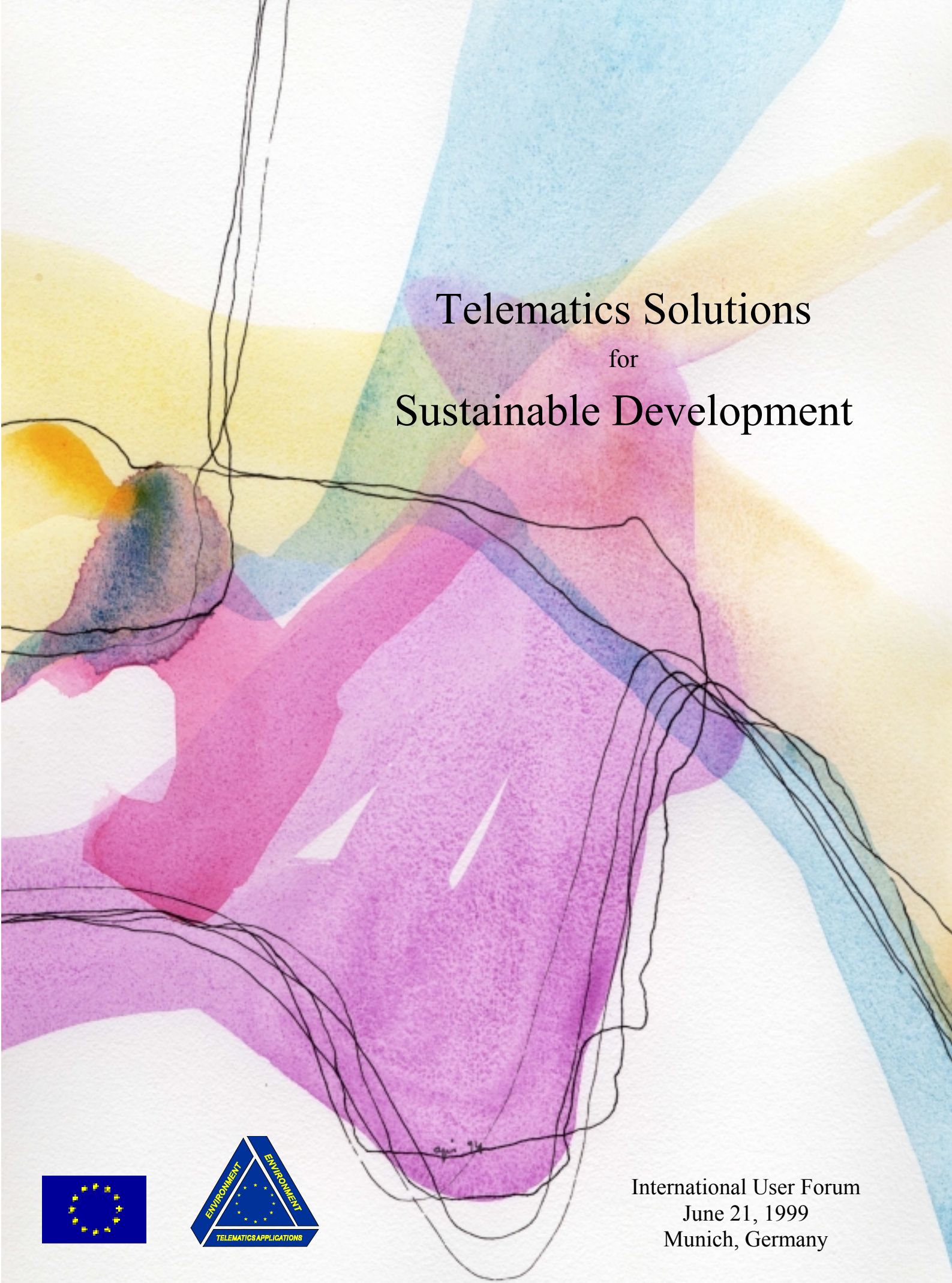
Telematics Solutions
for
Sustainable Development



International User Forum
June 21, 1999
Munich, Germany

Pan-European Environmental
Telematics User Forum
June 21, 1999
Munich, Germany

Directorate-General Information Society

Telematics Solutions
for
Sustainable Development

Organised within the **CAPE** supporting measure
(Co-ordinated Action for Pan-European Transport and
Environmental Implementation Support)

CAPE

Martin Mudri, Werner Pillmann (eds.)

POLIS

ISEP

Landeshauptstadt
München
Referat für Gesundheit
und Umwelt

THE REGIONAL ENVIRONMENTAL CENTER
for Central and Eastern Europe

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Pan-European Environmental Telematics User Forum

Landeshauptstadt München
Referat für Gesundheit und Umwelt

Telematics Solutions for Sustainable Development

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9:15	**Welcome and Introduction** Joachim Lorenz, Superintendent and Director of Health and Environment, City of Munich, DE
9:30	**EU - Accession Process-Impact on CEE Environment** Janusz Radziejowski Undersecretary of State, Ministry of Environmental Protection, Natural Resources and Forestry, PL
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10.15	**CAPE: A Unique Approach to Pan-European Co-operation** Petra Mollet, POLIS Networks, BE and Siegfried Rupprecht, RC, DE; CAPE Project Coordinators

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	EEA: A Reference Centre for Environmental Information - S. Bjarnason, European Environmental Agency, DK	**Telematics Assisted Handling of Flood Emergencies in Urban Areas** - K. Lagouvados, University of Athens, GR
	Demonstrator for Black Sea Marine Environmental Management Support System - P. Davis, Marine Information Service, NL	**DEDICS a TeleGeoProcessing and Intelligent Software Agents System for Natural Hazards Prevention and Fighting** - F. Guarnieri, Ecole des Mines de Paris, FR
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Pan-European Environmental Telematics User Forum

Landeshauptstadt
München
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und Umwelt

Telematics Solutions for Sustainable Development

Agenda

Monday, June 21, 1999

	Room I	*Room II*
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16.00	**Panel Discussion:** ***Telematics Tools in the Environment Sector: The Real Contribution to Sustainable Development*** Conclusion: Results of each session presented by the rapporteurs Panel Chair: **Siegfried Rupprecht**, Rupprecht Consult, DE Panelist: **João Ribeiro da Costa**, University of Lisbon; PT **Nick Hodges**, Leicester City Council, UK **Franz Jungwirth**, Bavarian State Ministry for State Development and Env. Affairs, DE **Violeta Kauneliene**, Environmental Center for Administration and Technology, LT **Joachim Lorenz**, City of Munich, DE **Franz Josef Radermacher**, Research Inst. for Applied Knowledge Processing, DE	
18.00	**End of the User Forum**	

19:30 **Evening Reception at the Munich City Hall**

Landeshauptstadt
München
**Referat für Gesundheit
und Umwelt**

Welcome Address to the Participants of the CAPE Environmental Telematics User Forum and Technical Workshop

Joachim Lorenz, Head of Health and Environment Department

June 21, 1999 Munich

Dear Ladies and Gentlemen,

on behalf of the City of Munich I would like to welcome you to the First European Environmental Telematics User Forum.

In consideration of the European elections 10 days ago it seems to be proven that the interest in European themes is still at the beginning. This should be regarded as an encouragement to share as many experiences and ideas in the European context as possible. I think environmental telematics, supported by the DG XIII, is one important part of this European exchange as many countries are facing problems in environment and transport. So cooperation and mutual exchange may explain the importance and advantage of common research and actions.

The City of Munich is proud to be a partner in the research and implementation of environment and traffic and we feel honoured to host the CAPE-Conference as a highly qualified auditorium for exchange and discussion of new perspectives in telematic solutions. Dear Ladies and Gentlemen, in the context of this conference and in your position as important decisionmakers and telematic-experts from Central- and Eastern European countries, here you have an excellent opportunity to build a foundation for the prospective cooperation of municipal departments on the European level.

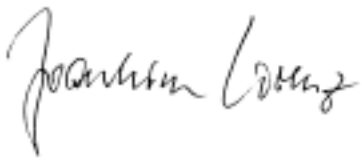
Facing more imminent and dominating problems like unemployment, environmental problems are pushed in the background of the political scene. Nevertheless I am convinced that we still have to use all our knowledge and intellectual resources to aim sustainable solutions for all the matters of environmental protection. Therefore the intelligent implementation of telem-

atics forms an important part. In my opinion telematic applications can and will be distributing successively and successfully to a new understanding of environment. Knowledge and data will be registered, evaluated and provided much faster and more efficient than today. Everyone, either it is a local, national or international decisionmaker, citizen, expert or student, will gain from the immense datapool of environment information. Early warning systems will be more precise and more prospective.

At the same time responsibility is growing for all those that provide telematic solutions or deal with them. Telematic should not evoke the impression to offer the solution of the environmental problem itself. But, and this is a fact I am dedicated to, it will contribute increasing awareness and understanding of environmental problems.

Hopefully Munich offers an ideal atmosphere for your forum. Although your timetables are dense until the early afternoon, I would like to invite you to our evening reception at the city hall of Munich and sent you warm greetings of our Lord Mayor Mr. Ude. Tonight you surely will have the opportunity to meet traditional and hospital Munich.

I wish your conference every success, a fruitful experience exchange and perspective solutions. Furthermore I wish you a pleasant stay and the opportunity to visit the beauties of Munich.



Joachim Lorenz
City of Munich

Ecological aspects of the accession process in Central and Eastern Europe

Janusz Radziejowski
Undersecretary of State, Ministry of Environmental Protection, Natural Resources and Forestry;
Member of Polish Negotiation Group on Environmental Protection

1 Introduction

The European Union's decisions on the East enlargement meant the beginning of the negotiation process with Central and Eastern European Countries. These countries, ten years ago, represented the part of the world predominated by centrally planned economy and democracy there was replaced by so-called „people's democracy" with limited citizens' rights and power exercised by only one political party. After the memorable events of 1989, started by Round Table talks and having their end in the fall of the Berlin Wall and the Velvet Revolution in Czech Republic, the Central European Countries began their way towards normality. To define the countries, which started difficult transformation of their economies and political systems, the new concept appeared in political terminology - the countries with economy in transition. The above mentioned processes were attentively observed by EU Member States. To assist democratic and economic transformations a wide range of assistance programs were created (PHARE), including experts exchange and economic programmes. Financial support was also given by individual countries.
New democracies were embraced by the political and economic assistance in the shape of Europe Agreements, which provided for political dialogue, economic integration and cultural cooperation. This act was signed with Poland and Hungary in 1991, with Czech Republic, Slovakia, Rumania and Bulgaria in 1993, and with Estonia, Latvia and Lithuania in 1995. The Europe Agreements became the fundamental document determining the tendencies in Central European Countries preparations for Union membership. The Association Committee - a new political body - was also created to hold regular meetings between associated countries and European Union.
In 1993, during the meeting in Copenhagen, the European Council announced the criteria, which should be met by a country to apply for Union membership. The criteria provide for preserving democratic rules, having efficient economy and readiness to accept all member's obligations.
The progress achieved by the Central European Countries in fulfilment of the criteria allowed EU to begin negotiations with the most advanced countries: Czech Republic, Estonia, Poland, Slovenia and Hungary in 1998 (Cyprus also joined that group). The rest of the countries are expected to join the first group soon.
At present, the negotiations are at the first phase of screening in the context of degree of compliance between the candidate countries and EU legislation. It is worth noting that in some spheres the compatibility of legislation was so high that negotiations in those fields were regarded completed.

2 Environmental protection problems in the accession countries.

Environmental protection is one of the most difficult negotiation problems between EU and associated countries. It is due to those countries' history. In the planned economy, where heavy industry dominated, overuse of energy and raw materials and great quantities of waste were not taken into account. The general public opinion about the citizens needs in environmental sphere was also not taken into consideration. What is more, in the 1970s and 1980s, the environmental organisations' activities were impeded and environmental information was made secret. As a result, the Central and Eastern

European Countries started their transformation processes with the burden of many ecological problems like serious air and water pollution, waste heaps and extremely low environmental consciousness level in the society. Although, in some countries legislation based on the best international examples existed, its efficiency was low because of the authorities policy which, in some cases, allowed transgressing the environmental law.
So the Central and Eastern European countries were entering the period of changes with serious environmental troubles. What must be admit is that their environmental situation was in some cases advantageous. For example, they had close international contacts in the environmental protection field, particularly related with United Nations initiatives, qualified experts and relatively extensive, not degraded areas, such as rural areas, forests and other areas of exceptionally precious natural features. This situation was owed to concentration of industry in industrial centres and kind of retardation in applying agricultural machinery.
From the beginning of the transformation, environmental protection issues became one of the priorities in the new democracies' activities. What contributed to that was the atmosphere connected with great ecological event in those days – preparations to the Rio de Janeiro Conference and circumstances related.
Another important factor stimulating environmental protection development in discussed countries, was the market reform. It caused the collapse of industry which was particularly harmful for the natural environment and additionally turned out to be completely unsuitable to meet market economy challenges, because of excess use of material raw and energy and high environmental costs. The rule was that the countries, where economic reforms were quickly adopted, achieved the best environmental effects. It was confirmed by the fact of those countries entering OECD.
In the 1990s the discussed countries made a significant progress in the field of improving the quality of environment and, in general, environmental management. We should remember that the countries which signed the Europe Agreements started transposition of the Union's law into their legal systems.

3 The state and the scope of accession negotiations

The official accession negotiations, which began last year in March, are the great challenge for the Central and Eastern European countries, especially in the sphere of environmental protection. That sphere is one of the most important priorities in the Union's policy. The united Europe aims, on the one hand, to create common, high environmental standards and, on the other hand, to set rules of the single European market, based on environmental criteria. The latter rule means accepting not only common standards, but also common administrative procedures to give goods producers and services suppliers same chance on the market, within European Union.
What must be stressed here is that in European Commission's and European Parliament's opinion environmental protection is one of the priorities in European Community activities. Environmental protection is to become the main premise in Europe's social and economic development. European institutions expect this kind of attitude from the candidate countries' governments.
The first technical phase of negotiations with the Union on environmental protection, so-called screening, took place in January and February this year. It was review of legal systems in the sphere of environmental protection valid in the six candidate countries (Poland, Czech Republic, Hungary, Slovenia, Estonia and Cyprus) in the context of their compliance with the Union's law and identification the problems which may appear during adjusting environmental law to the Union's legislation. The other problem discussed during screening was practical implementation of European legislation into national systems. Particularly, it concerned the question of setting administrative structures and procedures and realisation of investments necessary to ensure that in the future environmental standards will be consistent with Union's legal demands.

At present the position paper on environmental protection is being prepared. It will contain official declarations on adopting and implemanting Union legislation, terms of realisation and possible reuests for transitional periods. Those documents are expected to be presented in Brussels in July or September, during the Finnish UE presidency.
Screening covered 170 legal acts which must be adopted on the whole. What is more, where necessary, the conditions to start indispensable administrative procedures must be created at the moment the candidate countries enter the Community.
Negotiations in the field of environmental protection will mainly provide for transitional periods in investing in environmental facilities or, in some cases, postponing entering into force certain standards and procedures.
Environmental screening covered the following groups of issues:

- horizontal legislation, including environmental impact assessment, access to environmental information, participating in European conventions and agencies,
- nature protection,
- water quality problems, including such considerations like municipal sewage, pollution from agricultural sources, pollution of groundwater, quality of drinking water, problems of bathing water,
- problems of industrial pollution, including integrated pollution prevention and control, air pollution from industrial and combustion plants, preventing environmental hazards, problems of ecological audits and eco-labelling,
- problems of air pollution covering general rules of air protection with daughter directives including problems like liquid fuels quality and emissions from building machinery,
- reducing noise from vehicles and machinery,
- problems of chemicals and genetically modified organisms, including control of the risks substances, limiting using of substances that deplete the ozone layer and also problems of experiments on animals,
- problems of waste management, including hazardous waste, problems of incineration of waste, control of waste shipments, problems of management of packaging waste and batteries and accumulators waste,
- nuclear safety problems and protection against radiation, including medical radiation problems.

As the preliminary screening results show, the most difficult problems which are likely to appear during law adapting process will be:

- implementation of the EU directive on integrated pollution preventing and control (IPPC), because it requires starting new administrative procedures and introducing the institution of Best Available Technology (BAT) into national legislation;
- implementation of the directive on preventing municipal sewage, which requires building highly efficient sewage treatment plants in every population equivalents inhibited by over 2000 citizens (estimated costs of this directive will be from over ten to over twenty billion EURO),
- waste management problem – the most important problem here is municipal waste, including efficient purchase and transforming of industrial waste and waste management

Other undoubtedly difficult problems are chemical substances control (which, among others, will need an adequate office) and genetically modified organisms control. Each country has its own specific problems which need to be solved. All the solutions will surely take time and will require financial support.

The above-presented main problems connected with our EU accession set certain economical challenges. The last ten years period created lots of firms capable to provide the investors with attractive offer of environmental machinery and building and constructional services.
Ecological standards of various goods produced by Polish industry improved much. The above prompts me to presume that in the future our market will be entered by local enterprises, competitive with foreign firms' offer. These are quite important facts because the European Union membership will force us to accelerate investments with environmental protection facilities.
It should be mentioned here that EU established special fund called ISPA for the period 2000-2006 to support environmental investments in accession countries. About 500 (?) million EURO is to be allocated for demands of environmental protection.
Cooperation with society and non-governmental organisations representing experts and entrepreneurs is the other essential issue, apart from political and economical questions. Thanks to that kind of contacts it is possible to affect the development of society's environmental consciousness and to profit from those groups experiences in forming national strategies in the European integration field.
To rationalise these processes it is necessary to set suitable mechanisms of exchanging information and experiences between interests groups in various European countries. The already existing mechanisms of international information exchange may be successfully used for that purpose. That sort of mechanisms comprise systems operating under the auspices of UN Organisation, for example Infoterra system operating by UNEP, concerning exchanging information about diverse sources of information. The initiative which is really interesting is Clearing House Mechanism for Convention on Biological Diversity. It operates by the Secretariat of Biological Diversity Convention and concerns the questions of widely understood protection of biological resources in individual countries and in the whole world. That system allows free access to information localised in any databases and Internet pages world-wide.
Using these systems and equipping them with special services related to European integration would certainly contribute to accelerate the accession process.

"Moving from Telematics to IST Applications and Services for the Environment: Towards More Coherent and Integrated Services for Citizens"

Wolfgang BochI, European Commission, Directorate-General Information Society

Paper to be presented at the CAPE[1] User Forum and Workshop, 21-22 June 1999, Munich, Germany

ABSTRACT

The progressive linkage between Information Society Technologies [IST] (convergent information and telecommunication, and media technologies) and all social life aspects observed over the last decade has come more and more visible and reality in our day-to-day life. Due to the pervasive nature of Information Society Technologies and extreme short product life-cycles coupled with the high degree of innovation of products and services, this industrial sector presents one of the key drivers for economic growth and sustainability in Europe.

IST applications and services related to environment protection will play a crucial role to the contribution of environmental policy implementation, and equally, to inform Europe's citizens, industry and business about the state of the environment allowing them for better informed decisions and feedback to policy makers. The relevance and importance of this new service sector has been well reflected in the recently launched IST programme (1999-2002).

This presentation will outline the advantages of the new integrated approach of the Information Society Technologies (IST) programme in response to the most prevailing environmental issues in Europe. The strategy should be seen in the context of the wider 'IST' objective of supporting a "Sustainable Information Society".

The Challenges

The 4th FP (1994-1998) challenges of the Environment Exploratory action of the Telematics Applications Programme were primarily *"to demonstrate the potential and the usefulness of telematics solution for improved environmental protection*". About 30 research, technological development and demonstration projects have been launched over the last three/four years which largely underpinned the essential role IST can play in better environmental management.

I European Commission, Directorate-General Information Society, Systems and Services for the Citizen, Markets, Technologies – Innovation and Exploitation of Research, 29. Avenue de Beaulieu, B – 1049 Brussels, BE

[1] CAPE: An accompanying measures project funded by the Telematics Applications Programme and the International Co-operation Programme, within the 4th FP (1994-1998)

The main challenges stipulated for the 5th FP are described by the following three main criteria for selecting the themes and objectives of community activities:

- *Community "value-added" and subsidiarity principle* (need to establish a "critical mass in human and financial terms; addressing problems arising at Community level; significant contributions to the implementation of Community policies)

- *Support to social objectives* (improve the employment situation; promote the quality of life and health; preserve the environment)

- *Support economic development and scientific and technological prospects* (areas which are expanding and create good growth prospects; areas in which Community businesses can and must become more competitive; areas in which prospects of significant scientific and technological progress are opening up)

From the Information Society Technologies Programme point of view and in regard to environmental applications and services the new challenges can be summarised as follows:

(i) *to support the creation of a sustainable European Environmental Information Service Market*

- *moving from a "systems oriented" to a "service oriented" approach.* More and more services provided previously by public administrations and authorities are being outsourced to private companies who are capable to provide better cost-efficient services.

- *securing appropriate participation of user communities* (i.e. local, regional authorities, civil protection agencies, NGO's etc…) at the level of the projects and user groups

- *building on past results and securing a critical mass of funds and efforts* for fostering a significant contribution to standardisation, e.g. for European and global environmental data exchange, for generic environmental emergency management tools

(ii) *focussing on trans-boundary environmental issues with CEE*[2] *countries*. This dimension relates to both, the sheer scale of past environmental liabilities and the gap in the level of protection in the CEE countries compared with the situation in the EU. Full compliance with the "environmental acquis" will probably only be obtained in a medium to long term period. Partnerships in EU RTD initiatives between Candidate Countries and EU Member States are providing possibilities for assistance to candidate countries in the transfer of know-how and for support in their pre-accession strategies.

(iii) *integrating and taking on board new emerging environmental policies* which form or will form part of the different EU policies such as the Agenda 21, the new urban agenda , the noise, air, water and civil protection policies,

IST environmental information services to be developed under the 5th Framework Programme should fulfil the following criteria:

[2] Central and Eastern Europe

- improve environmental systems/service quality (efficiency, robustness and reliability as a second generation tools)
- provide for accurate, timely, and reliable information to be delivered to citizens and decision makers
- support a systematic technology transfer and dissemination of know-how in the relevant fields and places (initiatives, such as DETERMINE and CAPE are pioneers in environmental telematics technology transfer)

Results of the "Environment Telematics" exploratory action (1994-1998)

In the field of Community research, a first co-ordinated environment telematics action has been implemented as part of the Telematics Applications Programme. About 30 projects related to the environment are being or have already been carried out. It is at the heart of this CAPE Conference to show and demonstrate the results achieved and lessons learnt through the demonstration and validation of innovative approaches in environmental management.

For details on projects and contact points, see the web site:
http://www2.echo.lu/telematics/environ/environment.html

The new IST Environment research activities (1998-2002, research priorities IST-EN 1999

The IST Programme offers increased opportunities for co-operation on common environmental issues both at urban and regional, and trans-national level in domains, such as: air quality, water quality, and waste management, nature protection. The IST programme foresees a rolling workplan with annual updates.

In line with the specific programme, the research priorities for the call(s) in 1999[3] include: ***systems for intelligent environmental monitoring and management, environment risk and emergency management, including support systems for sustainable development and for ecological and resource efficiency***. *Probably in subsequent calls the IST environment action will promote research in environmental modelling, simulation and forecasting and* ***technologies for humanitarian de-mining***.

Further information available at: http://www.cordis.lu/ist

[3] First IST call launched 19 March 1999, Closing date 16 June 1999

Conclusions

The IST environment action will play a significant role in addressing a number of issues identified in the FP4 exploratory action. Particular issues of concern are the gaps identified
(i) between environment and data,
(ii) between policy/administration and citizen needs,
(iii) between users and environment R&D results, and
(iv) between the market and environment & ICT research results.

The IST programme aims at ensuring that environmental application and services will become a new flourishing service market. Thus, it will contribute towards standardisation, a more coherent approach in environmental management, and towards better linking the various existing and emerging environmental policies.

Efficient means to ensuring transferability of research results and to strengthening and enlarging the network of users (NGOS, privates, local, regional …) are to become intrinsic features, built–in in the environment action and the IST programme as a whole.

It is part of the CAPE User Forum and workshop to address these requirements and objectives in a number of ways and to provide essential feedback to both participants and programme and project managers.

