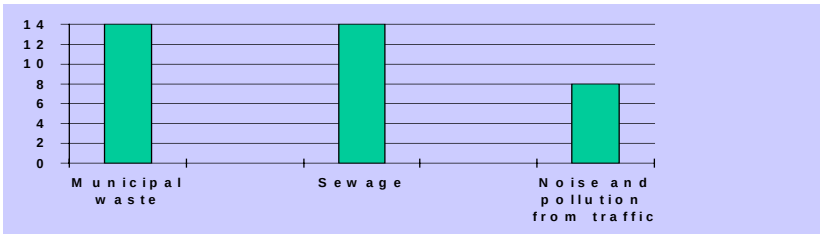
LATVIA - Most important actions needed

- adopt local regulations
- improve cost-efficiency of existing resources
- improve availability of information on funding sources
- foster cooperation with neighbouring municipalities

HUNGARY - Most important actions needed

- foster cooperation between municipalities, organize joint projects
- public education, awareness-raising
- improve exchange of experience with and information on succesful projects
- provide practical assistance in preparing local environmental action programs

HUNGARY
Environmental priorities of municipalities



Possible Telematics Applications

MIRACLE: Municipal Information Resources and Advisory Center on the Local Environment

Databases

- Methodologies
- Environmental Experts
- Publications
- Sources of Assistance
- EU Accession

Interactive Applications

- Helpline based on Databases, via regular mail, phone or e-mail
- brokering information
- mediating between potentail partners

Current use of Telematics at the local level

Achievements

- "Telehaz" network is one of the strongest in Europe (currently 39 houses in Hungary, goal is 150)
- more and more communities are creating their webpages

Deficiencies

- several municipalities are still unaware of the potenatial of Telematics
- when interest is present, technical expertise or equipment is often lacking
- information available is commercially oriented and not structured consistently

Possible solutions

Micro programs

- aimed at municipalities with no experience with Telematics
- general introduction to the use of computers for local authorities
- small-scale, simple programs
- seen as a preparation for macro programs

Macro programs

- for municipalities who have used Telematics before
- more complex technical programs to solve environmental problems

SZENTENDRE
Conference Statement
of 4-5 June 1998

on

"EU/CEEC collaboration
for Research and Technological Development
in the domains of Information Society Technologies and
Applications in the field of Environment and Transport"

BY THE DELEGATES and/or REPRESENTATIVES of the MINISTRIES OF ENVIRONMENT and/or RESEARCH OF ALBANIA, BOSNIA AND HERZEGOVINA, BULGARIA, CROATIA, CZECH REPUBLIC, ESTONIA, LATVIA, LITHUANIA, HUNGARY, FYR MACEDONIA, POLAND, ROMANIA, SLOVAK REPUBLIC, SLOVENIA AND FR YUGOSLAVIA

We, the Representatives of the Ministries of Environment and the Ministries of Research and Development of Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Latvia, Lithuania, Hungary, FYR Macedonia, Poland, Romania, Slovak Republic, Slovenia and FR Yugoslavia,

Participated in the „Environment and Related Transport Telematics Results, Innovative Services and Solutions for the Citizen“ international conference in Szentendre, Hungary, 4-5 June 1998, and,

Endorse the following statement on the Central and East European Countries (CEECs) priorities and needs with regard to future collaboration and networking between EU and CEE countries in the context of the Information Society Programme actions for the Environment and related Transport, as part of the future Fifth Framework Programme of the European Community for Research, Technological Development and Demonstration Activities (1998 to 2002):

1. Recognising that

(i) the political and economic reforms in the Central and East European Countries provide opportunities for ensuring that economic growth is compatible with environmental and sustainable development concerns;

(ii) the enlargement of the European Union creates new opportunities for environmental protection in CEECs that will further strengthen transboundary and inter-sectoral environmental development and cooperation;

2. Welcoming the progress and results from the **EU-CEEC Information Society Forums,** in particular:

(i) **The Action Plan:** „Toward the Information Society in the Central and Eastern European Countries: Thirty Ideas for European Initiatives", adopted at the Second EU-CEE Countries Information Society Forum in Prague, 13-14 September 1996, which provides a basis for more active involvement of Central and East European Countries in EU RTD programmes;

(ii) **The Conclusions** of the Third EU-CEEC Information Society Forum, Brussels, 9-10 October 1997 which state that:

1. The improved efficiency which the Information Society will bring to the CEEC, in particular for the candidate countries, will be an important contribution to their market competitiveness as they prepare for membership to the European Union;
2. CEE countries are making rapid progress towards realising the Information Society but that many important steps remain to be taken, which can benefit from continued cooperative efforts.