First Pan-European User Forum and Technical Workshop
"Telematics Solutions for Sustainable Development"
Munich, 21-22 June 1999

"Moving from Telematics to IST Applications and Services for the Environment:
Towards more coherent and integrated services for citizens"

Wolfgang BOCH,
European Commission, DGXIII

Scope of presentation

1. Introduction
2. CAPE & Munich User Forum
3. Telematics Applications for the Environment (FP4: 1994-1998)
4. Information Society Technologies Programme - Environment Action (FP5: 1998-2002)
5. Conclusions

Role of CAPE and Munich User Forum

- to disseminate Environment Telematics Research results
- to promote "Best Practice" in Environmental Management
- to foster technology and know-how transfer
- to support take-up
- to improve interaction between researchers, industry, users
- to facilitate networking and foster co-operation (EU, CEEC)

Telematics Applications for the Environment (FP4: 1994-1998)

The Mandate

- to demonstrate the potential
- to validate the usefulness, efficiency and quality of services
- to raise awareness on environmental issues - link with IST
- to ease implementation of EU Environmental policies
- to initiate networked co-operations between EU cities & regions

Telematics Applications for the Environment FP4 (1994-1998)

Results

- 30 RTD projects launched
- 30 M€ EU funding
- 250 Partners involved
- Network of users (25 cities, 30 regions)

Telematics Applications for the Environment FP4 (1994-1998)

Success stories - Examples

- EMMA 24/48 h Air Quality Prediction in European Cities (Genova, Madrid, Leicester, Stockholm)
- DEDICS Decision Support for Management of Environmental Emergencies focus on floods Participants: FR, DE, IT, GR, ES, PT

Telematics Applications for the Environment

Networks - Examples

Cities		Regions	
E.M.M.A.	THE CITY	REMSSBOT	E-MAIL
Genova, IT Madrid, ES Leicester, UK Stockholm, SE	Antwerp, BE Munich, DE Athens, GR	Allessandria, GR Athens, GR Piemonte, IT Torino, IT Flanders, BE Zeeland, NL	Fife, UK Toscany, IT Phone-Alpes, FR

The Concertation Process in TAP

Results of the 4th FP meetings

- 6 area reports

http://www.echo.lu/telematics/environ/environment.htm

- Minutes and presentations of 7 previous meetings

http://concord.cscdc.be

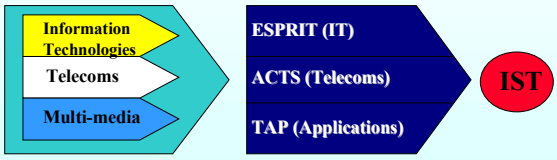
- ENWAP Web Site:

http://www.www.rec.org/telematics/enwap

IST Programme - FP5 (1999-2002)

A new approach

Convergence of technologies → Integration into 1 single programme



EU - 5th RTD Framework Programme

Criteria for selection of themes and objectives

community "value-added" & subsidiarity principle
support to social objectives
support economic development and scientific and technical prospects

The 5th Framework Programme

Thematic & Horizontal Programmes

Quality of Life & Living Resources 2.414 BECU	Information Society Technologies 3.600 BECU	Competitive & Sustainable Growth 2.705 BECU	Preserving the Ecosystem 2.115 BECU

International Cooperation 475 MECU	Innovation & SMEs 363 MECU	Human Potential 1.280 BECU

The IST Programme - Budget breakdown

- Four Key Actions
  1. Systems and services for the citizen — 646 M€
  2. New methods of work and electronic commerce — 547 M€
  3. Multimedia content and tools — 564 M€
  4. Essential technologies and infrastructures — 1363 M€
- Future and emerging technologies — 319 M€
- Support for research infrastructures — 161 M€

- TOTAL : ECU 3600 million

Key Action I - Systems and Services for the Citizen

Promote general interest services

Easy access
Affordability
User friedliness
Dependability and interoperability

in the domains

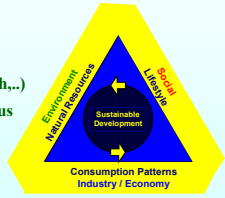
HEALTH
ENVIRONMENT
TRANSPORT and TOURISM
SPECIAL NEEDS
ADMINISTRATION

IST applications for environment protection

Mission Statement

... given by the mandate from Council and EP

- enhance technology basis and services
- support existing and emerging env. EU policies
- support other EU policies (employ., health,..)
- participate in actions as a support/stimulus for Sustainable Development
- support technologies for humanitarian demining



IST applications for environment protection

Challenges

ensure efficient co-ordination with related programmes/actors
- DGXII (Ecosystems/Environment RTD)
- DGXI (Environment Policy and Civil Protection)
- EEA (European Environment Agency)
- JRC (SAI, IE, ISIS) – earth observation, air quality, EO, land-mines
- CEE/MEDA countries

support a 'citizen centered approach'

support towards standardisation
- e.g. data exchange; protocols, interfaces

create new markets for environmental information tools and value-added services

IST - Applications for Environment Protection

Research Priorities / Actions Lines

- •1999 Call - Monitoring and management
  - Emergency management systems
- •2000 Call - Technologies for humanitarian demining (tbc)

1st Call: 19 March 1999
Closing: 16 June 1999

THE IST PROGRAMME 1999
Key Action I - ENVIRONMENT

Intelligent environmental monitoring and management

Objectives
- Monitoring slow chronic changes and pollution
- Assessment of new business models for value-added environmental info-services
- Contribution to European and global standards for Data Exchange
- Support to environmental planning and early warning

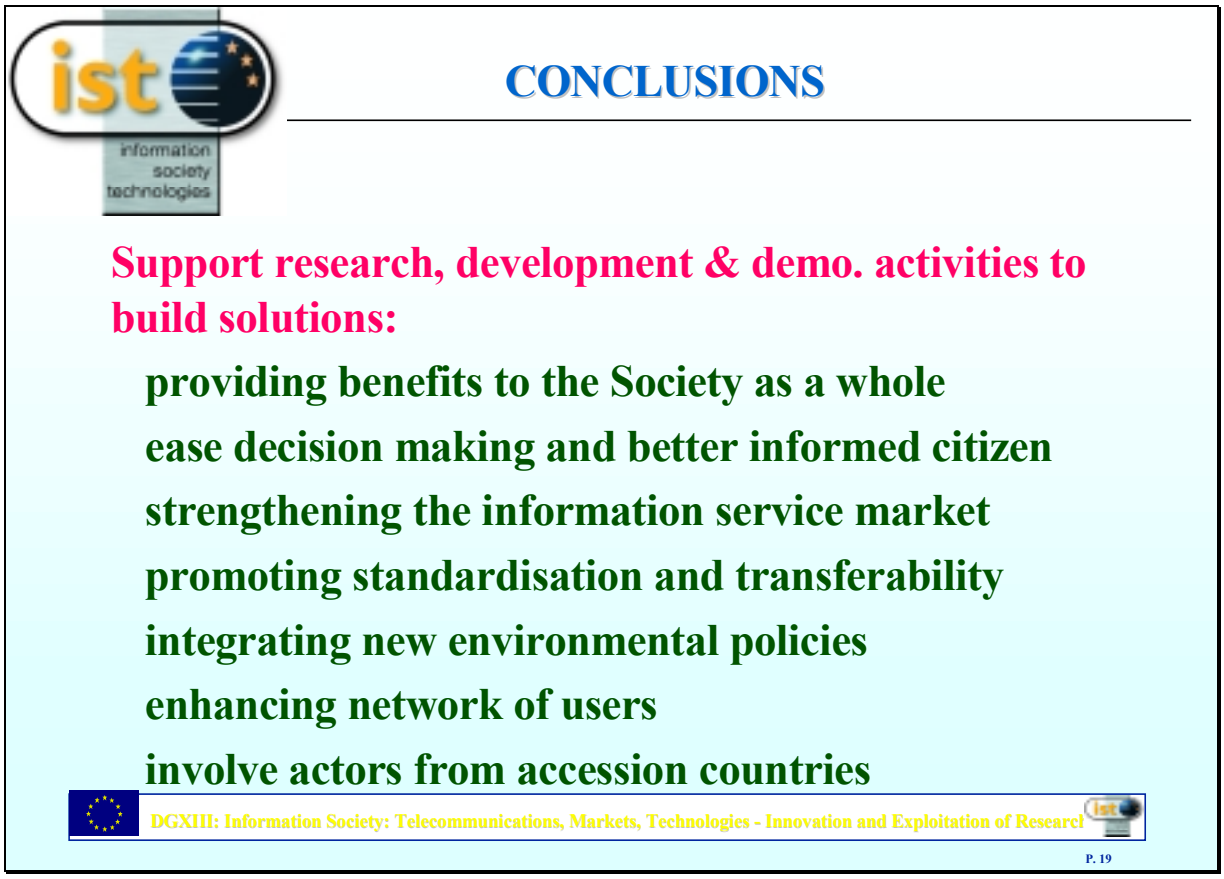
Intelligent information system development, including:
- intelligent sensors, detectors and telecommunication networks
- integration of diverse networked information sources
- advanced data mining, including geo-referenced data, and decision support systems

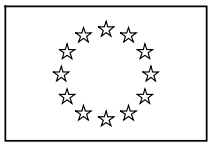
THE IST PROGRAMME 1999
Key Action I - ENVIRONMENT

Environmental risk and emergency management

Objectives
- Develop and demonstrate new tools and integrated systems for consistent emergency management supporting the entire cycle from prevention to follow-up
- Contribute and establish European standards for emergency management tools
- focus on floods, forest fires, land slides and industrial accidents

Emergency management system development, including:
- intelligent, mobile, and networked sensors for near real-time data collection
- remote sensing integrated with local continuos or sampled measures
- risk assessment models and real-time GIS
- fixed and mobile, point-to-point or multicast telecommunication networks and services


CONCLUSIONS
Support research, development & demo. activities to build solutions:
providing benefits to the Society as a whole
ease decision making and better informed citizen
strengthening the information service market
promoting standardisation and transferability
integrating new environmental policies
enhancing network of users
involve actors from accession countries
DGXIII: Information Society: Telecommunications, Markets, Technologies - Innovation and Exploitation of Research
P. 19



EUROPEAN COMMISSION
DIRECTORATE-GENERAL XI
ENVIRONMENT, NUCLEAR SAFETY AND CIVIL PROTECTION
Directorate D - Environment quality and natural resources
XI.D.3 - Air quality, urban environment, noise, transport

Brussels, 21 June1999
Dr. Wolfgang Güssow[I]

Priority to the Environment: A long-standing Commitment of the European Community – The 5th Environmental Action Programme 'Towards Sustainability' at the First Pan-European Environmental Telematics User Forum in Munich on 21/22 June 1999

Address

It's my pleasure to speak to you on commitment and strategies for Sustainable Development of the European Union and - like the other speakers in this session- setting a context for the discussions over the next 2 days.

1. I would like to start by outlining the EU's commitment to sustainable development. This is set out in the Treaty on the European Union. The new Treaty of Amsterdam, agreed in June 1997 and finally put into force on 1 May 1999 makes in Article 6 'sustainable development' an explicit objective of the EU, replacing the wording in the Maastricht Treaty which spoke about 'sustainable growth respecting the environment'.

In addition, the Treaty contains other provisions that make environmental policy stronger:

- It strengthens the requirement to take account of the environment in defining and implementing all EU policies. A *Communication on Integration* adopted by the Commission last year sets out some of the steps needed to make sure this happens.
- The new Treaty makes it easier for individual countries to take environmental measures that are stricter then the ones set by the EU, though there are mechanisms to make sure that these do not compromise the Single Market.
- It gives more powers to the European Parliament, which tends to be a bit greener than the Council of Ministers, though on some important things like tax reform it still has only a non-binding consultative role, which is one of the many reasons why for instance an EU carbon tax is such a difficult thing to set up.

Two other key points about the Treaty:

Since **health** is a theme of the conference and the Superintendent and Director of the Department 'Health and Environment' of the city of Munich, Mr. Joachim Lorenz, is hosting the conference– I want to mention that the protection of human health now has to be taken into account in defining and implementing all Community policies and activities. (Art. 152 new)

Moreover there is an intention to **involve local and regional authorities** more closely in EU processes. The new Treaty gives a stronger role to the Committee of the Regions, where local government views are formally represented; even closer links are being forged – for example by involving cities in

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the development of new legislation. This is happening at the moment in the case of new legislation for environmental noise, a co-operation organised through the Eurocities network.
In practice, the new Treaty sets the framework for policy development and legislative proposals that the Commission is making now, so we can expect to see sustainable development becoming an ever more important theme.

2. So much for the commitments – what about the strategy and actions for meeting them?
The EU's main statement of policy and action for sustainability is laid down in the 5th Environmental Action Programme. This was prepared in parallel with Agenda 21 and was put into effect on 1 February 1993. It is the formal framework for meeting the commitments made at the Rio Earth Summit. Incidentally, all the EU Member States and the Commission signed up to Agenda 21. However implementation of Agenda 21 as well as of many of the elements of the 5th Action Programme depends strongly on regional and local governments. This is why the Commission places such an emphasis on Local Agenda 21.
As well as providing the framework of environmental rules and regulations, one of the key things the 5th Action Programme does is to set out other sorts of instruments which can help to create the right market conditions for sustainable development and to support local authorities and other actors –like businesses – as they try to be greener.
Well, over the last 3 or 4 years there has been a certain amount of progress. We have the latest state of the environment report from the European Environment Agency assessing the state of the environment at the pan-European level, and the 5th Action Programme has itself been reviewed. After a long process of debate and conciliation we now have an up to date document setting out the European Union's priorities for the next stage of the 5th Action Programme taking us beyond the year 2000. The **Review of the 5 EAP**, as it is called, jointly taken by the European Parliament and the European Council, was adopted on 20 July and came into effect on 24 September 1998.

What has the EU decided upon?
2.1. The Review of the 5 EAP focuses its environmental efforts on five **'Priority Areas'**:

2.2.1 The first priority area: **Actions for integration of environmental requirements into other policies,** predominantly into the Programme's five target sectors: agriculture, transport, energy, industry and tourism.
In relation to **Agriculture** the main priority objectives for integration are

- Better integration of market development, rural development and environmental policies with a view to securing sustainable agriculture esp. within the framework of the Agenda 2000 reform
- Regular reporting and the elaboration of comparable data on the pressure on the the environment, including biodiversitiy and agricultural practices such as the use of fertiliser and pesticides
- Promotion of integrated farm technologies, organic agriculture, extensive production methods to respect biodiversity and the
- Development of an integrated strategy to reduce the risk to health and to the environment from the use of plant protection products, pesticides etc.

In relation to **Transport** priority objectives of the Community are

- To tighten provisions on emissions and noise from vehicles and aircraft, actions to reduce CO_2 and to strengthen provisions on vehicle inspection and maintenance
- To give greater attention to the transport demand side e.g. through better internalisation of external costs, promotion of integrated transport policy, improvements in environmental safety aspects and promoting demand management measures such as the use of telematics

- To reduce the imbalances between the different transport modes and encouraging the more environmentally friendly modes of transport e.g. through facilitating transport intermodality and modal shift and by encouraging public/collective transport

As regards **Energy** priority objectives are

- Promotion of energy efficiency, support of energy-saving technologies and practices, including renewable energy sources and combined heat –power. Furthermore the Community will
- Encourage the implementation of energy demand side management measures, energy conservation measures and the internalisation of external costs and benefits through economic and other instruments

In relation to **Industry** priority objectives are

- Promotion of the ongoing development of eco-management schemes by the industrial sector, further promotion of environmental awareness focussing particularly on small and medium sized industries (SMEs)
- Development of a framework for an integrated life-cycle oriented product policy ('cradle to grave approach'), promotion of cleaner products
- Enforcement of steps to reduce industrial emissions and pollution by ensuring improved integration of the 'polluter pays principle' into Community legislation
- Implementation of the concept of eco-efficiency and the strengthening partnerships between governments and industry (e.g. 'Umwelt-Pakts' as they have been far developed especially in Bavaria))

As regards **Tourism** priority objectives predominantly aim

- at the exchange of information on the impact on the environment of tourism practices
- Support of awareness rising campaigns and last not least
- The implementation of innovative good practices in the field of sustainable tourism development

2.1.2 The **second new priority** is to **broaden the range of EU instruments**. More is going to be done on market-based tools like green accounting, and some of the existing market tools are being extended. For example, the Eco-label Regulation is going to apply to services as well as products, and the EMAS Regulation (Environmental Management and Audit Schemes) is being revised at the moment to apply to all kinds of organisations, including municipalities, building on successful experimental schemes in some countries. These changes should make it easier for local authorities to develop greener purchasing and procurement policies.

Stronger emphasis will be put on the assessment of the effects of certain plans and programmes on the environment through Strategic Environmental Assessment (SEA); a Directive is on the way and might be adopted by the Environment Council at the end of this year under the Finnish Presidency.

2.1.3 A **third new priority** is **better implementation and enforcement of legislation**, which includes giving citizens more opportunities to use the courts to deal with complaints, for example about pollution incidents.

2.1.4 The **fourth priority** is **improving communication, education and training** on environmental policy as a means of stimulating awareness of sustainable development issues and promoting behavioural changes towards more sustainable consumption and production patterns. Better information is regarded as an indispensable prerequisite for enhanced awareness.

2.1.5 And **last but not least**, there is a promise to reinforce the EU's role in international sustainability efforts (Convention on Climate Change, Convention on Bio-Diversity, Kyoto Protocol and others), also in relation to the accession countries of Central and Eastern Europe, e.g. Measures focussing on capacity building and technical assistance under the TACIS Programme for the New Independent States.

2.2 Among the many other commitments in the Review of the 5th Action Programme there are two more of special relevance to this conference:

- Improving the basis for environmental policy
- Promotion of local and regional initiatives

2.2.1 As regards the **improved basis for environmental decisions** the Community will assure that its environmental policy is based on reliable and comparable data, statistics and indicators. The European Environment Agency is explicitly mentioned to play a key role in monitoring and reporting on the state of the environment. Particular attention will be given to

- Identify and fill the gaps in current statistical data on the environment
- Promote the development of environmental indicators on all relevant policy issues and indicators for sustainable development as benchmark indicators to measure progress towards sustainable development and to provide a basis for the setting of objectives and operational targets (Report on TERM-indicators to be endorsed at the Helsinki Summit in Dec. 1999)
- Improve co-ordination in the development and secure mutual feedback between scientific research, development policies and environmental policy

2.2.2 As regards the **promotion of local and regional initiatives** these activities are fundamental for the achievement of sustainable development as outlined in the beginning. Local and regional authorities are the most important partners to implement measures towards sustainable development. The Community therefore will pay particular attention

- To develop a comprehensive approach to urban issues with special emphasis on the assistance required to support actions by local authorities to implement the revised 5th Action Programme and Local Agenda 21 activities
- To promote the exchange of experience between local authorities in relation to sustainable transport initiatives and

- To promote the potential of spatial planning as an instrument to facilitate sustainable development taking forward the objectives of the European Spatial Development Perspective as a basis for creating consensus among policy makers.

3. The promotion of local and regional initiatives was endorsed by the Commission Communication on Sustainable Urban Development: European Union Framework for Action (COM(1998)605 final), which was adopted on 23 0ctober 1998 and officially launched to the public at the European Urban Forum on 26/27 November 1998 in Vienna. This document contains a list of 24 detailed actions to implement 'Sustainable Development' in urban areas where 80% of the European population live.
At the same time the Urban Communication serves as a major step towards implementing the strategic goals of the revised 5 EAP, providing its spatial dimension. Both documents are cornerstones to strengthen and restore the role of Europe's cities as places of environmental, economic, social and cultural integration and to secure the growing importance of a Community Policy towards 'Sustainable Development' in Europe.

CAPE: A Unique Approach to Pan-European Co-operation

Petra Mollet[I] and Siegfried Rupprecht[II]

CAPE Project

A Unique Approach to Pan-European Cooperation

Petra Mollet
POLIS Network

Siegfried Rupprecht
Rupprecht Consult GmbH

1st Pan-European Environment Telematics User Forum
Munich, 21 June 1999

CAPE

Co-ordinated Action for Pan-European Transport and Environment Telematics Implementation Support

Environment Telematics User Forum - Munich, 21 June 1999

Target Groups

Transport and Environment
Decision-Makers in
Local and Regional Authorities
in the EU and CEEC

Environment Telematics User Forum - Munich, 21 June 1999

Background

- in EU cities and regions, the potential of telematics not yet fully appreciated in the environment sector
- in CEEC cities and regions, major concerns about environment and transport
- proven, low-cost telematics solutions exist
- need for further investigation of state of the art and more and better targeted dissemination and exploitation

Environment Telematics User Forum - Munich, 21 June 1999

Strategic Objectives

- 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 the CEEC

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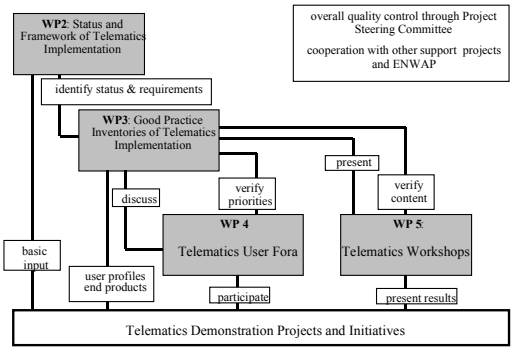
Methodology



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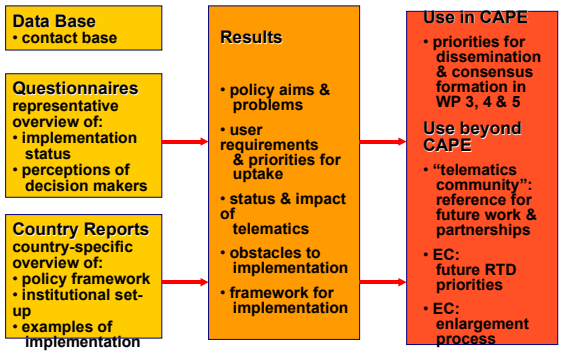
CAPE Project Context



Results

- Contact data base of 2000+ transport & environment decision makers in 25 countries
- Local & regional government questionnaire surveys for 25 countries
- 10 CEEC Country Reports
- Inventories of Good Practice in Transport & Environment Telematics
- User Fora & Workshops on Transport & Environment Telematics (& Proceedings)
- all accessible through ***www.rec.org/telematics/CAPE***

Future Events

- CAPE Transport Telematics Forum, Prague, 17-18 Sept. 1999
- CAPE Transport Telematics Workshops,
  - Warsaw, 8 Oct. 1999
  - Sofia, 15 Oct. 1999

Results of Surveys on the

Use and Priorities of Environment Telematics

in 25 European Countries

Perception of Technology Impacts

- problem-solving capacity of telematics
  - **highest:** improving decision making, service delivery public awareness & participation (ca. 50%)
  - **lowest:** air & noise (10% CEEC), waste (30% EU)
- key problem areas & long-term problems = lowest expectations in new technologies
- insufficient awareness of positive impacts among decision makers (EU & CEEC)

Current Use of Technology

- level of technology use
  - lower than expected in EU
  - major divide between EU - CEEC
- examples:
  - online publishing of environmental data EU: 40%/ CEEC: 20%
  - air quality modelling ("fully telematics supported") EU: 20%/ CEEC: 6%
  - Geographic Information Systems EU: 75%/ CEEC: 10%

Future Priorities

- application areas
  - domestic waste management
    EU: 76%/ CEEC: 97%
  - hazardous waste treatment/ contaminated sites mgmt
    EU: 76%/ CEEC: 77%
  - reduce traffic emissions
    EU: 81%/ CEEC: 76%
- systems
  - public information systems: 90%
  - decision support systems
    EU: 67%/ CEEC: 80%
  - GIS integration
    EU: 84%/ CEEC 63%

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Future Priorities (2)

- high interest in new technologies
  - substantial progress made
  - fast take-up of new, low-cost technologies
- double shift from "end of pipe" technologies to "preventive measures" (?)

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Obstacles to Technology Implementation

- data availability
  - "sufficient data" for air & drinking water
    EU: 60-70%/ CEEC: 50%
  - deficit areas: mobile pollution sources, noise, hazardous waste
  - data handling & data analysis to be improved
- basic infrastructure (especially in CEEC)
- lack of comprehensive planning
  - EU: 29% "integrated action plans"
- institutional barriers

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Obstacles (2)

vicious circle of

- missing up-to-date know-how
- low awareness of problem solving capacity of telematics
- low level of staff training in telematics
- insufficient political support

and consequently

- lack of financial resources (= no. 1 obstacle)

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Differences in Europe

- EU:
  - diminishing North & South differences
  - "technology pioneers": network members in EU
- CEEC:
  - local level: transfer of power, but lack of funds and capacity to enforce laws
  - vast differences in city size
  - approximation has created pressure to act
- CEEC - EU:
  - low in perception & priorities
  - high in infrastructure
  - highest in environmental quality

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Summary

- lower than expected use of technology
- infrastructure issues dominate in future planning
- shift to preventive measures?
- comprehensive planning needs improvement
- awareness of technology impacts low
- high interest in telematics
- high take-up of low-cost solutions
- need to build up know-how
- address decision makers

Environment Telematics User Forum - Munich, 21 June 1999

Availability and Use of Environmental Information on the Web

Werner Pillmann[I]

Abstract

Environmental information is essential in each phase of decision making to come closer to the goal of a sustainable development. It is a prerequisite, not only to achieve better understanding of natural systems, but also to control economic and social processes which affect the ecosystem.
This paper is focused on the need for environmental information and its distribution in the World Wide Web. Special attention is attracted to various potential and/or practical applications of environmental information in administration, science, industry, the media and for the public. A detailed example for access to environmental information is given by a Web-site application in the Danube Region.

1 Access to Environmental Information

The amount of environmental information available in Europe has considerably increased in recent years. Free access to such environmental information and data was a long desired aim of the public, dating back to the United Nations Conference on the Human Environment in Stockholm in 1972, and before. It took almost one decade until these ideas were conveyed into legislation e.g. with the Council Directive 90/313/EEC (freedom of access to information on the Environment). A further step with a broader approach was introduced with the *5th Action Program* of the European Communities and the implementation of the *Rio Declaration on Environment and Development* (Earth Summit '92), including Agenda 21, Chapter 40 and others (ZIRM, PILLMANN 1996).
A new approach was established in the Convention on the access to environmental information and public participation in environmental management at the Ministerial Conference 23-25 June, 1998 in Aarhus, Denmark, including public participation in decision making and access to justice in environmental matters.
For the distribution of environmental information, several systems are available now in administration, industry and research. Recently, a great number of Telematics services have been established, e.g. for measurement purposes, preservation of nature, resource management and awareness building. Such information sources are often designed as a system of layers consisting of different levels of accessibility and confidentiality.

1.1 Availability of Primary Information

As a consequence of the various international activities and in order to give public access to environmental data, several retrieval support systems are available. These are in general search machines (Yahoo, AltaVista et al.) and specific environmental data centers in the Web with links to Environmental Agencies, NGO's and to specific environmental information.
Within the 4th Framework Program, the European Commission started to support the development of Telematics applications. Especially DG XIII entrusted several consortia to elaborate environmental Telematics programs. The proceeding volume of the DETERMINE Conference 1998 (Dissemination of Environmental and Transport Telematics Results) gives an overview of applications in this field.
Activities of the European Environment Agency (EEA) related to a new, comprehensive Web-site, the further development of the metainformation system "Catalogue of Data Sources" (CDS) and the Envi-

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ronmental Information and Observation Network (EIONET), developed between European countries and the EEA are described by Sigfús BJARNASON (p. 27). Information services like GELOS, the "Global Environmental Locator Service" and CEO (Centre for Earth Observation) for Remote Sensing and Environmental Information at the Joint Research Centre in Ispra of the European Union provides "Europe-Wide Service Exchange" (EWSE). Also, Digital Library Systems can be implemented in such Meta-information systems (HICKS, TOCHTERMANN, 1998).
Instruments to facilitate the access to environmental information can be more and more found in the World Wide Web (WWW or the "Web"). Some examples of such Web addresses are given at the end of this paper. They were treated equal in literature, but it should be clear that there are fundamental differences. Web-sites are not stable information sources. They are developed and will be maintained over a longer period only under favourable conditions. On the other hand, the world-wide access to many different topics on a low-cost level is a valuable completion of all existing information resources.
Experiences in the field of the distribution of environmental information have been made since 1991, when the International Society for Environmental Protection (ISEP) started to develop CEDAR, the *Central European Environmental Data Request Facility*. CEDAR provided computing and Internet facilities to support international data exchange, among others with the Central and Eastern European environmental community and with UNEP INFOTERRA (PILLMANN 1995, 1999).

1.2 Environmentally Relevant Fields of Information

To select, initiate and evaluate measures for the reduction of pollution, the analysis of pollution causes and effects is necessary. Similar to the so-called pressure-state-response (PSR) approach or the extended DPSIR model (including driving forces and impacts), the graphical representation of a system for reducing environmental stress is depicted in figure 1 in form of a systems diagram with input/output process elements.

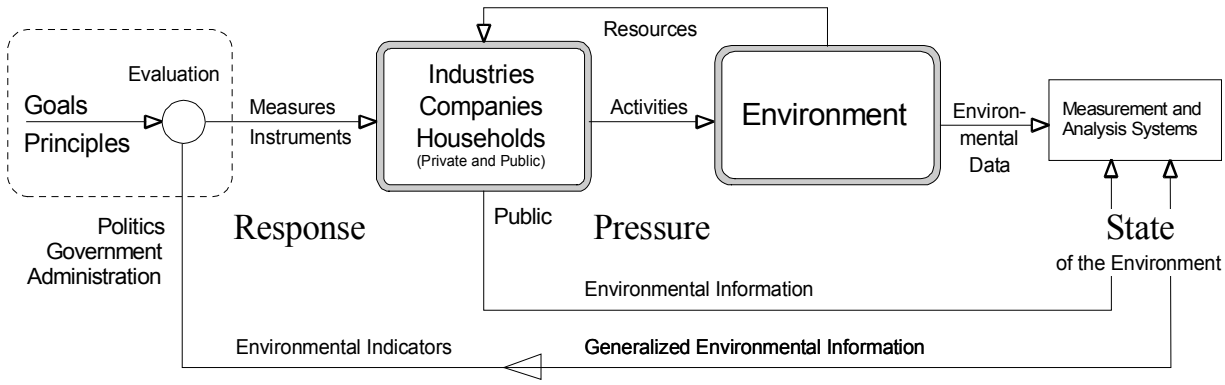

Fig. 1: Systemic view of environmentally relevant information

1.3 Metainformation

To facilitate the access to information, metainformation systems were developed. In co-operation with many European countries, the EEA built up an environmental data catalogue (Umweltdatenkatalog UDK, Catalogue of Data Sources CDS) providing an overview of the data collected and stored by authorities and institutions (Jensen 1998). Another Environmental Data Catalogue (Umweltdatenkatalog) is maintained by the Federal Environment Agencies of Germany and Austria. Figure 2 presents the flow of information from sources into a usable information and meta-information form.

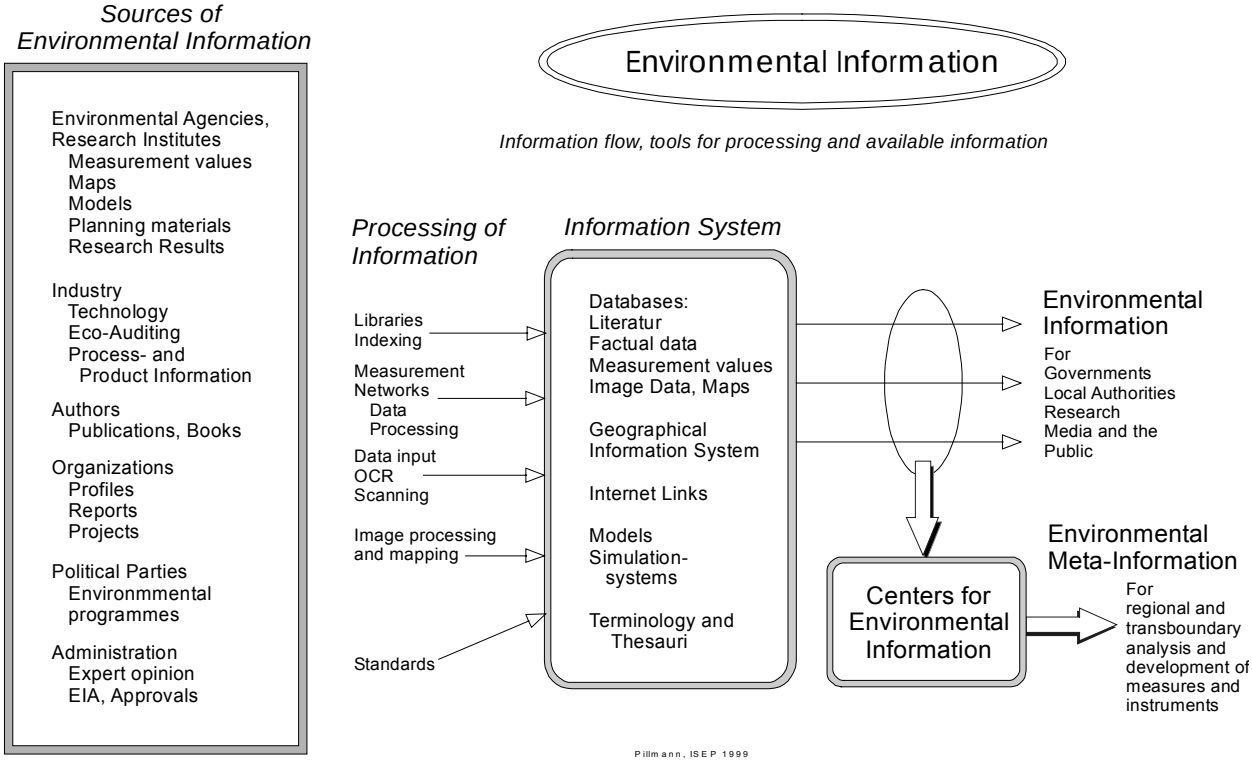

Fig. 2: Data flow from the source to usable information and meta-information

As an example, the Austrian WWW-UDK is a tool to fulfill the requirements of the Austrian Environmental Information Act (UIG 1993) and the Council Directive "Free Access to Environmental Information", which has to be implemented by all EU Member States. The UDK is accessed by interested citizens and especially by people working in the environment-related administration units and in the field of environmental research. The UDK is updated regularly in accordance with the above mentioned pieces of legislation as well as federal and local authorities and comprises now 12.000 entries. During the last 1.000 days approximately 700.000 requests from 16.000 hosts were registered (LEGAT et al. 1999). Close to 3 gigabyte data were downloaded in this period. The further development of this innovative and strategic guidance tool is realized in cooperation with the respective competent authorities in Germany, Switzerland, Liechtenstein and with the EEA.

2 Environmental Information and its use

In order to highlight how specifically information is used, I will give a brief insight in the development of the information system for the Danube River basin (DANUBIS), (FRAMEWORK FOR THE DEVELOPMENT OF AN INFORMATION NETWORK, 1998).

To reduce the cumulative inflow of nutrients and pollutants in the River Danube, the DANUBE RIVER PROTECTION CONVENTION (1994) has been signed and entered into force in October 1998. This was the starting point for an intensive information exchange between the expert groups for Monitoring, Laboratory and Information management (MLIM), the Accident Emergency and Prevention Warning System (AEPWS), and the Emission Monitoring Information System (EMIS). Furthermore, the requirement of databases e.g. for adresses, literature, water balances, research programs and the transnational network of water quality monitoring stations (TNMN) had to be met. For this reason, the development of the Danube River Basin Information System (DANUBIS), as an umbrella for existing information resources was initiated to serve the International Commission for the Protection of the

Danube River (ICPDR) as a tool to improve water quality, reduce risks and build a basis for the tasks within the Convention. Several existing information sources (Danube PCU-Homepage, DANIS database etc.) have to be integrated in a uniform information structure within the DANUBIS System. DANUBIS will meet the requirements of scientists, industry, administration, financing institutions and the public as well. In Table 1 some users and the use of information are classified.

Table 1: User classification for the Danube River Basin Information System

International/National/Local Users	Use of Information
Task Force/Bureau & International Commission/Steering Group	to oversee and to guide the implementation of the DRPC by the ICPDR (set policy and strategy; review progress achieved; coordinate the administrative, financial, scientific and technical facts).
International Secretariat and the Program Coordination Unit (PCU)	day to day co-ordination of the work, assisting meetings and individual activities, preparing reports
Donor organisations	to define eligibility criteria and program priorities for project support
NGO network	support of public access to environmental information and public participation in decision-making
Ministries for environment and/or water	co-operation with other countries; adopting environmental programs, conventions, agreements and declarations
Other ministries	support of environmental programs of multi-sectoral interest
Focal Points	co-ordinate preparation of National Environmental Action Plan, National Strategic Action Plan, National Strategic Implementation Plan etc.
Universities and research institutions	performing education, research and development activities, providing expert & consulting services and risk assessment studies
Monitoring laboratories	performing sampling, analytical measurements and quality assurance
Local health units	participating in quality assurance and health impact assessment
Municipalities	performing waste collection and waste water treatment
Industries (pollution sources)	participating in environmental management (EMAS, ISO 14000)
Political parties and interest groups	priority setting, public relation, support public participation
Journalists	information of the general public
Engineers and consultants	environmental impact, risk assessment, material flow analysis
Individuals (households)	concerned about the local environmental quality, interpretation of information needed

In addition, the harmonization of multinational information sources is a technical, financial but also a social/diplomatic communicative task. Some analytical details of the interaction of technical and political solutions, a necessity during the development of environmental information systems, can be found e.g. in PILLMANN (1995), RUZIC, PILLMANN (1998) and NOWOTNY, PILLMANN, RUZIC (1999).

3 Internet Resources for the Information Society

The characteristics of environmental information make it a challenging commodity to manage. This information is typically made up of a variety of different formats like images, graphics, maps and databases. Networking between citizens, administration, enterprises and within the scientific community makes it advisable to use state of the art Telematics to develop and distribute such information.
A variety of European Union programs are establishing links between environmental information and interested persons and organisations, the industry, research projects etc. (DETERMINE 1998). Their aim is to respond to the growing demand for improved environmental care and awareness, to improve people's working and living environments, their daily lives, their health and well-being, but also to

increase their competitiveness - an essential prerequisite for the benefit of both, the environment and the economy. Within the 5th Framework Program of the European Union it is foreseen to build an information society embedded in a global sustainable development. Therefore, available and future results of environmental management should as well be communicated within Europe for the benefit of all participating countries (PILLMANN 1999).

4 Literature

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Environmental Information in the World Wide Web (examples; http://)

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Black Sea Information System	www.domi.invenis.com.tr/blacksea
Black Sea Environm. Information Network	www.grid.maps.ch/bsein (www.bsein.mhi.iuf.net)
Catalogue of Data Sources: WebCDS	www.mu.niedersachsen.de/cds/start_info.html
Catalogue of Data Sources Austria	udk.bmu.gv.at
Central European Environment	
Data Request Facility - CEDAR	www.cedar.univie.ac.at
Danube Information System DANIS	www.ceit.sk/wwwisis/danis.htm
Danube PCU-Homepage	www.rec.org/danubePCU/
DANUBIS - ICPDR Danube Information System	www.icpdr/danubis (until September 99 for ICPDR internal use)
DETERMINE Conference Papers	www.rec.org/rec/programs/telematics/determine/default.shtml
DG XI - Environment	europa.eu.int/comm/dg11/index_en.htm
DG XIII - Telecommunication	europa.eu.int/comm/dg13/index.htm
Environment Protection Agency Austria	www.ubavie.gv.at/
Environmental Action Plan Task Force	www.oecd.org/env/
Environmental Links	www.bmu.de/links/index.htm
European Environment Agency EEA	www.eea.eu.int/frlinks.htm
EWSE (Earth Observation)	ewse.ceo.org/
GELOS (Environmental Metainformation)	ceo.gelos.org/
GRID Arendahl	www.grida.no/baltic/
US Environmental Agency (EPA)	www.epa.org

The European Environment Agency: A Reference Centre for Environmental Information

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Abstract

EEA's role as a Reference Centre for environmental information in Europe has been identified as one of the main priorities in the EEA's Work Programme. This paper provides background information about the principle of public access to environmental information and details the EEA's work towards launching the Reference Centre on Internet later this year. Main emphasis is placed on the importance of proper use of metainformation for organising the content of Web based environmental information services.

1 Background

The European Environment Agency, and its wider network, the European Environment Information and Observation Network (EIONET), was established (Regulation EEC 1210/90) to ensure the supply of objective, reliable and comprehensive information at European level and to insure that the public is properly informed about the state of the environment. In co-operation with the Member States, the EEA has been developing a European Reporting System, based on the DGIII - IDA initiated EIONET Telematics Network. The Reporting System includes the elements needed for efficient flow of environmental data and information between the 500+ EIONET organisations.

In the 1998 revisions of the EEA regulation, EEA's role as a Reference Centre for Environmental Information is reinforced, and developing the European Reference Centre has been identified as one of the main priorities in the EEA Second Multiannual Work Programme (1999-2003). The Reference Centre includes, 1) the electronically publicly available data and information held within the Reporting System, either at EEA or in Member State's EIONET organisations, and 2) various services to facilitate access to this data and information. Through the Reference Centre, EEA/EIONET also provides access to data that are developed from other sources, and are of relevance for the European environmental reporting.
At the Ministerial Conference, Environment for Europe, in Århus 1998, the EU and most Member States signed the Convention on *Public Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters*. According to the Convention, the parties should ensure that public authorities establish and make practical arrangements to make environmental data and information publicly available, and maintains publicly available lists, registers and files of their information holdings.
In line with the Convention, EEA aims at making the EIONET Reporting System more transparent, for the purpose of promoting public awareness and, as well, to support improved efficiency of data flows within the system.

2 From a Web site to a Reference Centre

By developing the Reference Centre, the EEA aims to establish a public information service that will be recognised throughout Europe as the main gateway to access easily understandable and well

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structured environmental information, wherever possible in the user's native language. For this purpose, the EEA is presently reorganising, redesigning and improving its present web site.

The main new feature of the Reference Centre Web site will be the possibility to navigate through the available environmental information by environmental themes. This service is mainly intended to support the general user in its search for environmental information. For the more advanced user, and users with specific experience and needs, another section of the Reference Centre will include a number of services for information retrieval (listed below).

For the purpose of allowing thematic navigation through the Reference Centre, the Web site has to become a dynamic site, in which its content is properly indexed and managed in a database that contains the necessary metainformation. We see the increased emphasis on proper metainformation and metadata is a key to build as successful system, as well as in general to establish better information and knowledge retrieval on the Internet.

Both EEA and the EIOENT member countries already held numerous catalogues/directories of environmental information. The Catalogue of Data Sources (CDS) is the official register of authoritative information held and distributed by EEA. Many Member States have national systems for the same purpose and many individual organisations do also have numerous files of their holdings.

The main challenge of the Reference Centre will be to integrate the isolated catalogues with the content management system of a dynamic Web site, in which the information resources and the metainformation are kept together.

The distributed catalogues will also have to be brought together to become searchable via common interface and one access point. The distributed files / registers are maintained in different formats, although with many similarities. Through the G8 Information Society Initiative, a Global Environmental Information Locator Service (GELOS) has been defined. The definition provides guidelines for data format and adopts the ISO 23950 (Z39.50) as a standard protocol for search and retrieval of environmental information. The CDS has adopted the GELOS definition, as have many national catalogues in EEA member countries. The definition includes a number of core elements for describing information resources and through the GELOS schemas, information in similar formats can be mapped to GELOS, for retrieval through a common gateway, without interfering with the individual system's architectures.

3 The main services of the Reference Centre

The services of the Reference Centre open different views, serving the different users needs, into the content of the Reference Centre:

CDS:
The EEA's official catalogue of authoritative information, for example the EEA publications, as explained above.

GELOS:
The Global Environmental Information Locator Service, including a list of environmental events, links to environmental Web-sites and search in national catalogues, as explained above.

Thesaurus and Glossary:
A multilingual search facility, allowing the users to use their native languages to find information in other languages. This service will be based on GEMET (the General Multilingual Environmental Thesaurus) which was developed by the European Topic Centre on Catalogue of Data Sources on behalf of EEA. GEMET was developed for the purpose of harmonising environmental terminology and facilitate retrieval of environmental information across language barriers. The GEMET includes some 5000 environmental terms which have been translated into 12 languages. Although the primary application of GEMET has been the indexing of CDS entries it will also have a more general role in the Reference Centre by offering multilingual search in the full-text index of the Reference Centre Web site and national Web sites linked to the Reference Centre.

Data Warehouse:
Access to data, graphs and maps used in EEA periodical reports. The Data Warehouse contains the datasets used for deriving the stable indicators in the regular environmental reports. The datasets contain aggregated data, typically on a country level, which are time series with a regular update cycle and a geographical coverage of at least EU15. The aggregated data are extracted from the databases in the European layer of the Reporting System, as far as possible by (semi)automated procedures using the EIONET Telematics Network. Metadata for the datasets are maintained within the Data Warehouse. The data in the Data Warehouse are made publicly available, if there are no constraints to that specified by the data owner.

SERIS:
The State of the Environment Reports Information System, includes documentation of state of the environment reports in European countries.

ROD (Reporting Obligation Database):
An overview of moral and legal environmental reporting of EEA Member Countries to the Commission / Eurostat / OECD and International convention (planned for year 2000)

STAR (Sustainability Targets and Reference Database):
An inventory of current environmental policy targets and sustainability reference values (SRVs) which apply in the countries of Europe of the EEA Area.

EnviroWindows:
Service (mainly for SMEs) for supporting the implementation of environmental policies, initiatives, or voluntary actions that may improve the environment in Europe.

The European Community Clearinghouse Mechanism for Biodiversity:
Service to be set up in accordance with the provisions of the UN Convention on Biological Diversity – allowing sharing of biodiversity information held by Community institutions and establishing links and interoperability with national CHMs and other international information sources.

BLACK SEA WEB, a Demonstrator for Black Sea Marine Environmental Management Support System based on Telematics

Peter Davis[I]

4 Introduction

Marine environmental management and assessment on the regional scale normally require multinational effort by the states bordering the sea area in question. Such integrated management and assessment can be effective only if there is a high degree of compatibility, accessibility and interchangeability in marine environmental data and information in possession or obtained by the different countries and organisations carrying out investigations in the concerning sea area

4.1 Requirements and tools for integrated marine environmental management and assessment

Water managers and policy makers want to be informed about the situation. For the execution of integrated regional marine environmental management facilitating tools in information strategies are required. An effective tool is a so-called Marine Environmental Management Support System. Such a system requires qualitative controlled data; these are the source for decisions. With these data the state of the art of marine ecosystems in the past can be compared with predictions, as well as input data (geographical information, water quantity and water quality data) can be obtained for numerical models.
In general data are available in digital form, but not always in possession of the organisation which needs these data and information and most of time these data are not available in the required format. A direct and uniform access to external regional data (bases), based on Telematics, is of great importance.
Besides, water managers have to deal with different kind of data (sets). These datasets must be combined with other data types and information sources. All this information should be embedded in a dynamic GIS-based Management Support System with a user-friendly interface. The Management Support System should provide the user an interactive working model, integration at various scales, viewing output in time and space and comparison of input and output data. To build and validate the application, access to meta-information should be possible.

4.2 Current practices in the Black Sea Region

The Black Sea is an almost closed sea being bordered by countries with intensive agriculture and several harbours without or with very limited water treating capacities. This anthropic pressure has a very important impact on the Black Sea environmental state. The main activities of administrations (organisations) in the Black Sea Region are related to the ecological functioning of the Black Sea. This implies the biological, chemical and physical functioning of the marine ecosystem. The physical and administrative area related to the Black Sea ecosystem and its environmental problems may vary from a part of this region up to several countries bounded on the Black Sea. Moreover, there is no (direct and uniform) access to each other's data as well as uniform tools (Management Support System), which complicates the execution of an adequate integrated marine environmental management of the Black Sea Region.

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Active measures have to be taken by riparian countries, to improve the endamaged state of the Black Sea ecosystem. The action plan for saving the Black Sea can not be realized without a real time information on the ecological aspects within the region. Black Sea Web could provide such information and help the decision-makers in their tasks to implement an adequate integrated marine environmental management of the Black Sea Region.

4.3 Adequacy of current practices and tools for integrated marine environmental management in the EU

Given the not direct accessibility and uniformity of regional marine environmental data, as well as not being available of uniform and adequate management applications and tools for integrated marine environmental management of the Black Sea Region, it is clear that data-access and integrated marine environmental management may be improved by application of (innovative) practice tools and management systems from EC countries.