3. Recognising that by bringing together the complementary areas of telecommunications, information management and environmental expertise, Environment and Transport Telematics is introducing to the market a series of powerful new tools that allow users (from local, regional or national authorities) to improve environmental planning and management and ensure wide public accessibility of environmental information;

We find it desirable and necessary:

1. **To continue and strengthen** co-operation among CEECs and EU Member States in pursuing innovative Environment and Transport Telematics applications and services with European dimension, using the mechanisms and opportunities discussed at the Szentendre meeting and supporting the objectives and RTD priorities set by the Fifth Framework Programme of the European Community for Research, Technological Development and Demonstration Activities (1998 to 2002);
2. **To take** measures to increase CEECs participation in the European Union's Research and Technological Development (RTD) programmes, such as:
   (i) establishing a network of CEECs national institutions currently involved in the dissemination and promotion of Environment and Transport Telematics;
   (ii) promoting the exchange of information and knowledge on respective programs and activities at Pan-European, CEEC regional and national levels;
   (iii) facilitating dialogue among key developers and users of Telematics applications and systems;
   (iv) continuing to disseminate results of EU-funded Environment and Transport RTD activities to CEE countries;
   (v) encouraging the wider dissemination of Best Practices and the possible uptake of Telematics-related applications in CEEC in order to improve environmental planning and management practices in these countries;
   (vi) undertaking educational efforts to train users in the CEE Countries and promote the exchange of experiences among users and developers;
   (vii) increase awareness among the general public of Environment and Transport Telematics applications;
   (viii) holding regular meetings at expert level to review and agree on priorities for future research and development actions;
   (ix) establishing a network of governmental, business and NGO representatives to review and disseminate results of projects to all sectors of society.
3. **To Provide** support for policy development in line with the goals of creating new and better quality environmental services for the citizen and in a broader perspective, building an environment-friendly Information Society in Europe;
4. **To Foster** co-operation between national and local authorities, research organisations, and industry between the EU and CEECs on the development and use of Telematics;
5. **To Meet** again in late 1999 to review and report on progress made since the Szentendre meeting.

Szentendre, Hungary 5. June 1998

DETERMINE - Conference Schedule

Thursday, 4 June, 1998

9:30 **Welcome and Introduction**

J. Stritih, Execut. Director, The Regional Environmental Center for Central and Eastern Europe, HU

K. Akots, Deputy State Secretary, Ministry of Environment and Regional Policy, HU

Message from Angela Eagle, Parliamentary Under Secretary, Department of Environment, Transport and the Regions, UK and EU Presidency

10:00 **EU Environmental Policies and Priorities Related to Agenda 2000**
J. Jörgensen, Principle Administrator, DG XI (Enlargement Unit), European Commission, BE

10:20 **The Environment action in the Information Society Research Programme - the follow-up to the Current Telematics Application for the Environment Initiative**
W. Boch, for M. Richonnier, Director, DGXIII-C (Telematics), European Commission, BE

11:15 **CEE Requirements in the Environmental Sector (and the view to approximation)**
J. Benes, Director, Dept. of Environmental Strategies, Ministry of Environment, CZ

11:45 **An Overview of the Strategic Value and Status of Environment Telematics in Central and Eastern Europe**
N. Dimov, Deputy Minister of Environment and Waters, BG

13:30

Air Quality Management

***Chair:** T. Bøhler, Norwegian Inst. for Air Research, NO*

EMMA: Developing and Validating Air Quality Monitoring and Forecasting in Urban Areas - M. Cecchi, Italtel Telesis, IT

ECOSIM: An Urban Environmental Management Information System - K. Fedra, Environmental Software and Services GmbH, AT

ENSIS: A Modern System for Air and Water Quality Management - T. Bøhler, Norwegian Institute for Air Research, NO

Remote Sensing as Tool for Vehicle Exhaust Emission Control - L. Asboth, Municipal Transportation Authority, and I. Polay, Environmental Affairs Dept., Mayor's Office of the City of Budapest, HU

Transboundary Air Quality Monitoring in the Black Triangle Region - B. Kobus, Voivodship Inspectorate for Environmental Protection, Jelenia Gora, PL

Water Quality and Resource Management

***Chair:** J.R. da Costa, New University of Lisbon, PT*

WATERNET: Online Monitoring and Assessment of River Basin Water Quality - A. Mpe A Guilikeng, Lyonnaise des Eaux, FR

Towards an Integrated Danube River Basin Information System - I. Ružić, Ruđer Bošković Institute, and W. Pillmann, ISEP, AT

SNIRH: Globally Accessible Water resources Data - J. Ribeira da Costa, University of Lisbon, PT

Water Quality Monitoring and Accident Emergency Warning Systems in the Danube River Basin - I. Natchkov, Danube Water Programme, AT

Use of Telematics in Water Quality Management and Monitoring in Hungary - F. Laszlo, Water Resources Research Centre (Vituki), HU

16:30 **Constraints and Problems in the Transferability of Telematics Applications and their Implementation** - Panel Discussion:

Panel Chair: Joao Ribeira da Costa, Professor, New University of Lisbon, PT

Panelists: Susanna Azzali, Staring Centrum, NL
Ivelin Roussev, The Regional Environmental Center for Central and Eastern Europe, HU
Gary McGrogan, Sheffield City Council, UK
Kestutis Kvietkus, Air Quality Management Dept., Ministry of Environment, LT
Elemer Szabo, Environm. Informatics and Org. Dept., Ministry of Environm. and Regional Policy, HU
Ilia Natchkov, Environmental Programme for the Danube River Basin - Programme Coord. Unit, AT
Tonu Otsason, Chief of the Board of The Estonian Association of Telecottages, EE

Exhibition: Thursday 4, 1998 10:50 – 19:00; Friday 10:00 – 17:00
COSIMA ECOSIM EFFECT E-MAIL ENVIROCITY TEMSIS WATERNET

Friday, 5 June, 1998

8:30

Digital Networks: Administrative and Public Access to Environmental Information

***Chair**: I. Roussev, Regional Environmental Center, HU*

TEMSIS : A Transnational Environmental Network - B. Hoffman, Stadtverband Saarbrücken, DE

REMSSBOT : Integrating Distributed Local Environmental Information systems - P. Gallo, CSI, IT

ENVIROCITY : Delivering Environmental Information to the Public - M. Spring, Environmental Department, City of Munich, DE

IOZIP : The Prague Environmental Information System; Information for City Authorities and the Public - J. Solc, Institute of Municipal Informatics, Prague, CZ

Community Building through the Telecottage Network - the Practice of Estonian NGOs in the Use of Telematics For sustainable Development - T. Otsason, The Association of Estonian Rural Telecottages, Pyhalepa EE

Tools for Environmental Assessment and Planning

***Chair**: B. Kobus, Voivodship Inspectorate for Environmental Protection, PL*

E-MAIL : Decision Support Systems for Environmental Managers In regional Public Organisations - E. Innocenti, AAT, IT

COSIMA : A Support Tool for Experts in Contaminated Sites Management - B. Doyle, ESBIC Ltd., IR

The Phare Corine Inventories in CEE; a Support Tool for Environmental Decisionmakers - G. Büttner, Phare Land Cover Technical Unit and FOMI Remote Sensing Centre, Budapest, HU

ECO-MANAGEMENT : Facilitating the Adoption of Environmental Management Programmes in SMEs - E. Ricque-Mathien, CESI Group, FR

TWENTY-ONE : Improved Distribution and Availability of Multimedia Documents via the Internet - J. ten Hagen, Geotronics Software, NL

11:30

European Environmental Information Systems

***Chair:** W. Boch, DGXIII-C (TAP), European Commission, BE*

EEA - EIONET: Development of a European Information and Observation Network - H. Saarenmaa, European Environment Agency, DK

CDS - Catalogue of Data Sources : Provision of Environmental Meta-information on a European Scale - S. Jensen, Ministry of Environment, Lower Saxony, DE

Expanding the EIONET: A CEE Case Study - E. Szabo, Ministry of Environment and Regional Policy, HU

Telematics Support for Sust. Transport Syst.