5 Project Objectives

The Joint Research Project aims to develop a Demonstrator for a Black Sea Marine Environmental Management Support System based on Telematics (Black Sea Web). The main objectives are:

a) Deploying of a telematics solution helping local and regional bodies around the Black Sea implementing integrated marine environmental management, describing what information is available at what location and providing IT systems (Internet techniques) with automated procedures to access the actual information:
    * The (innovative) design of a Demonstrator for a Black Sea Marine Environmental Management Support System (Black Sea Web) to have access into each others data of organisations dealing with marine environmental data of the Black Sea, on an independent base and maintaining the control of their own data. This concept results in several connected databases, which are physically separated, but appear as one.

b) Capability for the implementation of different types of integrated environmental information management through the use of a Central Meta Directory.
    * The (Innovative) Design of a Central Meta Directory (CMD) as central element of the system, considering the guidelines of the Catalogue of Data Sources of the European Environment Agency. The CMD describes what information is available at what location and will be installed as a World Wide Web Server (WWW), and will be supported by applications based on a Geographical Information System (GIS) for geographical interfacing.
    * From the CMD and GIS users can search for relevant data and information. The system will provide automated procedures and telematic solutions (by the Internet) to access the actual distributed databases and to locate and bring out the required data.
    * The distributed database model will be based upon CORBA-software architecture; the telematics/transport model upon Internet techniques.
    * The Demonstrator will focus on two separate databases, maintained and managed by different partners from different countries along the Black sea:
        - The Black Sea database of Marine Hydro physical Institute in the Ukraine, containing physical and geo-chemical data on the marine Black Sea environment.
        - The database of the Romanian Marine Geology and Geo-ecology Centre containing geological and geo-ecological data.

c) Facilitate the search for and access to specific environmental data by several well-developed navigation systems.
d) Developing a Marine Environmental Management Support System, which can be used for a wide variety of environmental topics and management levels.
e) Increasing velocity and quantity of environmental information available through the use of Black Sea Web.

6 System Architecture

The Demonstrator consists of the following elements:
a) Remote Access Module
b) Central Meta Directory and other Directories
c) Application Layer

6.1 Remote Access Module

Objectives
Providing the (scientific) user with a tool to search a number of heterogeneous databases from the World Wide Web (WWW) using a standard WWW browser.
The user will be able to query a Central Meta directory to identify a number of distributed catalogues, which is of interest of the user. The user will then be able to formulate queries to the different catalogues using menus, forms and possibly cartographic information. The user does not need to know anything about the location of the catalogues as well as he/she does not need to know the query language used at sites where catalogues are located.

Technical approach
The Remote Data Access module of the Black Sea Web consists of the following parts:
a) Scientific User Client Software
The client software consists of a World Wide Web Browser like Netscape, Mosaic or Microsoft s Internet Explore. The user will use the standard WWW Browser to access the Central Meta Directory where he/she is presented with information about available catalogues and their fields.
The user will be presented with a number of pages, which will enable him to locate the data on one of the distributed catalogue servers. When the data has been identified, the user can fetch the data directly from the server if the data are available via the network, or he/she can send a request to the data provider for data.
b) Distributed Server Software
The distributed server software will be located at the computer which holds the distribute catalogues i.e. at the different Data Centres. The local catalogue will be accessed through a local query engine with a uniform query interface (UQE). The UQE interface is used to hide the implementation layer of the different catalogue servers. Thus making the different heterogeneous catalogue servers appear as homogeneous servers that can be accessed through the same routines: e.g. AWhich catalogues will return a list of catalogues which is available at the server or those matching a specific keyword. AWhich Fields will return a list of valid fields for a given catalogue.
c) Local Query server
The local query server receives uniform queries from the Central Meta Directory via the WWW. The local query server takes the uniform query and converts the catalogues and fields in the query to the local presentation of the catalogues and field names by using the mapping catalogue. After the query has been converted, the query is executed against the local catalogue(s). The result of the query is passed through the result conversion layer, which is also using the mapping catalogue to convert the

fields from the local presentations to the external presentation. This will ensure that results from two local query servers, which contains the same kind of data, will be represented in a uniform way with the same names and in the same units.

6.2 Central Meta Directory

Objectives
To provide a search facility, which can search on multiple databases of marine environmental catalogues, these databases being geographically distributed and heterogeneous.
To provide a facility for on-line retrieval of marine environmental datasets (when accessible), integrated with the search facility.

Technical approach
The Central Meta Directory contains the information about the contents of the distributed servers, like which catalogues of data sources from a server and more detailed information about the catalogue, like what information is available at what location.

The Central Meta Directory will provide the (scientific) users with forms to be able to query the catalogues. At least two top-level query forms will be provided for the user:
* forms based queries
* cartographic queries

The Central Meta directory will be embedded in the Black Sea interface that will be largely based upon a Geographical Information System for geographical interfacing. The Central Meta Directory will be installed as a World Wide Web server.

The user does not need to focus on the location of the catalogues, as the Central Meta Directory will distribute the query to be involved distributed servers. The results from the servers will be returned to the users WWW Browser.
The Central Meta Directory is updated automatically at a regular basis, for example once per month or when the data manager at the Central Meta directory simply activates a command which will query the known servers to get information about the catalogues and fields available from the server. The information is stored in the Central Meta Directory to limit network access and to have a central access point to the different distributed catalogues.
The Central Meta directory will contain a program, which makes it easy to add new servers if they comply with the UQE interface specification.

6.3 Application Layer

Objectives
To provide application facilities for processing and presentation of data and information, largely based upon a Geographical Information System (GIS) for geographical interfacing.

Technical approach
The information demand will be focussed on spatial information, available in various table formats and locations in various scenario and interactively specified regions. It should be possible to view the output per grid cell and for the total region, to view it at various moments during the scenario and to view the differences between two scenarios.

The information demand of users that are implementing and validating applications is related to the requirement to integrate various geographical information sources as input for the process model. It should be possible to view the various source data, to view the converted source data that feed the model and to compare the results. Another part of the application is aimed at the interactive presentation of data.

The GIS will have the following functionalities:
- pre-processing of input data (spatial selection and combination and data integration, retrieval, and conversion)
- numerical processing (running of numerical models)
- post processing
- presentation (visualisation, animation, overlays, spreadsheets, word processing)
- analysis (spatial analysis and statistics)

The application layer should be able to link raw information as well as derived products with various datasets and data layers, numerical models, etc. and will encompass the overlaying of various data types: raster, vector and numerical. In general the datasets can be subdivided as follows:
- administrative data (borders of countries, restricted economic zones, etc.)
- topographic data (watersheds, rivers, seas, cities, etc.)
- geo-thematic source material (optical or microwave remote sensing data)
- processed geo-thematic data (sea surface temperature, etc.)
- geological/geochemical/geo-ecological (monitoring) data
- bathymetry data

7 Partners Involved

Marine Information Service MARIS, Netherlands (NL)
Project Management/Development Central Meta Directory/Co-ordination Development
Demonstrator Black Sea Web/User Consultation
Moscow State University (MSU), Russian Federation
Development Application Layer/Development Central Meta Directory/Implementation, Testing and Promotion
Marine Hydro physical Institute Sebastopol (MHI), Ukraine (UA)
Development Remote Data Access/Development Central Meta Directory/User Consultation/
Testing of System/Implementation, and Promotion
National Institute for Marine Geology and Geo-ecology Bucharest (GeoEcoMar), Romania (RO)
Development Remote Data Access/Development Central Meta Directory/User Consultation/
Testing of System/Implementation, and Promotion
TERMA Elektronik A/S Birkeroed, Denmark (DK)
Development Remote Data Access/Implementation, Testing and Promotion
Netherlands Institute of Applied Geosciences Haarlem (NITG), Netherlands (NL)
Development Application Layer (Presentation Tools)/User Consultation/Testing of System

City Information, A Digital Environmental Information System for the public

Markus W. Spring[I]

Abstract

The Digital Health and Environment Information System Munich exists now in it's third year. It originated from the push of the EU funded Research&Development-Project "envirocity", but first developed into a classical text-based information system on the internet. After a conventional GIS-based map-viewer a mapserver was designed and programmed in-house and shows now about 70 maps accompanied of more than 700 HTML-pages mainly of environmental topics in the intra- and internet. The classification of the needs of different user groups helps to concentrate on the most effective way to deliver information. Further cooperation with other cities and software-companies in the DG-XIII project "THE CITY" brings easier to use internet-applications and more platform in-dependence of the server-programs by using Java and XML. From the beginning the project made and still makes heavy use of free software and tries to stay free of vendor specific deviations of international accepted standards.

1 Overview: City Information in Munich

The City of Munich covers about 313 km^2 populated by 1.3 million inhabitants. As there is almost no heavy industry, the main part of environmental problems origins from traffic: About 1.8 million cars are crossing the city borders every day. Elder and sometimes illegal waste disposal sites cause serious but not numerous threat to the groundwater.

As the area of the city is populated quite densely, conservation of natural resources is very important, not only for nature itself but as well for recreation purposes of the inhabitants.

The Health and Environment Information System started with a port of the paper version of the "Umweltatlas", a two-folder compendium of maps of the state of the environment accompanied by textual explanations, originating from 1989. When the former department of environment was joined with the department of health, basic health information found its way into the digital information system.

There are two versions of a WWW-based information system at the moment: One for internal use which provides information only for the administration, and the public one in the Internet. Both arise from the same textual and alphanumerical database, which is accomplished by the use of SGML and conditional compilation into HTML pages.

To inform about the air pollution level, the web-pages are updated every 30 minutes. Daily messages are sent by fax to newspapers and radio stations. If a critical level of ozone is reached, immediate email messages are sent to everyone who is interested. This information is provided via telephone as well.

The internet information is now available for every citizen and tourist at the infokiosks, computer equipped columns at frequented places of the city. 1999 we do not use screen panels in the subway for real-time information about air pollution as we had a drastic cut in the available budget.

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2 User needs vs. Available Information

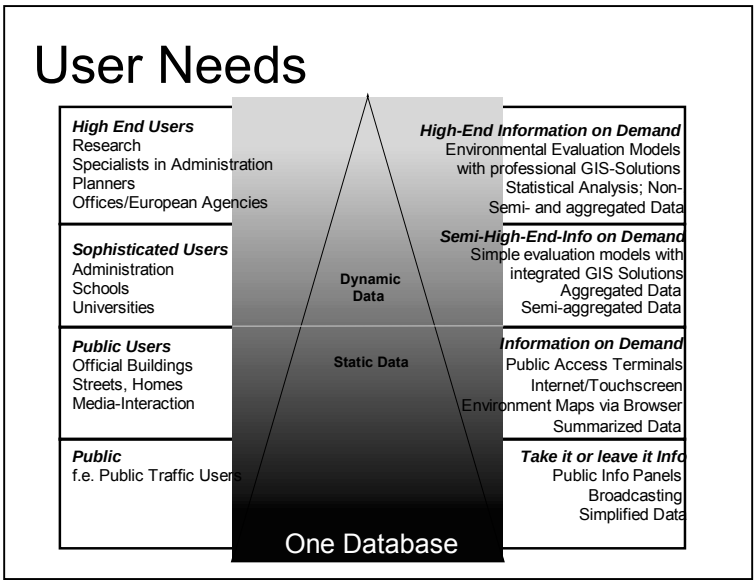
The themes for environment and health information were chosen by an intra-administration expert group. Availability of data and possibility of publication played a major role in this first phase of design. As the internet as additional publication medium became available, measurement data was added for online information of the public about air pollution. The intellectual level of the created texts was quite high, which did not help spreading the usage of the paper "Umweltatlas" as a information source for greater parts of the population.

2.1 Categories of user needs

When migrating to web based environment information, it was realised that this medium offered the possibility to further differentiate the offered information according to the user-types and user wishes. As the WWW is a typical pull-medium, it is hoped that good structured information can give the necessary simple facts to those who want quick information, but provides the details to the more interested.

2.2 User wishes

To identify the different user groups, their specific demands and to visualise the number of requests of each of these groups, the model of a user pyramid was created.



Public information at the base gets the most simplified, easiest to perceive information – and is the most numerous target group, whilst on the top we have only a very small number of recipients for our information, but the cause very hard and expensive efforts to fulfil their needs.
At the moment the Health and environment Information System Munich covers the needs of the levels one to three (bottom-up). In level three only the results of off-line calculations oft the air pollution models are available.

Administrational and political demands
Administration always demands to cut costs, while politics wants the best visualised information for the big target groups, and the specialists don't want to cut away the gory details of their texts.
A WWW based information system reaches at the moment a still small but fast growing audience which is considered to be important especially in terms of economic power and leadership regarding public opinion. Therefore the Department of Health and Environment sees the costs of the information system as justified. Page hits, as cautious as they have to be interpreted, can help a little bit in showing the importance of electronic information.
Comparing costs of classical paper oriented environment information and an internet based system, the digital system tends to be cheaper per customer contact.
Information depth can be improved without a rise of costs as the Department of Health and Environment now experiences in the field of publication of ground water data: Supported by an EU DG XI

project, data of about 10.000 measure points of the ground water of Munich is going to be held in a database, parts of which will be made accessible through the digital information system

2.3 Implementation barriers

Administration is not the easiest terrain for implementing a new electronic information system. Administration sometimes tends to be slow, unimaginous, thinking in paragraphs, re-chewing every semi-colon of given information and for the worst, thinking that it is the only one and legal owner of collected data.
Implementing an electronic information system means to overcome classical publication rituals of modelling data and to show the possibility of giving access to raw data. A perpetual example for this process is the almost annual discussion about the how-to-publish (air) pollution data. The Department of Health and Environment has decided to publish raw data accompanied by text which help to interpret the data, instead of restricting itself to a simple 'traffic light model', to oppose the fear that the held back data would signalise something dangerous. An european "freedom of information act" would be of great help in the process of convincing administration that data collected with tax money has to be given back to the public.
An unsolved problem is the fact that especially emission data is considered a property of the declaring company. As long as politics does not decide in an other direction, this data has to be held back.

2.4 Using feedback

The paper version of the "Umweltatlas" caused a big reflux of letters. Some proposals were useful, many of the wishes were impossible to fulfil because of the sheer quantity of work the would have caused. Originating from this experience the Department of Health and Environment does not have a formal feedback system for our web-pages.
Looking too much at feedback seems to be a bit problematic, as there is no way to find out how representative the received statements are. It remains a critical question how much importance of feedback is acknowledged, the department tends to prefer own development strategies over user suggestions for new themes.

3 Development of the Health and Environment Information System

3.1 Project "Envirocity"

This DG-XIII project brought the first approach to electronic publishing of geographical data. The developed map viewer was designed for stand-alone-PC's and did not integrate into a browser based information system.
For our Department this project was the first and most important push to develop an electronic public information system with textual, alphanumerical and geographical data. While the viewer was used only for a short period due to the upcoming internet hype, the then developed SGML-tools for textual information are still in use. The software tools for this task are purely public domain. They were chosen not only because of their (no-)cost effectiveness but as well because of their platform independence: They are available for Windows 32-bit platforms as well as almost every UNIX and VMS. The generated HTML conforms to the W3C-Standards and can be adjusted to meet the needs of almost every browser.

3.2 Mapserver

A spin-off of this project was the later availability of an internet-enabled map-viewing software component, "mapobjects" (ESRI). From this toolkit a mapserver-software was programmed and implemented, which uses ArcView (ESRI) as a rapid development tool for the design of the maps. The

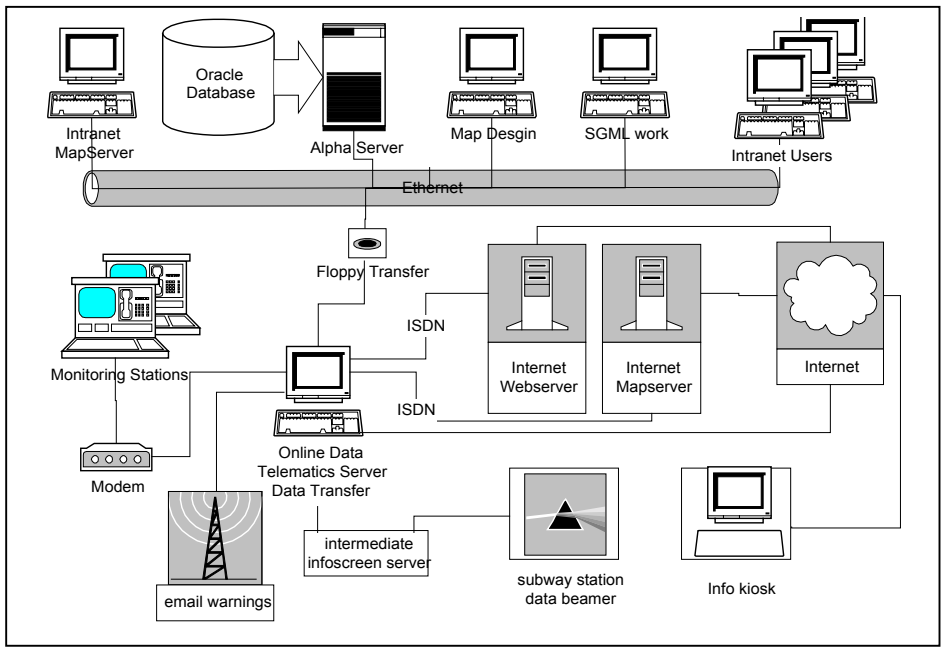
mapserver is based on object oriented technologies. Its output can be displayed with any browser, it makes use of simple javascript to accommodate the handling. It does *not* need any plug-in at all. Basic functions like zoom and pan do not rely on more than pure html/cgi at all.
For the Department of Health and Environment this was a major design goal as the necessity of plug-ins proved to be a major obstacle accessing foreign geographical databases, especially in a software environment where the ordinary user is not allowed to modify his runtime-environment.

3.3 Project "THE CITY"

Thematically close to the project "Envirocity", in this project a co-operation of ESRI, the University of Athens and the cities Antwerp, Athens and Munich is developing the next generation of mapservers. Two targets are going to be pursued: First, greater operating system and hardware independence will be obtained by switching to java, second on-line processing capabilities are going to be provided especially for dynamic routing according to the air pollution situation.

3.4 Current hard-/software environment

The Department of Environment does the main cartographic and textual work in house with PC's and an UNIX server. For security reasons we have no direct access to the internet, this will be accomplished by a firewall until the end of this year. Webserver and Mapserver are kept secret for organisatorical reasons. A central telematics server provides polling and pushing services to get and re-distribute online data. At the moment it uses Windows NT, but a switch to Linux is considered in order to gain more stability; same is true for the mapserver.



4 Lessons learned

Public domain software provides valuable and platform independent tools which compete in lifespan with the textual data they are used on. Using high level and wherever standardised interfaces for text and database instead of vendor specific tools made the project Digital Health and Environment Information System Munich easy to maintain and develop.
Having a small nucleus of devoted promoters of a digital information system, it is possible (while a long and tedious process) to persuade the own administration of the benefits of a digital information system. When taking part in R&D co-operations or outsourcing development projects it was absolutely necessary to build up in-house knowledge and high qualified manpower in an adequate degree to the foreign done work. For the Department of Environment and Health this turned out to be the only way to profit for a long period of the work and money invested in the development of an digital information system.

Use of Telematics for Emergency and Disaster Management

Michael Hadrbolec[I], Konrad L. Zirm[II]

Abstract

Disaster management and information depend to a great extent on the availability and efficiency of telematics. This is a brief overview over the recent developments in this subject, its demands and deficits. Furthermore, as an example for telematics application in disaster management, the concept of the Global Environmental Disaster Information System, GEDIS, is presented.

1 Background

The general tendency of the annual global economic costs and life losses, related to disasters, rises from year to year. Each year, on average, disasters world-wide kill more than 133.000 people, and make more than 140 million homeless. In 1996, financial losses of approx. 440 Billion Dollars were reported by *Flannery, 1997 et al.* Progress in disaster prevention, prediction and warning capabilities allows to decrease the loss of lives and property. However, there is a tendency that disaster costs are still rising.

Nowadays, more information about disasters and hazards is being released than ever before. There have been major improvements by using data from satellites, ground based networks and telecommunication. Moreover, the rapidity of information transmission is increasing due to the Internet. New communication satellites provide opportunities to use e-mail, telephone service and others in almost any part of the world. The application of remote sensing systems, air-borne and/or from space in combination with GIS-systems allows completely new perspectives for the analysis of disaster cases as well as for training, prevention and mitigation. In this context, telematics provide the necessary transfer of information and data between different services, sensors and applications.

2 State of the art at European level

Fax and telephone are still the preferred tools of communication between the different disaster relevant authorities. Daily thousands of pages are transmitted between administrations via fax. To our knowledge, in rare cases e-mail, normally without encryption, is used for the regular exchange of information between administrations in national and international organisations. In critical situations and acute disaster cases, modern technologies do not seem to be reliable enough, so that a “fallback” to past technologies is probable.

Generally, an enormous lack of interoperability and interconnectivity in the information and communication flow of disaster management can be found. Beside the communication problem, major gaps are in the field of gathering information, database access and specialised disaster meta-information availability. Last but not least, we face major problems when accessing and exchanging information in different languages.

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3 International information activities

Many organisations have the objective to improve disaster information for the purpose of reducing the loss of lives and property. One of the most recent initiatives, the Global Disaster Information Network, GDIN, is promoting the development of new and reliable tools and methods for potential users of natural disaster information sources. GDIN is an initiative of the US State Department; an international conference has recently been held in Mexico City, where a number of international work groups have been established to harmonise global activities in fields such as Technology & Systems Engineering[4].
Another important progress can be seen in the establishment of the "Tampere Convention 1998" which provides the legal framework for the use of telecommunications in international humanitarian assistance. Until May 1999, the Convention has been signed by 37 countries *(H. Zimmermann, 1999).*

4 Potential Benefits from Telematics

The revolutionary development in the field of Telematics during the past years has fostered systems and services in the area of applied disaster information and management. Multimedia applications (text, images, audio and video) in combination with the Internet break the barriers between traditional and advanced communication technologies. Furthermore, new ways of communication were established like the Internet, satellite based and cellular telephone communication.

5 Resources

Presently a multitude of sensors and devices have been developed to collect environmental information, watch negative impacts on the environment; and we hold a large number of data bases describing all kinds of negative effects on human health. Although we have an increasing number of tools to treat and analyse data, to forecast impacts, to communicate and to disseminate information there are great difficulties to access and use the data since

- Good information is expensive,
- Data-sets are often confidential, and
- Interoperability is lacking since
- standards for integration, fusion and overlaying in order to generate added value are missing.
- Terminology and other languages applied lead to major problems in communicating in difficult and stressing situations.

6 Needs of Disaster Managers

The whole disaster management cycle requires support from telecommunication. It is evident that more lives and property could be saved if more efforts would be invested in prevention, preparedness, training and crisis management. Therefore, important efforts have been made to strengthen the pre disaster stages (i.e. risk analysis tools, early warning of citizens in the disaster prone area, etc.).
They need mainly during all stages of the disaster management communication and information resources (access, fusion, overlay, view, exchange, share, notify, etc.) in an easy to use, fast, reliable, confidential and cost effective way.
In order to make the appropriate decisions in this field the new arising telematics applications are perfectly predestined.

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To go further into the details of the usage of telematics technology for disaster management we give a brief introduction in our submitted RTD project proposal GEDIS (IST 5th Framework program).

7 Global Environmental Disaster Information System (GEDIS)

GEDIS**,** the **G**lobal **E**nvironment **D**isaster **I**nformation **S**ystem is a **new integrated system** for confidential, reliable emergency communication and coherent disaster management information support.
This system will aim to overcome existing information access and communication deficiencies by using advanced **user-friendly, Internet** based, **multilingual** and **multimedia telematic** technologies (including tele-/videoconferencing and remote interpretation).

8 Basic GEDIS System

GEDIS is a distributed client-server system. The internal and external communication flows are confidential and ensured through the use of the best-available and/or most appropriate broad band telecommunication technique (fixed, mobile, satellite based, ...).
The basic system is equipped with security, communication (tele- and videoconferencing, data-exchange sharing and notification) and data-access utilities, as well as multilingual support and real-time GIS tools.
In addition, the basic GEDIS system will allow confidential and reliable communication with other GEDIS systems via a docking mechanism. This opens the possibility for establishing regional, national, and international disaster management networks.

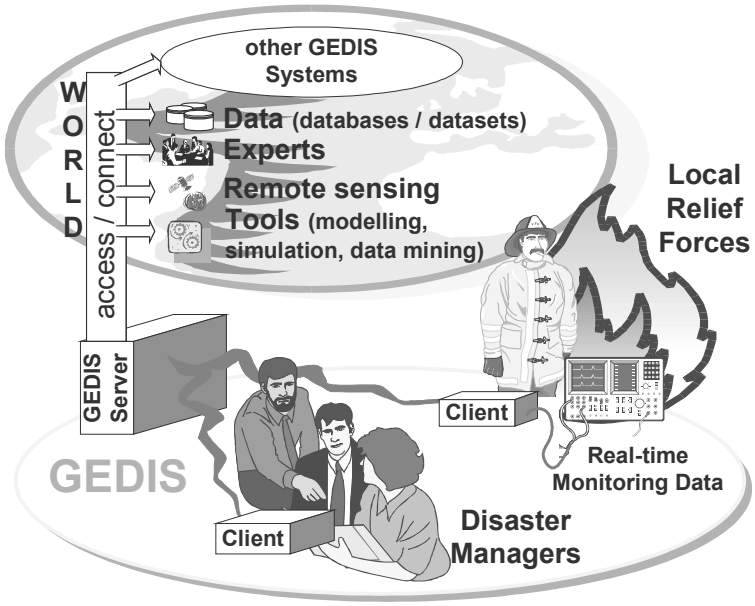

Fig. 1: GEDIS overview

9 Tailored GEDIS Systems

Since an ultimate, all-including disaster information support and communication system is not feasible, a modular approach will be the GEDIS development paradigm.
Additional functionality, needed by a user, is provided by tools tailored to specific user needs, to be encapsulated as plug-ins (in short "*application-specific plug-ins*"). The well documented, modular, open architecture of GEDIS allows extensions by compatible plug-ins. This approach allows the interoperable interconnection of existing or available disaster specific information resources such as (legally) fixed and quickly deployable monitoring networks, mobile and remote sensors (including

satellite data), as well as relevant simulation tools (forecasting, risk assessment), knowledge bases and decision support systems. A GEDIS implementation will typically include the basic system and one or several related application-specific plug-ins.

10 GEDIS Features at a glance

- GEDIS supports the entire disaster management cycle from prevention to post crisis phase. The system's well-documented, open, scalable and adaptable architecture allows to tailor a GEDIS implementation for nearly every requirement of a disaster manager by integrating/plugging-in application-specific tools in the GEDIS basic-core system.
- GEDIS accepts input from fixed and mobile sensors for real-time data collection, including acquisition on demand of (near) real time remote sensing data.
- GEDIS allows to process, integrate, add value and visualise (using the advanced, real-time, internal GIS capabilities), system-internal and (predominantly) system-external information resources, be them available yet or forthcoming. These include information inventories and on-line accessible forecasting, risk assessment and decision support tools. Critical-phase disaster management support is provided by real-time command and control tools.
- The system employs standard, state of the art (fixed, mobile and satellite-based) telecommunication networks to ensure a broad band reliable information and communication flow.
- GEDIS lays the foundation for an Internet based early warning system for the citizens in a disaster prone area.
- GEDIS' open architecture unfolds the market for third party vendors of relevant tools and data-sets and thus contributes to establishing a European standard in the field of disaster management.

11 Conclusion

Disaster do not respect boundaries of technical disciplines, countries (languages), hierarchies of institutions etc. Therefore, we experience an urgent need for an integrative unifying approach to serve the very heterogeneous requirements of disaster managers and satisfy the demand of safety and high expectations of the European citizens in a disaster situation. The Tampere Convention which will enable an easier international co-operation in actual disaster cases and training. However, there is a lack of systems especially dedicated to the needs of the disaster management. GEDIS will hopefully solve some of those problems when it becomes available. One of the potentially driving forces within Europe could be the Commission itself which is preparing the new phase of the IDA 2000 program (Interchange of Data between Administrations, DGIII). In addition, it seems important to aim at an international or even global co-operation which can be intensified by an advanced exchange of information and experience with organisations such as the UN (OCHA and others) and with initiatives as GDIN from the United States.

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TELEmatics Assisted Handling of FLood Emergencies in URban Areas (TELEFLEUR)

Antonis D. Koussis[I], Kostas Lagouvardos[II]

http://www.gein.noa.gr/telefleur

Abstract

Several Southern European urban centres situated in basins characterised by steep topography and short hydraulic response time experience catastrophic floods when exposed to severe storms. In view of this problem, and in order to reduce the impact of the flooding a solution idea is the implementation of emergency response plans. The whole project is based on the implementation of a Command Centre that will gather real-time data, produce meteorological and hydrologic/hydraulic forecasts of the evolving phenomena and finally, based on the knowledge of the drainage system, will provide an integrated information to the public authority. Then the public authority will be able to allocate resources for optimal emergency control.

1 Objectives of the project

The objective of the "TELEmatics Assisted Handling of FLood Emergencies in URban Areas (TELEFLEUR)" project is the development of a comprehensive operational system for handling urban flood emergencies that synthesises cutting edge telematics technology with advanced forecasting of meteorology and hydrology encapsulated in a Decision Support System (DSS).
The consortium that has been formed in the frame of this project is structured as follows:

- National Observatory of Athens (Greece) - NOA
- Universita di Genova, Dipartimento di Fisica (Italy) - DIFI
- IHE- International Institute for Infrastructural, Hydraulics & Environmental Engineering (Netherlands) - IHE
- Ingenierbuero Brand Gerdes Sitzmann Wasserwirtschaft GmbH (Germany) - BGS
- Water Corporation Athens, Directorate for Sewage Works (Greece) - WCA
- Regione Liguria - Struttura di Protezione Civile (Italy) - RL
- New Technology System Design Commercial & Construction Co. S.A. (Greece) - G-System

The utility of a validated, integrated system shall be demonstrated in Athens (Greece) and in Genoa (Italy). Both cities have experienced severe floods in the past due to their complex topography (which plays an important role in the enhancement of precipitation) and to the short hydraulic response time of the basins where the cities are located. Substantial government support has been secured at both sites. Regione Liguria already operates a flood forecasting centre in Genoa and is interested in enhancing its capability, in the frame of this project. The Water Company of Athens (WCA), which has the support of the Hellenic Ministry of Environment, Physical Planning and Public Works, aspires to establish such a capability.

A schematic representation of the proposed integrated system is given in Fig. 1. In brief the system demonstrator will have the capability to:

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- manage the dynamic information provided by telemetry;
- feed the dynamic data along with the relevant static data (topography, land-use/ground cover, etc.) into models;
- forecast flooding conditions and flood risk estimates;
- assist authorities in decisions regarding emergency measures (DSS), proposing actions for avoiding flood episodes or for minimising their consequences, and in restoration actions.

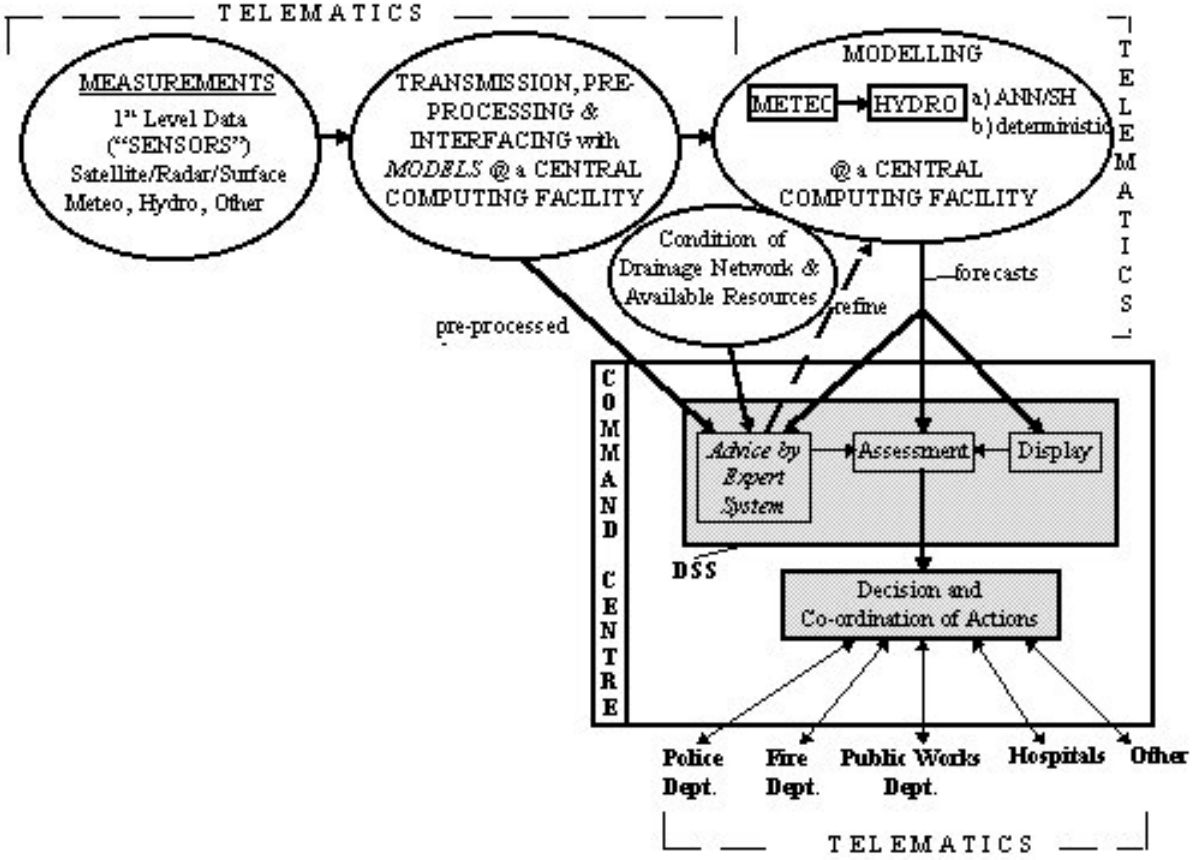

Figure 1. Schematic representation of the proposed integrated system

2 Implementation of the project

The project started on February 1998 and will have duration of 30 months. In order to meet the project objectives the following steps were followed:

- The user needs of an urban flood forecasting tool have been assessed.
- Up-to-date meteorological models have been tested in Genoa (Italy) and are currently being tested in Athens (Greece).
- The hydrologic/hydraulic analyses of the relevant catchments and associated drainage systems and the validation of the models are in progress.
- The Command Centre already exists in Genoa and has been designed for Athens.

- The communications protocol between the various sources of relevant information (measuring stations, databases, etc.) has been defined for Athens and has been described for Genoa.
- The front end of the Decision Support System of the telematics demonstrator has been developed.

For the demonstration phase in Athens a mock-up of the system will be installed and operated at NOA. The design of the *Command Centre* for the Athens Demonstrator was derived through:

- Interaction with the public authorities responsible for flood emergency handling, especially the Water Company of Athens, partner in this project, and the General Secretariat for Civil Protection (Ministry of Interior).
- Audit of the sources of meteorological and hydrological data and of the means for remote access to and communications with databases and monitoring platforms.
- Audit of the organisational infrastructure required for the co-ordination of the human and technological resources in order to deal with flood emergencies.
- Audit of the flood forecasting system applied by Regione Liguria in Italy (CMIRL, Centro Meteo-Idrologico della Regione Liguria).
- Own analysis of past problematic experiences in Athens.
- Study of the literature and collaboration within the TELEFLEUR Consortium.

The main functions of the Command Centre, include:

- receiving meteorological and hydrological data, via telemetry, from all types of sensors (e.g., satellite, weather radar, rain gauges, stage gauges) and processing these data dynamically;
- receiving numerical model data;
- handling of data (input to models/output from models, storage in databases, statistical processing and display, accessing information from other relevant data bases);
- receiving and sending information about status of operations and issuing of orders for actions, so that communication with authorities and public service organisations can be optimised, throughout the life cycle of an emergency;
- issuing communications to the individuals, organisations, mass media and public authorities, each cleared for access at different levels of information, via appropriate, officially approved channels, e.g., the Internet, before, during and after a severe event;
- forecasting weather and flow on the basis of numerical simulations with meteorological and hydrologic/hydraulic models operating on suitable computing platforms, with appropriate display and printout of results;
- operating a Decision Support System as objective “advisor”: evaluate measurements and simulation results data and decide on the guidance to be given to and measures to be taken by the user of the telematics product, in order to handle a projected flood emergency (assist authorities in their actions until restoration to normality, administrative and technical, based on established watch/alert, warning and alarm status levels). The current stage of the prototype contains several modules that include graphic user interfaces for data input, information display with background maps, graphic information about flooding, generation of flood statements, and a mail composer to send warning statements

The cost-effectiveness of the system will be judged by calculating the hardware, software and installation cost of the demonstrator at a particular site. Then the demonstrator will run with past flood in-

put data; the degree of prevention will thus be evaluated and hence the savings in damages. It will then be possible to calculate a payback period, clearly showing the cost-effectiveness of the system.

3 Expected results

The results of the demonstrator would be employed directly by the users, in order to handle flood events successfully. This shall lead to better organisation of preventive actions against floods, the optimal distribution of the available manpower and equipment of the civil defence and the efficient organisation of restoration actions. If the operation of the demonstrator is judged successful then it can be used by other authorities (such as the Water Company of Athens, the General Secretariat of Civil Protection).

The system will be transferable to any urban area, since the demonstrator can be customised by entering the new geophysical and constructional details of the area, and by tailoring the rules and procedures of the DSS to the idiosyncrasies of the particular urban administrations and authorities. The communication protocols and interfacing software are to be tuned to the hardware requirements of the individual tasks. The meteorological forecast is implemented under UNIX environment while the remaining features are PC oriented. Therefore a maximum interoperability across systems and countries is guarantied.

DEDICS a TeleGeoProcessing and Intelligent Software Agents System for Natural Hazards Prevention and Fighting

F. Guarnieri, A. Jaber, and J.L. Wybo[I]

Abstract

This paper presents the development and the demonstration of Telegeoprocessing capabilities thanks to Intelligent Software Agent technology. The application is dedicated to natural hazards prevention and fighting. It consists of a network of autonomous specialized Decision Support Systems linked through several communication networks. This R&D action is based on a project named DEDICS (Distributed Environmental Disaster Information and Control System) co-funded by the European Commission (Directorate General XIII, Telematics Application Programme).

1 Introduction

The world of Spatial Decision Support Systems (SDSS) for natural hazards prevention and fighting is rich and varied. Hundreds of software products are already available. They supply the users with a variety of information and services in many sectors of activity related to natural hazards management (database, early detection, monitoring, forecasting, crisis pre-suppression ...). Considered separately, these products bring great satisfaction to their users. However, natural hazards management needs in term of exchange of information and services with others SDSS and Information Systems are growing fast, so the placement in the relationship of these tools seems appropriate to bring solutions as for the resolution of problems always more complex. Nevertheless, allowing the cooperation between already existing systems in different contexts is not easy. The developer in charge of this work has to overcome difficulties linked with the nature and the content of different products (data formats, operating systems, programming languages...). Despite obvious progress in the level of programming languages (object paradigm) the main problems to solve are related to the consistency, the communication and the compatibility between heterogeneous systems. Thus we propose a communicative and cooperative problem solving approach, based on Telematic and Telegeoprocessing technologies (ground sensors, remote sensing, Geographical Information System, radio-communication, telecommunication, modeling, spatial analysis....) and on an Artificial Intelligence (AI) model (Intelligent Software Agents (ISA)).

2 Natural Hazard and Telegeoprocessing

Many studies have more or less demonstrated the usefulness of Telegeoprocessing technologies for natural hazards monitoring and prevention, and many authors and research groups have developed prototypes of operational systems including modules for early detection, monitoring, risk assessment, simulation, advising for pre-suppression planning, natural hazard suppression decision support ... These advanced prototypes are based on the following technologies:

- Ground sensors for monitoring and early detection : monitoring and early warning of natural hazards are becoming important tools in minimizing risks due to natural hazards. Various types of sensors and cameras have been investigated on their usefulness for groundbased monitoring and

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early detection systems, such as weather sensors, flood alarms, infrared (IR) cameras (thermal or night cameras) and video cameras.

- Satellite communications are now available for telemetry and telecontrol application requiring portability and fast deployment of the remote acquisition points. These applications are characterized by an absence of infrastructure for communications in case close-to-target data acquisition is wanted, which is normally the case in emergency situation.
- Remote sensing, Global Positioning Systems and Geographical Information Systems are now widely used in the field of natural hazards.
- Modeling, Spatial Analysis and Decision Support : a number of major initiatives have taken place over the two past decades to provide computational natural hazard modeling tools enable to simulate environmental processes (forest fires, flooding, landslides, avalanches...).

3 Telegeoprocessing thanks to Intelligent Software Agents

3.1 Intelligent Software Agents, definition

The concept of Intelligent Software Agent (ISA) has been invented to facilitate the cooperation between softwares. The ISA can be a simple procedure or, more often, a more elaborate entity (several tasks in a single program, several processes in the same computer or several processes on different computers). This concept is a part of a bigger paradigm : Multi-Agents System (MAS). This paradigm is based on the share and the distribution between several agents of the totality of the knowledge and capacities of the reasoning that has an intelligent system. A MAS is therefore a distributed system composed of several agents.

3.2 Model, Language and Architecture for Intelligent Software Agents

To make a set of Spatial Decision Support Systems (SDSS) more efficient, it is necessary to conceive and to implement methods and computer models which will assist SDSS to cooperate and to coordinate their actions in the framework of complex problem solving process. The efficiency of this cooperation depends on the quality of reasoning and on the communication language that will be used inside the model of agent. The reasoning will be used inside the ISA to allow them to take appropriate decisions concerning the cooperation. The communication language is used to allow the exchange of information between SDSS in a heterogeneous environment. The heterogeneity of the environment can be considered at several levels : heterogeneity between platforms (PC, MAC, workstations …), heterogeneity between the data base and the representation of these data in each software ...

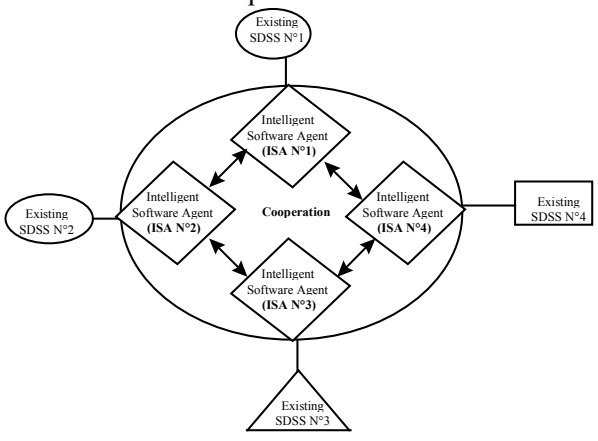

Figure 1: A system of Intelligent Software Agents

4 Demonstration on forest fire prevention and fighting

4.1 Demonstration background

In order to demonstrate both the capabilities of Telegeoprocessing and Intelligent Softwares Agents, two demonstrations have been organized in July and September 1998. The test location was in the Sophia Antipolis Science Park, a technological and research park, located in the South of Europe, on the French Riviera, between Nice and Cannes. Sophia Antipolis covers a green space equivalent to a quarter of the surface area of Paris, currently 5 750 acres. These features represent a typical case of interface between natural and urban areas in Mediterranean region. The presence in the same place of important companies and large forest areas increases the vulnerability and thus the risk of forest fire.

Three actors are involved in the demonstration (see figure):

- The Firefighters Command Center (a Command Center is located in the heart of Sophia-Antipolis), where several specialized SDSS are installed.
- The Firefighter Patrols are represented by a truck (first intervention) equipped with a GPs and radio communication system.
- A watch tower where an autonomous early detection system is installed and which communicate with the Firefighters Command Center through a satellite link.

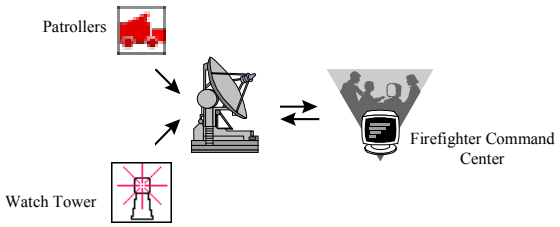

Figure 2 The actors involved in the demonstration

4.2 The SDSS involved in the demonstration

Five applications specialized in forest fire decision support are considered. The communication between the five Decision Support Systems is done thank to satellite, telephone, radio and internet/ethernet networks. We give a brief description of these systems:

- **WILFRIED:** The Wilfried system contains four dedicated modules using the data available in the firefighter's GIS: Map Viewer, Climatic Risk Assessment, Land Use Risk Assessment and Preferential Spread Area Modules.
- **LogBook SYSTEM (LB/MCI)**: This system allows the user to store all the messages received (in the Firefighter Command Center) and forwarded (to firefighters on the field) during a forest fire. These messages are organized in a Database Management System thanks to a data-conceptual model. This system provides also a synthesis of each event, and is automatically updated with each new message, and proposes some functions to contribute to the backtracking process.

- **METEOROLOGICAL MONITORING SYSTEM**: This module is based on a real-time data acquisition system. The system is connected (via modems and a telephone line) to a network of 21 weather sensors throughout in the Alpes-Maritimes region.
- **FLORINUS**: is a system specialized in communication and exchange of information between the different firemen groups on the field (Patrollers). It is used by the different kinds of operational actors to give them an exact image of events, locations (thanks to a GPs) and to provide information when and where it is needed.
- **AFFIRM**: is a prototype for early and reliable wildfire detection. The system consists of a network of autonomous terminals disseminated in the forest area and linked to the Firefighter Command Center through a satellite communication link.

4.3 Conclusion of the demonstration

This demonstration has given the opportunity to present the possibilities of Telegeoprocessing and Telematic for supporting the management of emergencies and more precisely forest fires. The introduction of prototypes of DSS components in the operational environment has been achieved and the interaction with operators has permitted to improve the performance of these applications and to demonstrate their ability to support emergency management tasks. During the discussion at the end of the demonstration, the general impression was positive and it can be concluded that this project is successful, but it should be seen as a first phase of implementation. Several attendees have proposed that a second phase should start from these working prototypes, to develop a real operational system, integrated in emergency management services.

5 Conclusion and outlook

The present paper has briefly described how both Telegeoprocessing and Intelligent Software concepts and technologies can improve decision making in natural hazards prevention and fighting. Nevertheless, this paper indicates only some main problems and criteria of the development of cooperative Decision Support Systems. A pilot application has validated the methodological and technological approach. Another pilot application, dedicated to forest fire too, is in test since July 1998 in Crete (Greece) in collaboration with the local forest fire services. As far as further development is concern, it has been planned to:

- implement these technologies in the field of seismic risk.
- concentrate our effort on a more advanced prototype of Intelligent Software Agent able to manage in the same time more than one DSS and having high reasoning capabilities.
- enter, as soon as possible, the project in the industrialization phase.

6 Acknowledgement

Commission of the European Communities, DG XIII, Telematics for Environment, the DEDICS project is undertaken by 11 partners coming from 6 European countries: ARMINES/Ecole des Mines de Paris (France, coordinator), Algosystems (Greece), Fisia-Teletron (Italy), IBP-Pietzsch (Germany), FABA-Bazan (Spain), University of Seville (Spain), OANAK (Greece), University of Turin (Italy), Technical University of Athens (Greece), Athens University of Economics and Business (Greece) and University of Coimbra (Portugal).

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Telematics Applications of the Danube Accident Emergency Warning System

György Pintér[I]

Abstract

The Danube Accident Emergency Warning System (DAEWS) was put into operation in April 1997, as an important step of the Environmental Programme for the Danube River Basin. The System provides immediate information on accidental transboundary river pollution incidents to assist the responsible authorities and water users in the downstream countries to make preventive measures in time. National Centres called PIACs (Principal International Alert Centres) were established in each of the cooperating countries, which are in close contact with the national pollution control authorities. The DAEWS is equipped with satellite communication system linked to local computer network between the units of the PIACs, equipped with unified information processing system, hazardous substances database, the Danube Basin Alarm Model for the simulation of pollution effects. International Operation Manual provides the standard operation technique in each country. During the last two years period of operation the System reported eight accidental water pollution incidents in the river basin, much less than expected. Transferable parts of the applied telematics applications in the DAEWS are in the field of data processing and management (IPS information processing system), the decision support model-system (Danube Basin Alarm Model) and also the telecommunication.(satellite communication system).