***Chair**: N. Hodges, Leicester County Council, UK*

QUARTET PLUS: Using Transport Telematics to Reduce Travel Time - and Environmental Pressure - G. Franco, MIZAR Automazione, IT

EFFECT: Local Air Quality Prediction Mechanisms and Effective Traffic Demand Management - N. Hodges, Leicester City Council, UK

POLIS: Networking for the Development of Telematics in the Areas of Traffic Management, Energy and Public Information - L. Lonza, POLIS Network, BE

14:00

EU Funding Rules: FP5-IST, PHARE and ECOS-Ouverture

Expected Rules for the Participation of CEE Countries in the FP5-IST Programme
W. Boch, European Commission, Head of Sector DG XIII-C6, BE

PHARE Multi-Country Programme for Environment - K. Borissov, Phare Multi-Country Liaison Office for Environment, HU

ECOS-OUVERTURE - K. Ember, Deputy manager ECOS-Overture, HU

14:45

Research Priorities for CEE Environment Telematics Initiatives under the 5th RTD Framework Programme - Panel Discussion

Panel Chair:: Johannes Mayer, Federal Environment Agency, AT
Panelists: Gerald Fancoj, Business Research Services, The Regional Environmental HU
Adrian Pascu, Office for European Integration, Ministry of Research and Technology, RO
Vilmos Bognar, National Committee for Technological Development, HU
Jaroslav Solc, Prague Environmental Information System (IOZIP), Dept. of Environmental Protection, Institute of Municipal Informatics of the City of Prague, CZ
Bogdan Kobus, State Inspectorate for Environmental Protection, Jelenia Gora, PL
Agata Miazga, Local Environmental Action Programme Coordinator, The Regional Environmental, HU

16:30

Closing Session including Adoption of Collaborative Statement - Jernej Stritih, REC Executive Director, H

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ISEP

The International Society for Environmental Protection ISEP was founded in 1987 as an non-profit organization. The Society is a forum for the presentation of different views on environmental policies on an international level with special emphasis on a fair and equal co-operation between environmental experts and the business world.

ISEP's main target is to initiate and promote the exchange of knowledge and information on environmental issues among partners from science and research, public authorities, the economic sector and NGOs. Active participation in environmental information networks is the foundation of ISEP's activities, where 'networking' is understood as both the distribution of information via electronic media and the maintenance of direct, personal contact to specialists and institutions. ISEP is intensively co-operating with Austrian and European partners and holds contacts to international institutions such as the European Commission, the European Environment Agency (EEA) and UN organizations (UNEP).

In order to facilitate the exchange of environmental information, ISEP has organized a number of international conferences and workshops on topics such as environmental technology, tourism and computer application or Environmental Protection. By using most recent communication technology ISEP operates CEDAR a on-line environmental information source on the Internet. Lately, ISEP has become involved in the development of national and European environmental information systems.

REC

The Regional Environmental Center for Central and Eastern Europe (REC) is a non-partisan, non-advocacy, not-for-profit organisation with a mission to assist in solving environmental problems in Central and Eastern Europe (CEE). The Center fulfils this mission by encouraging cooperation among nongovernmental organisations, governments, businesses and other environmental stakeholders, by supporting the free exchange of information and by promoting public participation in environmental decisionmaking.

The REC was established in 1990 by the United States, the European Commission and Hungary. Today, the REC is legally based on a Charter signed by the governments of 26 countries and the European Commission, and on an International Agreement with the Government of Hungary. The REC has its headquarters in Szentendre, Hungary and Local Offices in each of its 15 beneficiary CEE countries which are: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, FYR Macedonia, Poland, Romania, Slovakia, Slovenia and Yugoslavia.