1 Background

In the 1980s and 1990s many accidental water pollution events were identified in the Danube River Basin. A significant number of these were international, while still others went unreported. In some countries these accidents on occasion required the shut down of drinking water intakes, or other precautionary measures to be taken. A clear need appeared to improve the early information about such events, especially in case of their transboundary impacts. Countries that lie in the middle and lower part of the basin that are the most at risk from this respect.

The strategic approach to this problem was to establish a system of international co-operation in the Danube River Basin which is able to provide early information on transboundary river pollution incidents. The responsible authorities of the countries affected by the impacts of such pollution events can use this information to assist the effective control and damage prevention activities on national level.

The Rhine International Alert and Warning System which has been in operation since many years, as well as the recently developed system for the Elbe River clearly demonstrated the needs for accidental pollution warning systems in river basins where important water uses are in operation (Rhine 1987). This is why the establishment of the Danube AEWS was one of the high priority actions of the Environmental Programme for the Danube River Basin (EPDRB), and was supported by the Governments of the Danube countries with the financial support of the European Union's Phare Programme.

2 Objective

The main objective of the Danube AEWS is to increase the safety of population and protect the environment in case of water pollution accidents, which have adverse transboundary impacts on the River Danube or its tributaries. For this purpose a basin-wide fast information system on emergencies caused by transboundary pollution incidents were established in the Danube Basin. The provision of

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such information enables the competent authorities to act in time to protect sensitive water users. The DAEWS was planned to cover the whole catchment area of the River Danube, including all of its significant tributaries.

The set-up of the DAEWS is in accordance with and builds-on the relevant and adopted multilateral conventions and declarations concerning the Danube or transboundary rivers. The Convention on Co-operation for Protection and Sustainable Use of the River Danube (the provisions on the establishment of communication, warning and alarm systems are stated in Article 16.) is an important one among the related international agreements as well as the conventions agreed under the UN/ECE framework. The DAEWS is also based as much as possible on the bilateral agreements that already exist between various Danube countries.

3 Set-up of the System

The set-up of the Danube AEWS is based on the principle of one national centre (called PIAC = Principal International Alert Centre) for each of the Danube countries, having the same responsibility and functionality (Delft H. 1994). There are at present nine fully equipped PIAC (Germany: Passau, Austria: Tulln, Czech Republic: Brno, Slovakia: Bratislava, Hungary: Budapest, Slovenia: Ljubljana, Croatia: Zagreb, Romania: Bucharest, Bulgaria: Sofia), all in operational stage. Three other PIAC are under establishment in the lower Danube Basin to serve the countries Ukraine and Moldova (Fig. 1.).

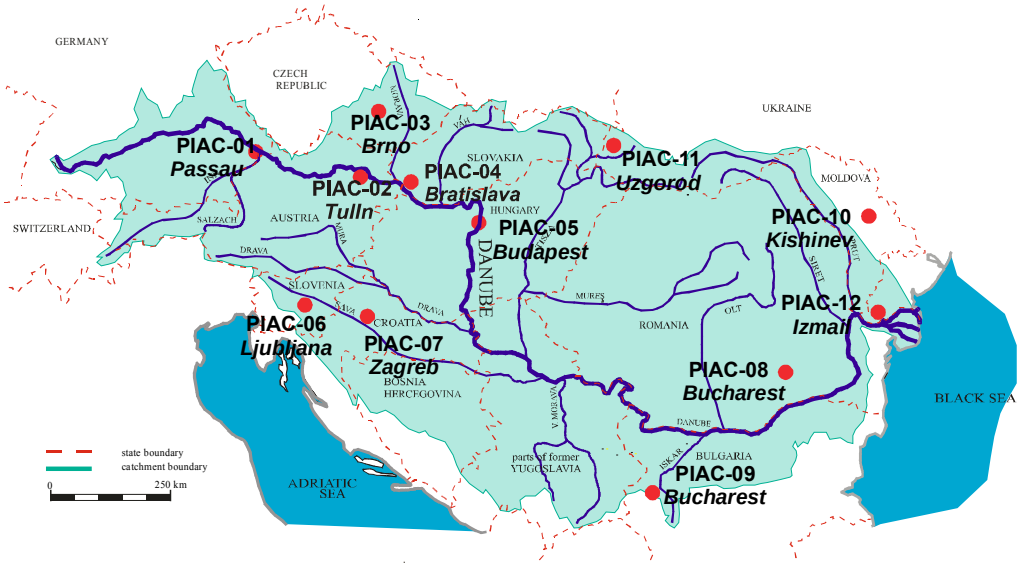

Figure 1. PIACs of the Danube AEWS

The geographical scope of the DAEWS unfortunately have a territorial „gap" at present. Due to the recent political situation, Yugoslavia is not part of the system in the Danube Basin. The design of the system however is such that it can be easily extended in the future, allowing the integration of the remaining areas.

The Accident Emergency Warning System Sub-Group of the Danube countries designed and directed the development activities of the DAEWS (Hartong 1994), with the essential technical support of EU consultants. The practical experiences of the design and operation of the Rhine system were taken into consideration and utilised. The Danube Program Coordination Unit in Vienna harmonised the international contributions during the implementation period (EPDRB-PCU 1996.).

3.1 The PIACs of the System

Each PIAC in the co-operating countries has three Units to perform the following tasks during emergency periods:

- Communication on a reported sudden pollution of the Danube river basin waters;
- Expert involvement to assess the effects or impact of the reported accidental pollution;
- Decision making on further actions (local or international warnings) to be taken.

To assist the proper management of the above tasks, the computer-network established at PIACs were suited to the systems in use in the different countries (Novell, etc.). Direct access were established to the national water quality and hydrological data banks.

3.2 Tools of the PIACs

International Operations Manual ensures the standardised operation of the System (Manual 1997). The operation of the PIACs during emergency periods are supported by the following tools:

- Satellite communication system provides safe and independent transmission of standard messages (warnings) between the PIACs on the planned routes;
- Data-base of dangerous chemicals pollutants;
- Danube Basin Alarm Model (DBAM). The model-system provides important tool for the impact assessment of accidental water pollution incidents (DBAM 1997).

4 Operation of the System

During the last two years of operation since the inauguration of the DAEWS, only eight accidental water pollution incidents were recorded in the river basin by the system, much less than expected. Five of these incidents were caused by oil pollution of the River Danube, in other cases the pollutants were salt, detergents and pesticide (Pinter 1999). The System reacted properly during these emergency periods, sending the necessary messages to downstream countries. The basic information about the pollution incidents were provided for the PIACs in each country by the competent local authorities for water pollution control.

5 Outputs for potential utilisation

The main main fields of outputs coming from the development activities of the Danube AEWS, in which the results could be further utilised as „good practice" were identified as follows (ENWAP 1999):

- Data collection and pre-processing, data management, Output: system for the management of information flow on national level within the units of the PIAC and on international level between the different PIACs in the Danube River Basin. The user-friendly software provides options for each country to use his home language while the language of international communication is English.
- Models and decision support systems, Project output: DBAM Danube Basin Alarm Model applied for each Expert Unit of the PIACs as a tool for decision support. The model-sytem covers the whole catchment area of River Danube and its important tributaries providing capabilities to assess water pollution impact characteristics, like time of travel, maximum concentrations, etc. along the affected river stretch.

- Telecommunication, Project output: basin-wide satellite communication and alarm system for the immediate receive and transmission of messages on accidental pollution incidents. Pagers connected to the system provide details on emergencies for personnel alerted

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Good Practice in Air and Water Management. Lessons for the Use of Telematics in the Sustainable Management of Environmental Resources

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Abstract

Sixteen research projects with objectives related to developing novel telematic applications in environmental resource management were reviewed and assessed by the ENWAP user forum. The work of the user forum has been to summarise common user requirements and good practice in environmental telematics as a means to identify innovation in strategic development and the production of tools for environmental resource management and sustainable development. This paper summarises the work of the user forum and its forthcoming publication of a good practice guide for telematics in air and water management.

1 Context

Efficient monitoring and management of the environment are essential activities contributing to sustainable development. The exploratory action on Environment of the European Union's Telematics Applications Programme (1994-1998) has demonstrated the usefulness of telematics research and applications for protecting and improving the environment. It has promoted the development of research and technological tools which enable the sharing of information among citizens, industries and city administrators and to make informed decisions for improving the environment. In the most efficient form of a sustainable Information Society, this new range of telematics research and results should not limit the benefits to a few users but attract the interest of as wide an audience as possible. Therefore, a dedicated dissemination activity was established to make the results obtained in the Environment Telematics Application Programme more widely known. This activity, known by the acronym ENWAP, gathered in a User Forum participants and projects from EU and CEE countries, discussing the needs and results obtained by environment telematics systems applied to manage air pollution and water resources.

2 Target Audience

This report is directed to stakeholders involved in the monitoring and management of the water and air environment, whether or not they are currently using telematic systems, i.e. from senior politicians and ministers responsible for implementing environmental policy to those collecting the basic data in the field. Particularly, the document is directed at central and local government departments in their role as environmental decision makers and managers. It is, also, of interest to public watchdogs, community organisations and NGO's interested in tools for supplying environmental information. Other stakeholders are represented by regulators responsible for controlling and preventing pollution, and emergency managers dealing with river flooding and with high levels of air pollution in urban areas.

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3 Objective

The Good Practice report aims to identify particularly innovative and efficient telematic systems developed by pilot RTD demonstration projects in the EU and CEE countries, which could be applied in similar sites elsewhere, in order to maximise the benefits of research and results for other users. The report provides a detailed description of sixteen research projects, selected as outstanding examples of environment telematics applications in the EU and CEE countries. The conditions under which projects have been successfully established are discussed, and it is stressed that good practice does not identify a single system, but shows how alternative solutions can be exploited.

4 Telematics and EU accession for CEE countries

The ENWAP User Forum has given broad attention to the analysis of different telematics applications for environmental protection in the CEE countries and to the problems, the priority needs and the driving forces for future telematics applications. Therefore, one section of the Good Practice report is devoted to the problems confronting CEE countries which are preparing for accession to the EU, and which role telematics can play in the approximation of the regulations of these countries to conform to the environmental *acquis* (body of existing regulations) of the EU. Clearly, the EU projects are well aware of the existing rules and regulations, and the systems being developed are directed to monitoring situations and managing them in order to respect and to limit pollution to the legal standards, and to lead to a steady reduction in pollution. The environmental policies of the candidate CEE countries will be aligned with the requirement to achieve the standards set by the EU legislation. Particular problems exist for some of these countries because of the environmental damage created in past development and the need to remedy the situation by the date of EU accession. The report comments briefly on the progress in implementing environmental legislation in the CEE candidate countries. It looks at issues of the Information Society, research, education and telecommunications, and the various strengths and weaknesses are identified.

5 Analysis

The analysis of Good Practice has been carried out by completing a standard form for each of the 16 selected projects. This form contained an abstract explaining the project, its objectives and implementation. It covered the domain and target user category, including details of the site, technical parameters, functional requirements, duration of the project and the cost. It also provided the results achieved and the obstacles encountered. An assessment of the transferability of the system to other situations and the lessons learned are set out, with critical factors of success and recommendations for others intending to use the systems being supplied.

6 Discussion

The successful ingredients of the projects analysed consist of the creation of environmental management concepts merging effective technological solutions with social and sectoral factors. By supporting multi-disciplinary co-operation and transnational co-operation some projects have designed specific solutions to address crossboundary environmental management (TEMSIS, DANUBE-AEWS, JAMS, REMSSBOT). Innovative and early exploitation of advanced IT and telecommunication technologies are common to almost all the projects, leading to the delivery of better quality environmental information. This has led to improved decision making with regard to air quality and traffic management (EMMA, EFFECT, SIMTRAP), to drinking water (WATERNET), to water resources (E-MAIL, SNIRH, Croatia-TNMN), to assessment of environmental impact (REMSSBOT, E-MAIL, TEMSIS, ECOSIM, IOZIP), and to forecast air pollution (ECOSIM, EMMA, EFFECT, SIMTRAP).

In the majority of cases, dissemination of environmental information to NGO's and the public has resulted in better awareness of the broader public on environmental issues (TEMSIS, HEIS-MUC, DANIS, EMMA, EFFECT, EUROAQ, SNIRH, IOZIP).
The obstacles encountered were of both an institutional and technical nature and similar in the EU as well as in the CEE countries. The bureaucracy encountered in public administration was a major difficulty for most projects, consisting of slow decision taking, low levels of internal competence and poorly defined responsibilities. Low levels of co-operation within and between departments were seen. Technical difficulties encountered related to the availability of data, scarce data standardization and factors such as data ownership, rights and reliable data delivery. Obsolete telecommunications infrastructures create problems in implementing telematics, especially in CEE countries. Financial provision is another area where difficulties are encountered. Inadequate education and training are major obstacles for implementing telematics systems in the administrations.

The transferability of systems and of methodologies has been examined project by project, and the broad conclusion is that most systems can be adapted to other sites if certain basic conditions are satisfied. Varying degrees of sophistication in local circumstances may lead to a complex or simpler approach in the methodology or in the application. The projects have frequently used sites of widely differing characteristics as demonstrators, and there are several examples of similar systems implemented at different levels of complexity.

7 Lessons learned

The projects have assessed the lessons learned by examining different factors such as success, the need for improvement or alternative actions in future applications, and some general advice to any potential end user. The results indicate that technical factors are as important as human, social and institutional factors in achieving a successful implementation of the product. In some projects, the definition of a modular and flexible framework was the key to success, in others the use of existing components with valid data were to prove decisive elements. Early prototyping led to better definition of requirements and familiarised users with new systems. Some technologies which were new to users often needed more time to become familiar than was first expected and a standard method of defining user requirements could reduce the time needed for this element of development. Data suppliers should be involved from the outset, as their role is critical in successful projects, and data standardisation and validation are key parts of the system. Where transnational systems are involved, standardised data and comparability of data are critical factors, as well as efficient data transfer across frontiers (not just national, but also communication systems). In all cases, communication systems are important to efficiency, whether between sensors and monitoring stations, or between data collection systems and management, between departments, and between management and political decision makers. This is particularly valid if transnational organisations are involved using different languages. In all cases, the processes of political decision making and the willingness of those responsible to decide issues are important promoters of good environment management systems, however simple or sophisticated the technology involved. Whatever level of sophistication is implemented, those operating the system must be trained to an adequate standard, and existing systems should be used to the maximum extent in order to minimise the difficulties of wholesale switch-over to entirely new technologies. Integration of operations should be pursued to the maximum extent to create efficient implementation.

8 Conclusions and Recommendations

The good practices of air and water pollution management systems, developed by a number of EU and CEE countries, show good examples of applications which use recent developments of telematics in the areas of :

- environmental monitoring and data and information management
- simulation and forecasting techniques for the environmental pollution processes
- decision support and warning systems
- communication systems for data and information flow

Each of the projects has clearly demonstrated that telematics are an indispensable tool to assist environmental management and contribute to the evolution towards sustainable development.
The results provided by the Good Practice form and the discussions in the ENWAP Expert Group have been the crucial elements for the analysis of experience and results of 16 demonstration projects. Communication and uptake of the information developed during the good practice exercise should be disseminated to a wider audience of potential users. Such information needs to be tailored to the receiving audience, and a suitable medium chosen, from conferences, publications, web sites, communication media, etc.
The main aim of the Good Practice document is to prevent others “re-inventing the wheel” and duplicating existing systems or repeating the errors which other researchers made, but rather to learn from their experiences and make more advanced steps.
The definition of user requirements is one of the key elements of successful projects. Transfer of the knowledge, technology and application of information must have the pro-active involvement of end-users.
The implementation of environment telematics systems does introduce considerable institutional changes. Essential to long-term public commitment to undertake measures and provide financing for environmental concerns are public awareness and educational programs. The projects stressed that human factors are the cornerstone of the integration of new ‘technology’ by end users. Acceptance of new ideas and advanced technology needs both training and education as well as integration of local knowledge and technology.
The most important conclusions drawn from the analysis of the projects show that supporting multi-disciplinary as well as transnational co-operations are keystones for a serious and durable approach to environmental management. It cannot be stressed too often that the environment does not recognise administrative boundaries, and that good neighbourliness is critical in solving environmental problems. It is in this context particularly that EU and CEE co-operation in RDT can generate enormous benefits for all concerned, by linking related organisations, sharing data, pooling knowledge and experience and demonstrating solutions which can be exploited in other sites.
Better quality of environmental information is essential to take informed decisions by the authorities and to improve the confidence in the broader public in the information itself. By
implementation of EU Environmental Directives, the good practice exercise may assist fruitfully in the future orientation of environmental legislation.

A set of general recommendations are proposed :

8.1 The European Commission and National Governments should :

- improve the transfer of know-how and technology results through publications for a broader public, user fora, web sites, conferences, seminars between the EU countries as well as between EU and CEE countries.
- promote structural activities on improving training and education for use of environment telematics
- stimulate actions on the awareness of environmental problems.
- stimulate activities to develop standards and harmonization for environmental data and IT technology
- enhance the free flow of information
- promote structural activity to integrate environmental management tools with day-to-day activities such as transport, tourism, agriculture, etc.

8.2 The National Governments should :

- reinforce the available legislation with respect to the European Directives for the environment
- strengthen actions for environmental legislation compliance

8.3 Decision Makers – Regional and Local Authorities, Environment and Health Authorities should:

- enhance co-operation between authorities responsible for environmental protection decisions
- define clear responsibility within the administration for the system and the data management
- set up clear strategies for implementing the environmental legislation
- indicate at regional and national levels the specific needs for an improvement of the legislation
- support activities to transfer telematics applications (demonstrations, fora)
- promote greater dialogue between the stakeholders
- raise awareness and encourage educational campaigns
- promote initiatives to analyse good practices for the management of water and air resources by means of telematics on regional and local levels

8.4 Information Providers, i.e. Project managers , etc. should :

- provide information tailored to the audience addressed
- activate web sites, easily accessible, preferably supporting a multi-language information base and demonstrations
- provide an evaluation of the social and economic impact of the telematic systems developed.

9 Acknowledgement

This report is based on significant inputs from EU and CEE research and demonstration projects, the results of several meetings, on the results of the DETERMINE conference and on information and analyses provided by the experts of the ENWAP Group.
The ENWAP group would like to express their gratitude to all the projects participating in the Good Practice exercise. The analysis of the good practice performed here would have been impossible without the project contributions provided during the ENWAP meetings, the information extracted from the public deliverables of the TAP-EN demonstration projects and the feedback from the project managers. Only non confidential information is included.
Appreciation is given to Mrs. E. Jaskulke and Mr. K. Zirm for their Peer Reviews and contributions.
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Joint Air Monitoring System in the Black Triangle Region, the First International Air Monitoring in CEE

Jiri Novák[I]

1 Introduction

The Polish, Czech and German border areas have been recognized as the most degraded region of Europe . It covers an area of 32,400 sq. km, and has a population of 6.4 million.
The intensive mining of lignite began in Central Europe in southern Saxony in Germany, northern Bohemia in the Czech Republic, and Lower Silesia in Poland during the 19th century. Following the development of lignite-miming, the region became intensively within, and after the 2nd World War. The side effect was environmental pollution, which with the accumulation of industrial activity within a small area and without sufficient measures for the protection of the environment caused not only local pollution but also that of distant regions.
In 1990, with the advent of political change, Czechoslovakia, Germany and Poland found themselves facing a difficult legacy – the results of a long period of relentless environmental destruction. They also found that only common, trilateral cooperation could lead to the significant improvement of the environment on this Central European lignite-mining area.
In June 1991, the Environment ministers of Czechoslovakia, Germany and Poland issued a joint declaration at a meeting in Dobris that created a trilateral Working Group for neighbourly cooperation. The primary task of the Working Group was to prepare an action plan of joint priority tasks. The programme created by the Ministers became the international Regional Environmental Black Triangle Programme. The European Commission joined the Working Group as a fourth partner, providing financial support through the PHARE Regional Environment Programme. One of the first common achievements the Black Triangle Programme was the establishment of the Joint Air Monitoring System.
The Joint Air Monitoring Systems (JAMS) shared the following objectives to:

1) Support international cooperation in the field of air protection concerning the transboundary pollution caused by large power plants fired by brown coal;
2) Create a mechanism for continuos air quality control in international scale;
3) Collect complementary information concerning the quality of different environmental components;
4) Assure good quality measurement according to standards, recognisable by all cooperating countries and international institutions;
5) Create an early warning system for dealing with smog situations;
6) Enable the creation of a decision support system for efficient environmental management;
7) Enable research into the movement and quantities of transboundary pollution;
8) Collect data for dispersion model evaluation and validation

2 User needs

Several groups of end-users rely on and benefit from the air quality monitoring data. These include:

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1) Environmental protection services, forestry services. The staff of national parks and protected area administration;
2) Researchers of universities and institutes;
3) Local and regional authorities, administration and decisionmakers;
4) The general public via the media (newspapers, tv and internet).

All the above mentioned groups rely on information concerning the quality of environment. Some of them, particularly specialists, need more detailed data further analysis and research. Non-specialists, i.e. journalists and the public, need elaborated reports and publication, where information is more general and carries clear conclusions.

3 Area of applicability

The monitoring system consist of three independent areas, the Polish, Czech and German segments. There are a total 43 ambient air monitoring stations within the Black Triangle region. Ten stations are based in Poland in a former provinces Jelenia Gora and Walbrych, twelve stations are based in Germany in the provinces of Chemnitz and Dresden, and 21 stations are located in Northern Bohemia of the Czech Republic in the counties of Sokolov, Karlovy Vary, Chomutov, Most, Teplice, Usti nad Labem, Decin, Ceska Lipa, Liberec, Semily, Trutnov.
The basic ambient air monitoring programme includes the continuous measurement of sulphur dioxide (SO_2), nitroxen oxides (NO and NO_2) and particulate matter-PM10. Most stations also measure ozone (O_3) and some stations measure carbon monoxide(CO). In parallel, meteorological parameters are also collected, i.e., windspeed and direction, temperature, humidity, solar radiation and atmospheric pressure.
Apart from the automatic data acquisition of air pollution compounds and meteorological parameters, manual collection and measurements are also made in selected stations. Those parameters are metals from Hi-Vol Samplers and classical parameters from Wet Collectors only (pH, conductivity, sulphates, nitrates, selected metals).

4 Technical aspects of the JAMS

The backbone of the JAMS are sets of automatic air quality stations Poland received a complete automatic monitoring system of ten stations and one mobile station. The Czech Republic received a set of monitors and meteorological sensors to update the existing network in Northern Bohemia, while a member of the European Union, Germany linked up to the Black Triangle JAMS with it's own monitoring network without financial support from the PHARE Programme.

For the purpose of automatic monitoring data between the three countries, a data exchange system was developed, based on the Meteosat satellite. Satellite communication via Meteosat offers a technical means for data acquisition from stations located across Europe, as well as from north Africa. The Central Acquisition System in Jelenia Gora, Radebeul at Dresden, and Usti nad Labem were all therefore equipped with satellite receivers.

Apart from a standard communication system, the stations in Poland and Germany are also equipped with satellites transmitters. German stations already use the Meteosat systém and data is directly received in Poland and the Czech Republic. Validate data are exchanged between the country centres via the wide area network DatexP, Eurotel and Polpak as well as the Internet.

Measurement results are collected in country regional centres and go through a validation and processing procedure. Furthermore the data is distributed in textual and graphical form to the relevant institutions and to the public. Lastly data from each monitoring centre is exchanged online, assuring direct access to environmental information across the region.

5 Experiences gained from implementation

A complex system such as an international monitoring system, which must assure data flow between different sites and adhere to technical standards, always causes problems when implementing. Contractual issues has also caused some difficulties and delays. The rules of PHARE project implementation is that the EC is the suppliers awarded to issue the contract. All problems must be clarified between the beneficiary and the contractor with the EC acting as mediator. Problems in this respect contributed to many months delay in project implementation.

Particular care should also be taken at the stage of supplier selection. Successful implementation relies a great deal on the ability and reliability of the supplier. References should be checked carefully.

Another problem was caused by the lack of a sound technical infrastructure within the beneficiary countries to establish a reliable wide area network connection. Digital data networks were only just being introduced in Poland when the tender for JAMS was made. This has resulted in the fact that the fully automatic international data exchanged process is still being implemented.