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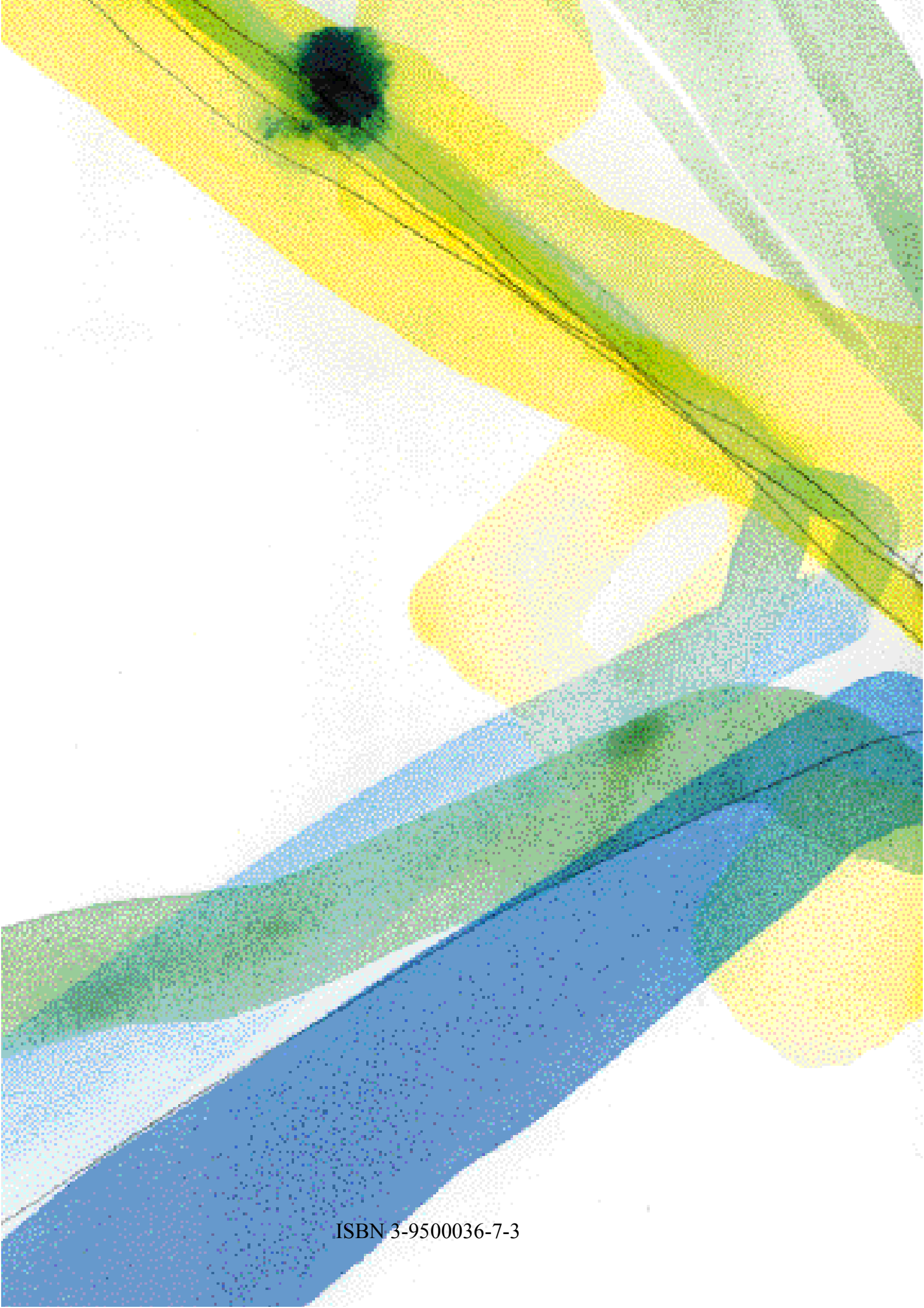

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