6 Transferability aspects

The JAMS relies on data acquisition, validation, storage, processing, visualisation, transfer and quality control. Familiarising oneself which such a system is a good example for all persons working in the field of air protection. Factors affecting the transferability of any system which might be learned from the JAMS include:

1) Planning of a monitoring system (which parameters to measure and where, which methodology to use, how to organise data transfer and processing, how to communicate with the stations etc.);
2) How to prepare technical tender documentation and the tender itself;
3) How to organise the operation of the system;
4) How to assure the high quality of data;
5) How to produce reports and in what form for different users;
6) How to integrate the system with other information system and tools.

7 Good or best practice aspects

The cooperative efforts of air monitoring experts from Germany, the Czech Republic and Poland, supported by experts hired by the Commission was an excellent opportunity to create an international team. This group of experts cooperated not only to create the system, but also to successfully operate ot, examples of such cooperation include the exchange of standards and measurement techniques, common inter-calibration programme, meetings and exchange of data.
To ensure the long-term cooperation within the framework of the JAMS project, on September 17, 1996 the Data Exchange Memorandum was signed in Most (in the Czech Republic) by the Polish Minister of Environmental Protection, Natural Resources and Forestry, the Czech Minister of Environment, and the German Minister of Environment and Reactor Safety. The countries declared to

further exchange air pollution immission data concerning the Black Triangle region and to elaborate summary reports about the immissions situation of the Black Triangle.

After the first period of JAMS operation, our conclusions are as follows:

1) Data processing system should be based on common standards, recognized by all;
2) Common methodology for environmental assessment should be used;
3) Data validation should be made in a similar way by all partners;
4) A periodic inter-calibration programme should be implemented e.g. by means JRC Ispra
5) The system of reporting should be commonly agreed upon, especially that data intended for the general public.

Not all of the defined objectives have yet been implemented, for example, common reporting or the full integration of systems.
The founders of the Polish Black Triangle JAMS idea were a ware that the creation of the monitoring system is just a first step in the creation of an environmental management and support system. As the network can never be dense enough, the next step is to collect information for those places between stations, this can involve the implementation of dispersion models, typically difficult to successfully implement in complex territories like the Black Triangle Region.
Cost-benefit considerations

The total cost of equipment financed by the PHARE Programme was 2.2 MECU. Additional cost related to the technical infrastructure of monitoring stations was covered by the beneficiary countries. Current operational costs are covered by the countries involved.
It is very difficult to make a direct cost-benefit assessment of an air quality monitoring system. In general, the cost of monitoring does not exceed 1.5 percent of overall environmental investments. In the case of the Black Triangle region, the analysis of the monitoring data has clearly shown that the highest concentration of air pollution in highly populated areas does not now come from big power plants except heavy metals (e.g. Cd). The elaboration of air quality data therefore confirmed that the abatement strategy which involved financing gas conversion was the correct measure.

Lessons from the Application of Telematics in Water Resources Management in Portugal

João Ribeiro da Costa, Rodrigo Oliveira[I]

1 Introduction

Water resources planning and management have a long tradition in Portugal, where the first water law was published in 1919. The legislative framework has been regularly updated and currently, once again, a major effort is being put forward aiming at developing a National Water Resources Plan and several Watershed Master Plans for each of the river basins in Portugal. Recently, a new agreement on the preservation and sustainable sharing of common water resources has been signed with Spain and awaits approval from the Portuguese and Spanish Parliaments.
Within this spree of activities, telematics are playing a role. A National Water Resources Information System is in operation since 1996 providing data for the public administration, universities and private consultants involved in the water resources management, planning and research activities and some consultants responsible for the elaboration of Watershed Master Plans are relying on information systems to improve their analysis capabilities and to cut costs.

2 Framework

Situated in the Iberian Peninsula, Portugal is the most western country in the European Union. The country has an area of 92,000 km^2, occupied by a population of about 10 million. The average yearly rainfall is 910 mm, but is heavily concentrated in time and space. Portugal is greatly dependent on Spain for its water resources since most of its major rivers drain from Spain. Two thirds of its area is within international watersheds and about 50 % of the run-off originates in Spain.
The Water Institute (INAG) is currently the institution responsible for water resources planning and co-ordination in Portugal, together with 5 regional environmental offices. Following the guidelines of the new Water Resources Framework Directive, INAG has in 1997 initiated the work towards the development of a National Water Plan and promoted public tenders for the elaboration of 14 Watershed Master Plans. All major Portuguese water resources consultants are now responsible for one or two watershed plans and the main universities are involved in technical committees sponsored by INAG to review all the documents and proposals that are being put forward.

3 SNIRH, the Portuguese Water Resources Information System

3.1 Objectives

Collecting hydrological data and publishing them has been the responsibility of INAG' s ancestors since the beginning of the century, and this responsibility has been written into law. In fact, aware that hydrological data, including both surface and groundwater hydrology, and quality as well as quantity aspects, are the cornerstone of all water resources management activities, the legislators have established as one of INAG's responsibilities the creation and maintenance of a Water Resources Information System, capable of providing the data and information required for water resources management.

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SNIRH (Sistema Nacional de Informação de Recursos Hídricos), the Portuguese National Water Resources Information System is such a system.
The Portuguese Water Resources Information System, SNIRH, collects and stores data on climate, hydrology (quantity and quality), groundwater and reservoir operation from over 2000 measurement stations, in ten different networks in the country. Besides these data, SNIRH stores other data required for water resources planning, namely geographic data, like elevation data (DTM, slopes, aspect), hydrographic data (rivers, drainage basins, aquifers), water uses data (wells, dams, pipelines) and administrative data which is used as a framework for analysis.
The ultimate goal of SNIRH is improving the technical performance of INAG, thus contributing to:

- improved water resources management in Portugal;
- concrete implementation of EU Directives related to water resources, with special emphasis on the Water Framework Directive (to be approved by the European Parliament) and the Integrated Pollution and Prevention Control Directive.
- To fulfil this goal, SNIRH must be capable of:
- storing, processing and displaying water resources information, both internally in INAG, based on the SNIRH INTRANET, and to external entities (namely consultants, other government agencies and research institutions, EU institutions through the SNIRH INTERNET (www.inag.pt/snirh));
- making available the required planning tools, including models and data processing and analysing tools;
- integrating the geographical dimension of hydrological data;
- transparently merging these tools with the data.

SNIRH was tailored to satisfy INAG' s requirements and changes are introduced as the requirements evolve in time. As long as it is used SNIRH, will be under continuous development with new procedures being added on a regular basis, to cope with the various areas of responsibility of INAG.
Presentation
The Portuguese Water Resources Information System, SNIRH, starts in the field, collecting data on climate, hydrology (quantity and quality) and ground-water in over 2000 measurement stations, in ten different networks in the country, and gathering data from day-to-day management tasks of the Institute. In a second stage SNIRH processes and stores those data in a complex database system. Besides these data collected by INAG, SNIRH stores other data required for water resources planning, namely geographic data, like elevation data (DTM, slopes, aspect), hydrographic data (rivers, drainage basins, aquifers), water uses data (wells, dams, pipelines) and administrative data which is used as a framework for analysis. In a final stage SNIRH makes those data available to the Institute as a whole and to the outside world, providing the data analysis capabilities required to support hydrological studies and the development of water resources plans.
SNIRH was designed as a database server, continuously receiving data from many different sources, and simultaneously replying to requests from many different clients. INAG selected ORACLE as the database server; the system is installed in a network including workstations and PC's at the Institute headquarters (Figure 1). The database server concept was taken as far as possible, storing at the central database not only the usual data, mostly time-series and alphanumeric, but also complex data, like geographic data and images. ESRI SDE is being used to extend the database server to geographic data and ORACLE' s Binary Large Object, BLOb, is used to support image storing.

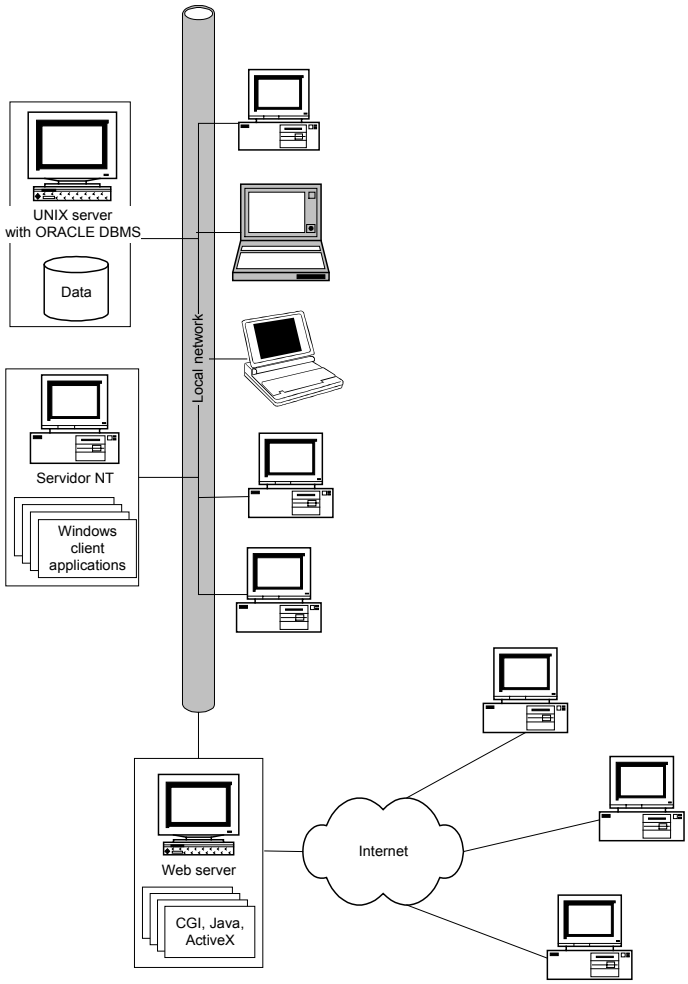


Figure 1 – SNIRH structure

Appropriate client programs were developed to fulfil the multiple tasks to be supported by SNIRH. The following client interface programs are currently operating:

1) SQL command line interface, for low-level system administration tasks;

2) *TSF-Manager* – the SNIRH System management client interface, used for internal system management;

3) *TSF-NetManager* – a general purpose client interface, used for the measurement network management, database update, and to produce regular data reports;

4) *TSF-Loader* – a generic data input client interface, for time-series data input;

5) *SNIRH-Ser* - a generic time series visualization and analysis tool with exporting and printing capabilities, that is used to support most studies;

6) *SNIRH-Reservoir* – a visualization and analysis tools, with reporting capabilities, specific for reservoir operation data;

7) *SNIRH-Qual* – a water quality data analysis tool, used to verify the satisfaction of water quality legislation and to classify river stretches based on its water quality;

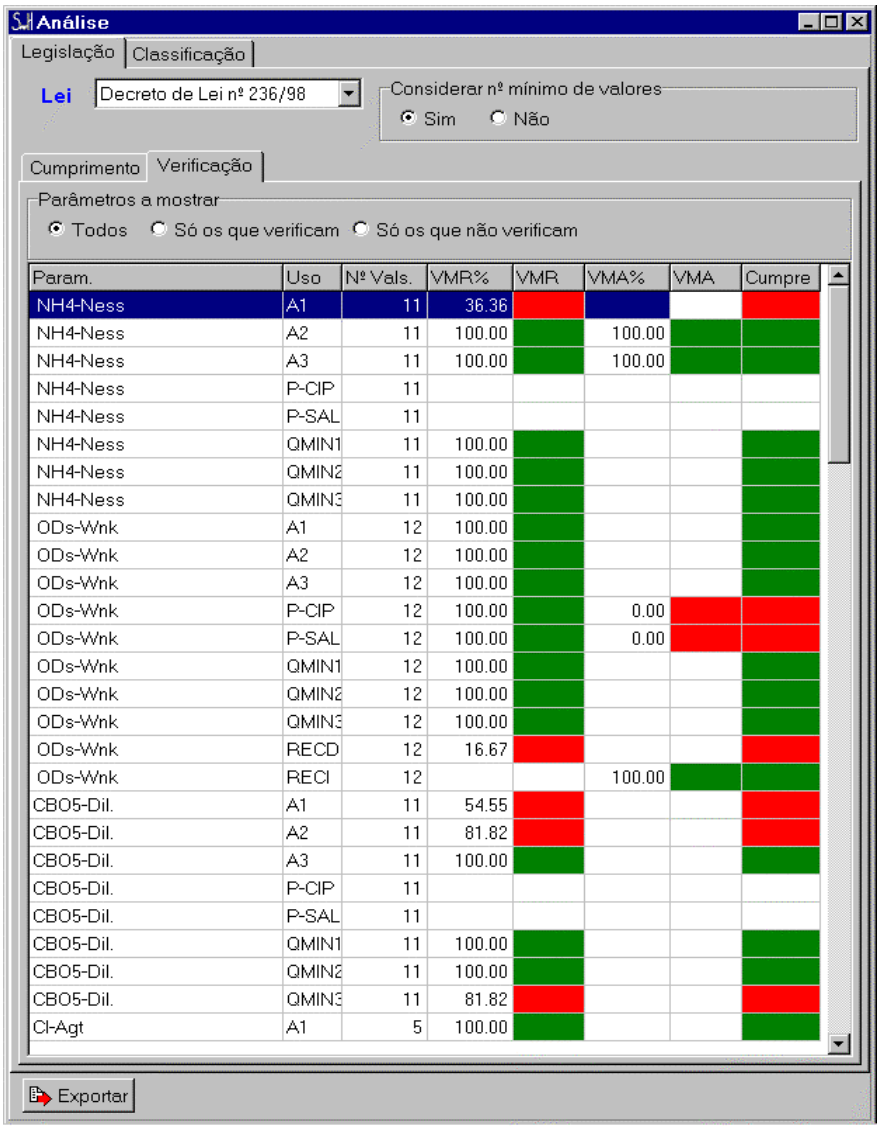
8) *SNIRH-Hydro* – an hydrometry analysis tools, used to compute discharge rating curves;

9) *H2D* – an ArcView extension that combines time-series with GIS;

10) *SDE-Manager* – an ArcView extension used to load and extract geographic data from the database server;

11) *SDE-Browser* – an independent client application with some basic geographic data visualization capabilities;

12) WWW Interface, for both INTRANET and INTERNET access, SNIRH-WWW.



Param.	Uso	Nº Vals.	VMR%	VMR	VMA%	VMA	Cumpre
NH4-Ness	A1	11	36.36				
NH4-Ness	A2	11	100.00		100.00		
NH4-Ness	A3	11	100.00		100.00		
NH4-Ness	P-CIP	11					
NH4-Ness	P-SAL	11					
NH4-Ness	QMIN1	11	100.00				
NH4-Ness	QMIN2	11	100.00				
NH4-Ness	QMIN3	11	100.00				
ODs-Wnk	A1	12	100.00				
ODs-Wnk	A2	12	100.00				
ODs-Wnk	A3	12	100.00				
ODs-Wnk	P-CIP	12	100.00		0.00		
ODs-Wnk	P-SAL	12	100.00		0.00		
ODs-Wnk	QMIN1	12	100.00				
ODs-Wnk	QMIN2	12	100.00				
ODs-Wnk	QMIN3	12	100.00				
ODs-Wnk	RECD	12	16.67				
ODs-Wnk	RECI	12			100.00		
CBO5-Dil.	A1	11	54.55				
CBO5-Dil.	A2	11	81.82				
CBO5-Dil.	A3	11	100.00				
CBO5-Dil.	P-CIP	11					
CBO5-Dil.	P-SAL	11					
CBO5-Dil.	QMIN1	11	100.00				
CBO5-Dil.	QMIN2	11	100.00				
CBO5-Dil.	QMIN3	11	81.82				
Cl-Agt	A1	5	100.00				

Figure 2 – SNIRH-QUAL, water quality legislation verification

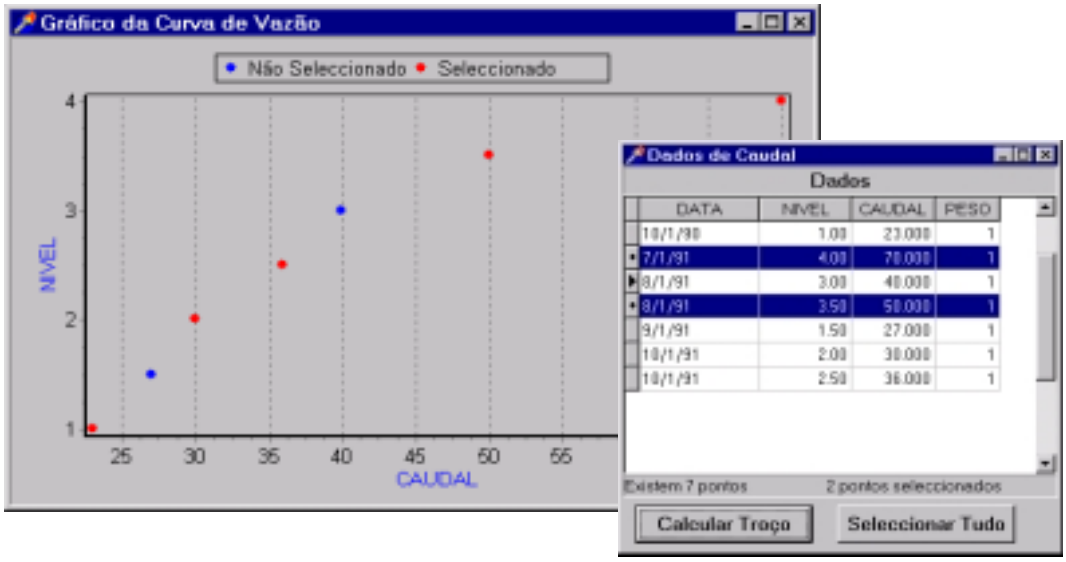


Figure 3 – SNIRH-Hydro, the hydrometry client application

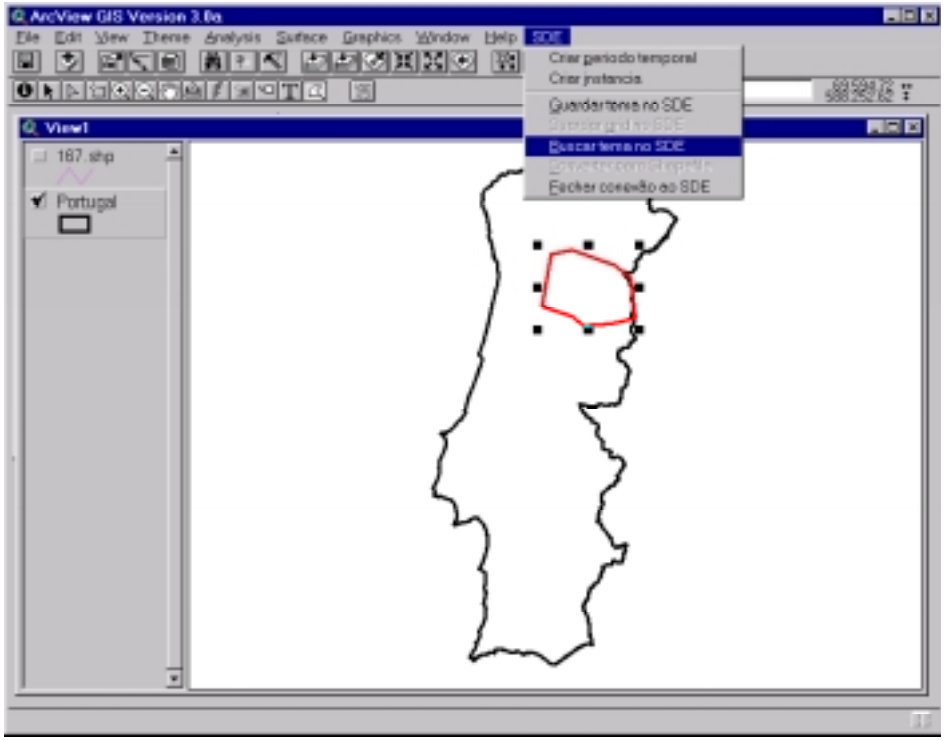


Figure 4 – Retrieving geographical data from SNIRH using a geographic query

The Database Server is an ALPHA 4000, UNIX, the Web Server is a ALPHA 600. The network includes workstations and Win95/Win98/WinNT PC's. The basic software includes Oracle Database Server, Apache Web Server, Arc/Info and ArcView GIS software and original software developed by Chiron.

3.2 Users and user needs

INAG was responsible for the start-up of the project SNIRH. As such, the first group of users belonged to the Institute. INAG' s position regarding the access to data (all data are made available for free) and two concrete initiatives were the basis for the explosive growth of the number of users in the past year. The first initiative was determining that all data to support the basin plans currently under way, would be made accessible through SNIRH, thus allowing/compelling consultants to access the system. The second initiative was designating that the National Water Plan will draw on the system, both for data, procedures and models.
So, at present, 5 categories of users may be identified:

1) water resources planners, internally, within INAG and in the Regional Offices, who access the system through the INTRANET;
2) consultants involved in the water resources plans, who must obtain all their data through the system and provide the results in a format compatible with the system;
3) University researchers and students, looking for reliable data;
4) EU technicians, willing to obtain data on Portugal;
5) the public in general, to obtain information of general interest, ranging from simple climate analysis to water quality from their favourite beach.

Aware of the importance of establishing and documenting procedures INAG has produced considerable documentation on the system, organised special sessions in Congresses and promoted country-wide presentations. Numerous newspaper articles have been published and its usage has quickly spread in universities, eager to have access to data.
The SNIRH site (http://www.inag.pt/snirh) is the main contact point to users external from INAG. The number of hits currently exceeds 50'000/month, some 20% of them from outside Portugal. As a confirmation of the public interest to this site, the project SNIRH-Internet was awarded the Descartes Prize 1997, the most relevant prize for Public Administration Information Technology Projects in Portugal.

3.3 Project development

The strategy consisted in the development of an early prototype (6 month), followed by a full scale implementation (2.5 years), at national level. Regional deployment is under current analysis, based on concrete experience.
The main activities in the project were:

1) objective definition;
2) functional analysis, including a detailed user needs assessment, information products needed, information system and geographic information system operations required, etc.;
3) implementation plan (including specifications, general design, and application specification);
4) database, client- server software and INTRANET development;
5) procedure development;
6) INTERNET access development;
7) training.

One of the major concerns was the definition and implementation of specific procedures for each of the regular tasks being performed using the system. For simple cases, like computing the rainfall over a given hydrographic basin, the procedure may be totally built into SNIRH; for more complex cases, like validating rainfall stations, the validation steps can be built into SNIRH but expert intervention is always required. Precise procedure definition becomes an important tool also in terms of staff train-

ing, and even for the outside world, as consulting companies get precise rules to comply with, rather than having to re-invent the wheel at high cost each time a new contract is issued.

3.4 Experiences from SNIRH

The implementation of a major information system does introduce considerable institutional changes, power-shifts, etc. Upper management support and clear objectives, associated to robust technical competence in IS development, are two crucial items for a successful project. The main difficulty experienced has been getting the support staff with enough database management competence to actually manage day-to-day a large and complex database system.
As practical recommendations for other agencies willing to implement similar systems, it is possible to mention:

1) clearly define your goals and objectives;
2) find the right project director;
3) be realistic in the budget;
4) find the correct partnership for system development, implementation and maintenance;
5) pay attention to maintenance;
6) provide enough attention to training.

3.5 Transferability

SNIRH is a general water resources information system, which can be applied in any region. Besides the software the underlying functional analysis and theoretical concepts have a wide application in every environmental project. Potential user groups include Water Resources and Environmental Agencies. INAG is keen on helping other regions and countries to implement SNIRH like systems. Efforts are under way to implement it in Madeira, Azores and Mozambique.

4 Watershed plans elaboration work

Chiron has been heavily involved in the elaboration of several Watershed Master Plans, namely for the Minho, Cavado, Lima, Ave, Leça, Douro, Vouga, Mondego and Lis river basins. It is responsible for the development and maintenance of information systems, including GIS, for the water quality analysis and modelling, for the hydrological modelling and for the watershed water balance modelling.
Chiron approach to these tasks has relied on information systems storing all the available data, both alphanumerical and geographical. Several different client applications interact with the information system providing insight to the data or producing results from the data. Examples of such applications are GIS based tools that are used to compute climatic variables surfaces from point measurements or generate automatically river networks from digital elevation models. The system provides data to several mathematical models and stores its results for further analysis. Examples of such models are an hydrological model similar to the Standford Watershed model, a GIS-based non-point source pollution model, QUAL2E water quality model and IRAS, a regional water resources planning and management model.

This approach has lead to an improved analysis capacity at lower costs. The main advantages arise from

- Easy access to data and intermediate results;
- Clear data transfer fluxes between several members of the team;
- Improved information exchange within the team;
- Avoidance of work duplication;
- Automatization of repetitive and tedious tasks;
- Improved data insight and analysis capabilities;
- Possibility to evaluate different alternatives or scenarios.

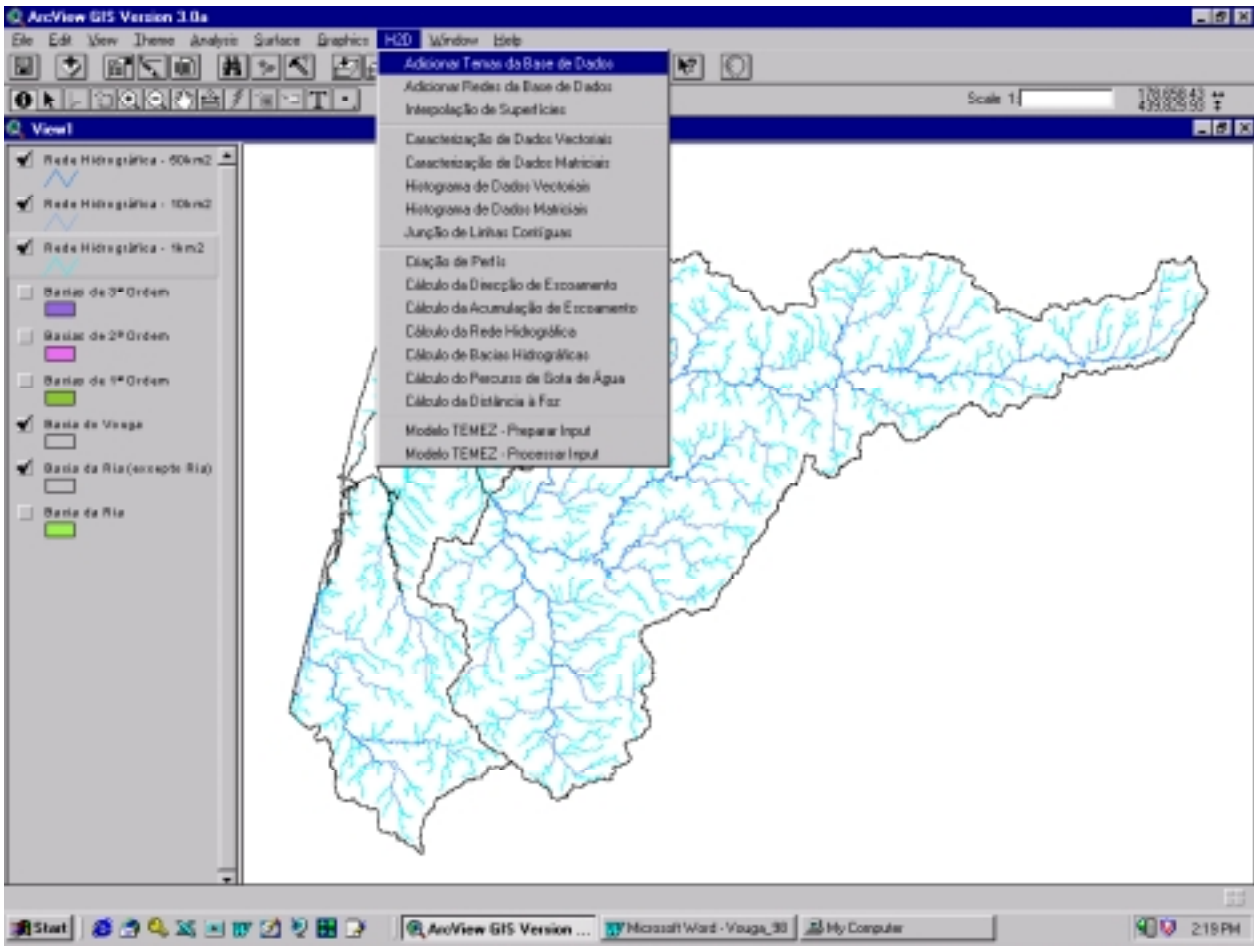


Figure 5 – Automatically generated river network

5 Conclusions

INAG was the first public administration entity to clearly define a data dissemination policy, which is free of charge and complete. At present every citizen may have direct access free of charge to the

water resources data collected by the Water Institute. Communication with other government institutions is optimised and internal resources at INAG are better allocated. Communication with Europe, namely the European Environmental Agency, is facilitated, as all data are made available in a transparent mode.

This policy had has had a major impact in the Information Society in Portugal, and in particular in the work of other public institutions and private consultants. The availability of data, as well as the requirements put on the studies sponsored by INAG, has increased the pressure to use modern technologies throughout the technical community. The on-going planning process, aiming at developing the National Water Resources Plan and the River Basin Plans, is a clear example of such result.

This planning process, co-ordinated with the practical implementation of the Water Resources Framework, is directly associated to SNIRH, which has become the foundation of the plan and the axis for the development of all planning scenarios.

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www.inag.pt/snirh

Status and Structure of Automatic Ambient Air Pollution Monitoring Network: Development Strategy in Lithuania

Kestutis Kvietkus[I]

1 Introduction

Air pollution monitoring began in Lithuania in 1967 and was initiated by the Lithuanian Hydrometeorological Board. Air pollution measurement network, which was in operation in 1995 and is still in operation today, consists of 21 manual stationary sites located in 10 cities. The Lithuanian Environmental Ministry and Joint Research Center are authorities responsible for monitoring and managing the air pollution measurement sites.

The main sources of atmospheric pollutants in Lithuania are mobile sources (traffic) and stationary (power plants and industry sector), e.g. oil refining, cement, fertiliser, pulp and paper industries and so on (see Fig. 1a, EM Report, 1996). The following figure shows the proportion of atmospheric pollutants coming from major sources in Lithuania. The ratio of air pollutants from the same sources in the largest cities differs as compared to the total atmospheric pollutant inventory data in Lithuania (see Fig.1 b). The main source of pollution in cities is mobile sources because of a high concentration of both streets and motor vehicles. Concentration of industry also partly contributes to such level of pollution. Atmosphere is a very dynamic system, and hazardous atmospheric pollutants may reach high levels within a short time, especially in cities. The influence of weather conditions is most significant, so that the emission of a pollutant being constant, the pollution conditions can change essentially only as a consequence of meteorological changes. It means that in cities and "hot spots", pollutant sampling must be frequent, and automated monitoring network is the only alternative acceptable. Automated continuous pollutant concentration monitoring systems allow to identify extreme conditions: the moment they appear, and their duration period. In such cases it is possible to warn the polluter and the population of ongoing toxic episodes, to announce alert situations, an enforcing a shutdown of emission source. Continuous monitoring not only describes the current situation, but also provides data necessary for air pollution modelling and forecasting.

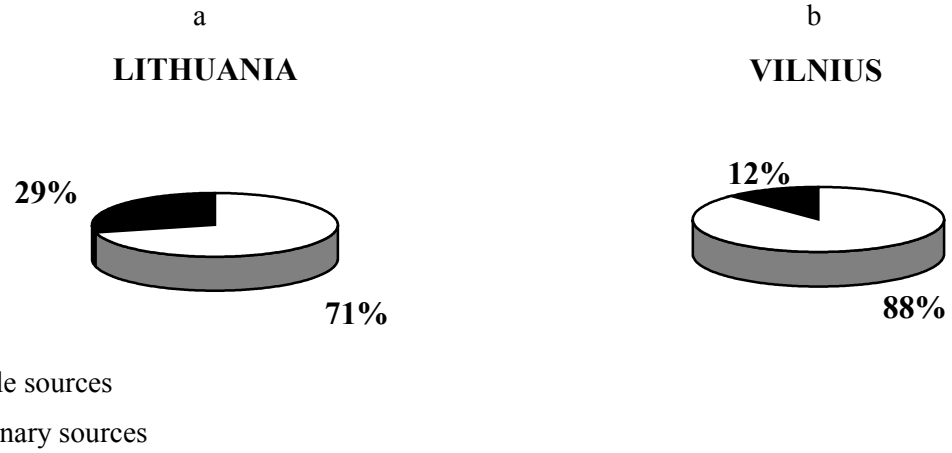

Figure 1. Total emissions from stationary and mobile sources

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2 Current Design of an Automated Air Pollution Monitoring Network

Apart from the above mentioned manual monitoring sites, a well-equipped automated meteorological station was primaly installed in 1995 in Vilnius in the Airport area. Another automated air pollution monitoring station was set up in Zverynas area [Vilnius Air Quality Management Group (VAQMG) Report, 1995]. During 1996-97, two more automated air pollution monitoring stations in the Zirmunu and Senamiescio areas were installed [see Fig. 2 and Table 1]. Additionally, a small meteorological station was installed at the Zirmunu site. A modern air pollution monitoring station in the Senamiescio area has been constructed to meet the EU requirements. The description of a block diagram is a typical one for automated monitoring stations operating in many other countries. In Figure 3, the Vilnius air pollution automated monitoring station is presented alongside with a data structural diagram. Monitored data are described by using the Swedish AIRVIRO SYSTEM [Final Project Report, 1996] and presented in the Internet almost in real time.

By the end of 1997 only a minimal number of stations needed for Vilnius city air quality management were installed [VAQMG Report, 1997]. After installation of a new air pollution monitoring station in 1998 in a dwelling district, the development of the Vilnius city automated monitoring network will be optimally completed.

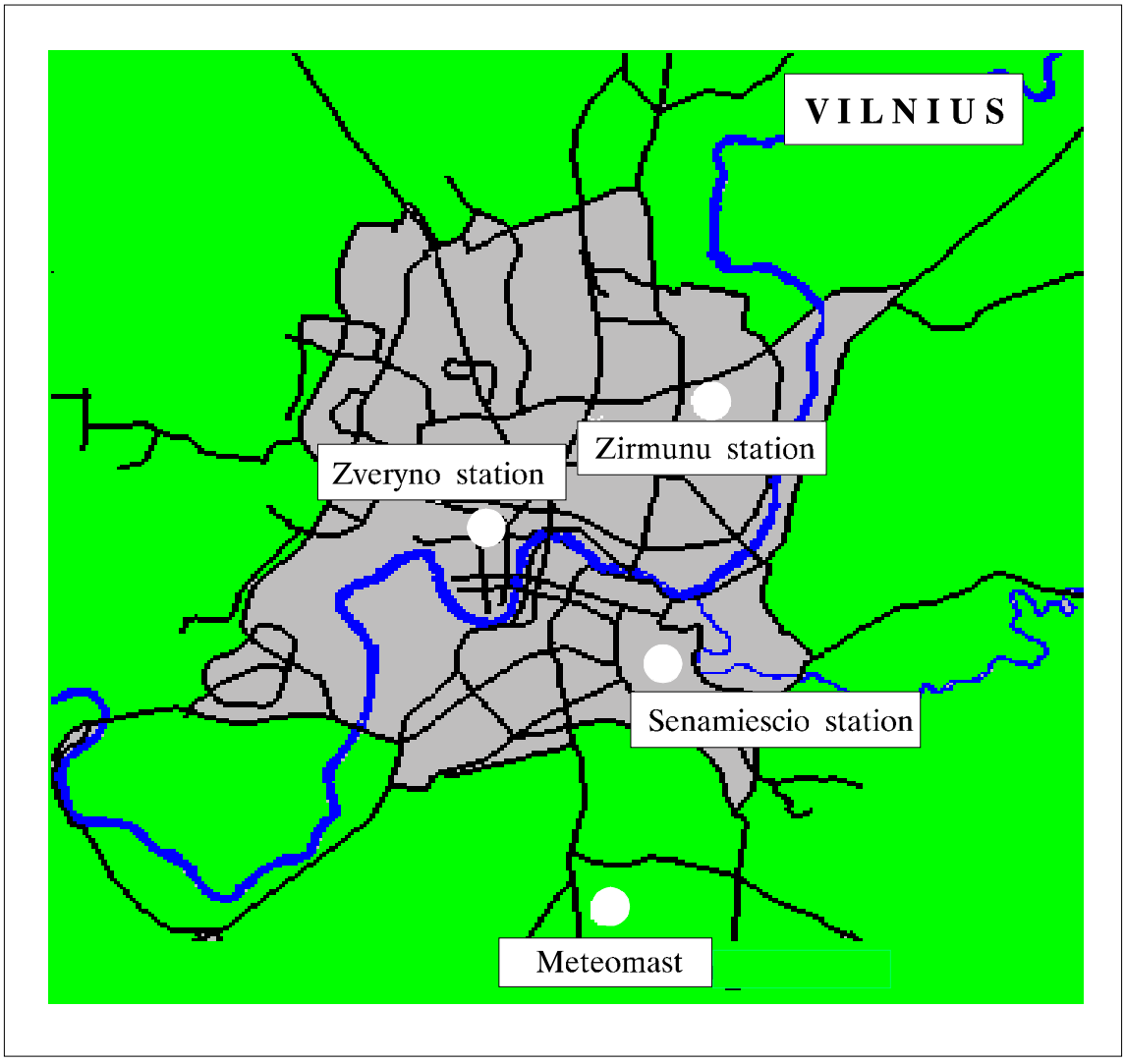

Figure 2. Location of air pollution monitoring stations in Vilnius

Table 1. **Vilnius automated monitoring sites and measured parameters**

Station name	Altitude asl, m	Starting Time	Components				Wind direction, speed	Absolute temperature	Temperature difference, 2-8m and 8-22m	Precipitation, global radiation
			NO_x	CO	SO_2	O_3				
Zverynas	108	951204	X	X	X	X				
Zirmunai	119	960922	X	X	X		X	X		
Senamiestis	105	971017	X	X	X					
Meteomast	190	950311					X	X	X	X

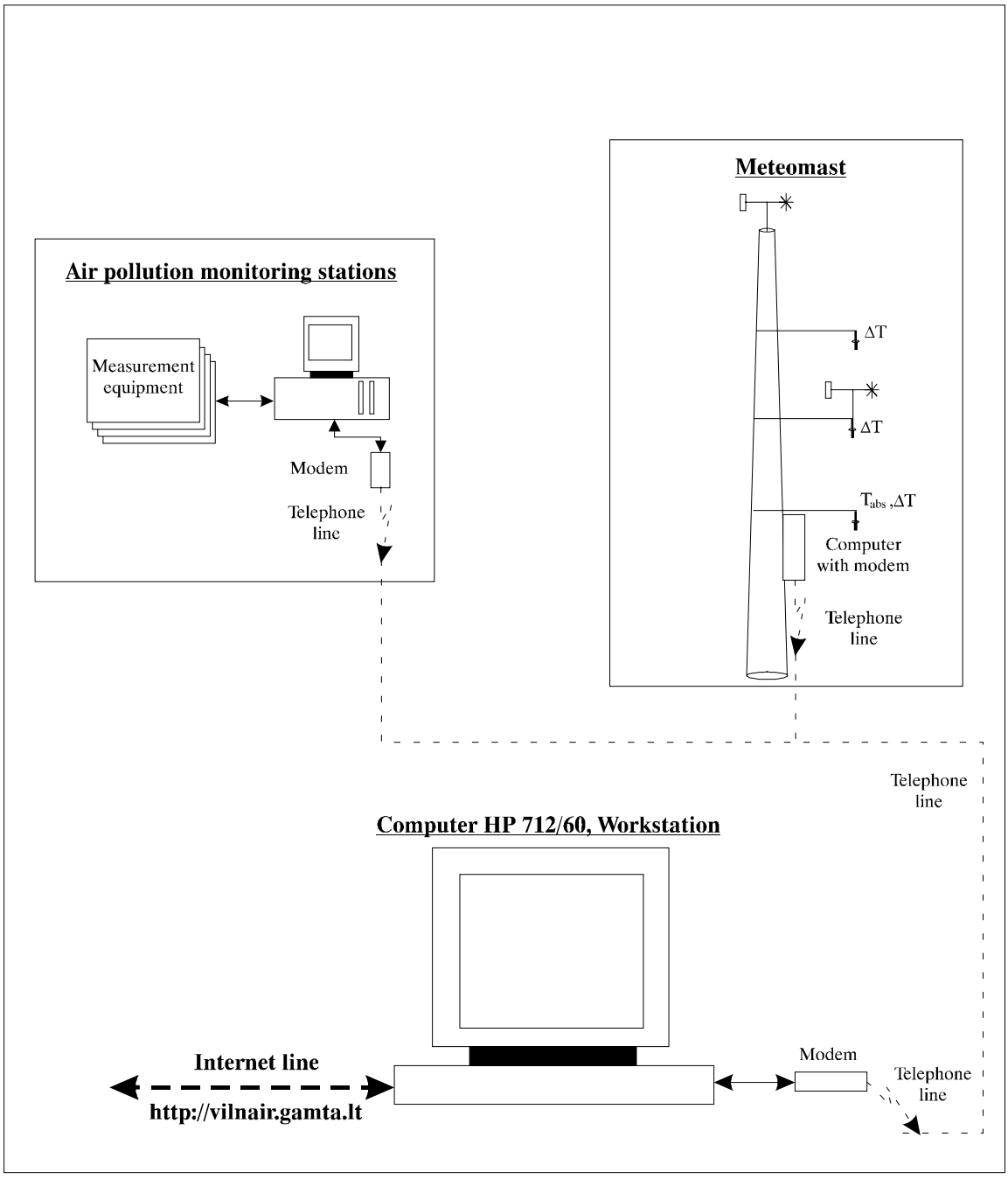

Figure 3. A structural diagram of Vilnius air pollution automated monitoring and data presentation

3 Urban Air Quality Management Strategy

The main tasks of urban monitoring are: to verify emission inventories and models, to provide information to the public, to identify air pollution problems in order to involve decision-makers into efficient air pollution management activities, to check for compliance with the EU Directives. The urban air quality management scheme is presented in Fig. 4. The balance between measurement and modeling must be optimal in order to get needed results at minimum cost.

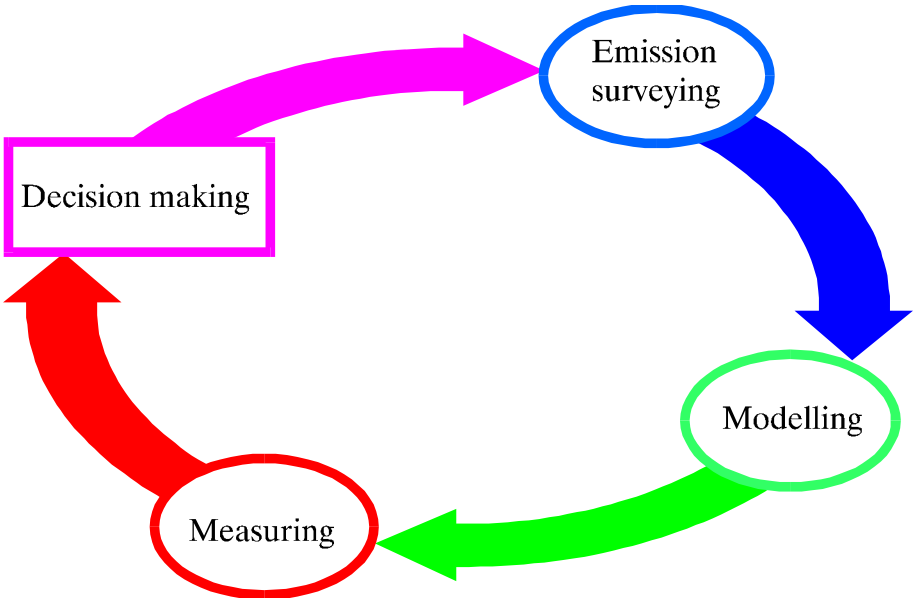

Figure 4. Urban air quality management

In future Lithuania could have two main networks: urban (5 major cities) and "hot spots" air pollution automated monitoring network, and other toxic pollutants (e.g. PBS, Hg, CD, As, In, Benzene, etc.) network located in existing manual monitoring sites. The latter network should be optimised by reviewing the demands of the sites today and in future. Besides, some of the above mentioned automated monitoring stations can be a part of the EU network.

- Fig.5 presents a detailed Vilnius city air quality management scheme. It could be successfully adapted to other cities or regions. The Swedish Airviro system consists of monitoring, data analysis, emission simulation, and dispersion calculation modules and is intended both for air quality management, and for production of information for decision-makers.
- Fig.6 presents the prospects and the strategy for local, state and regional air quality management systems with corresponding responsibility levels. Municipalities monitoring program must be part of the state monitoring program and the state monitoring program must be the part of Baltic Sea region and the EU monitoring program.

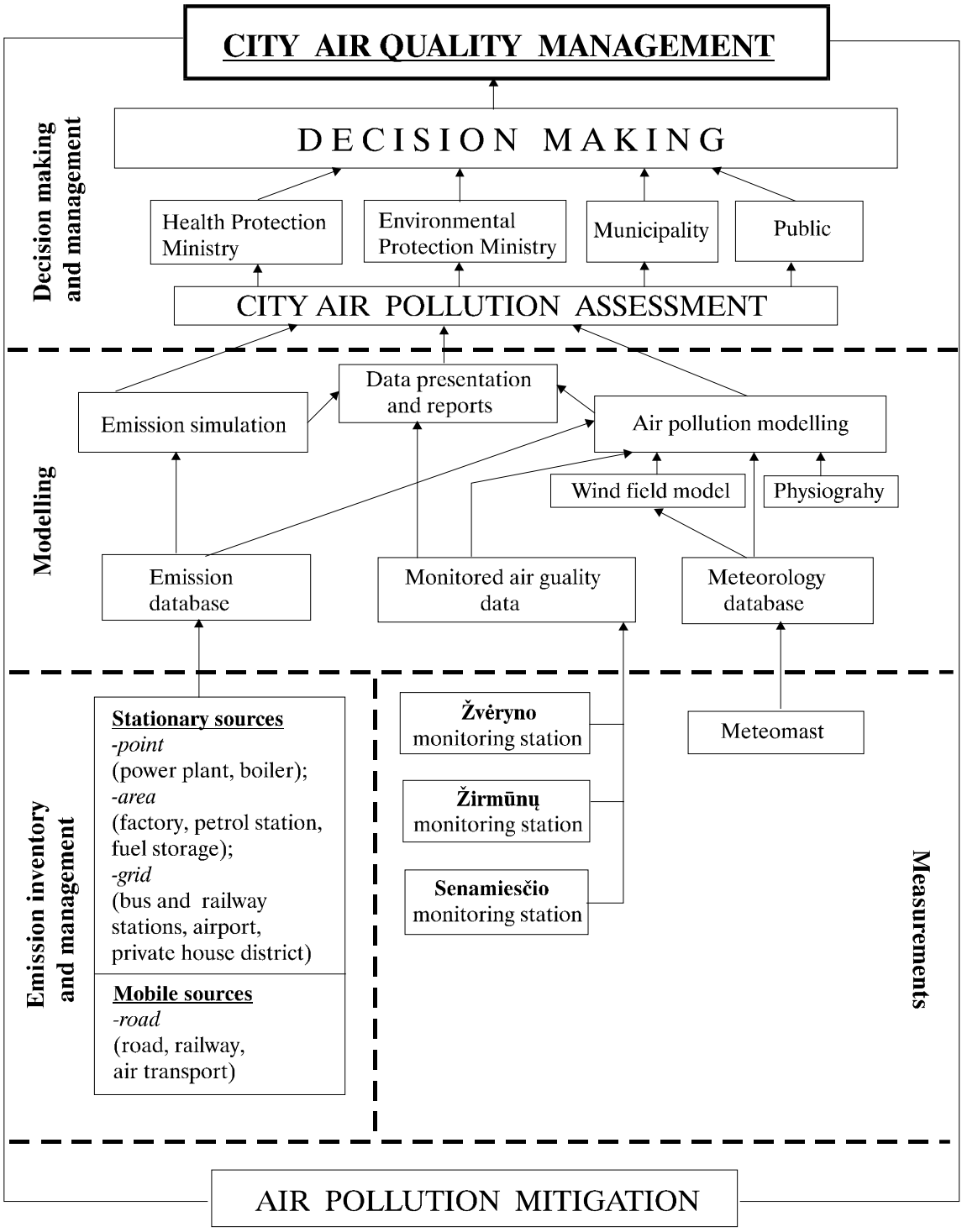

Figure 5. Air quality management in Vilnius

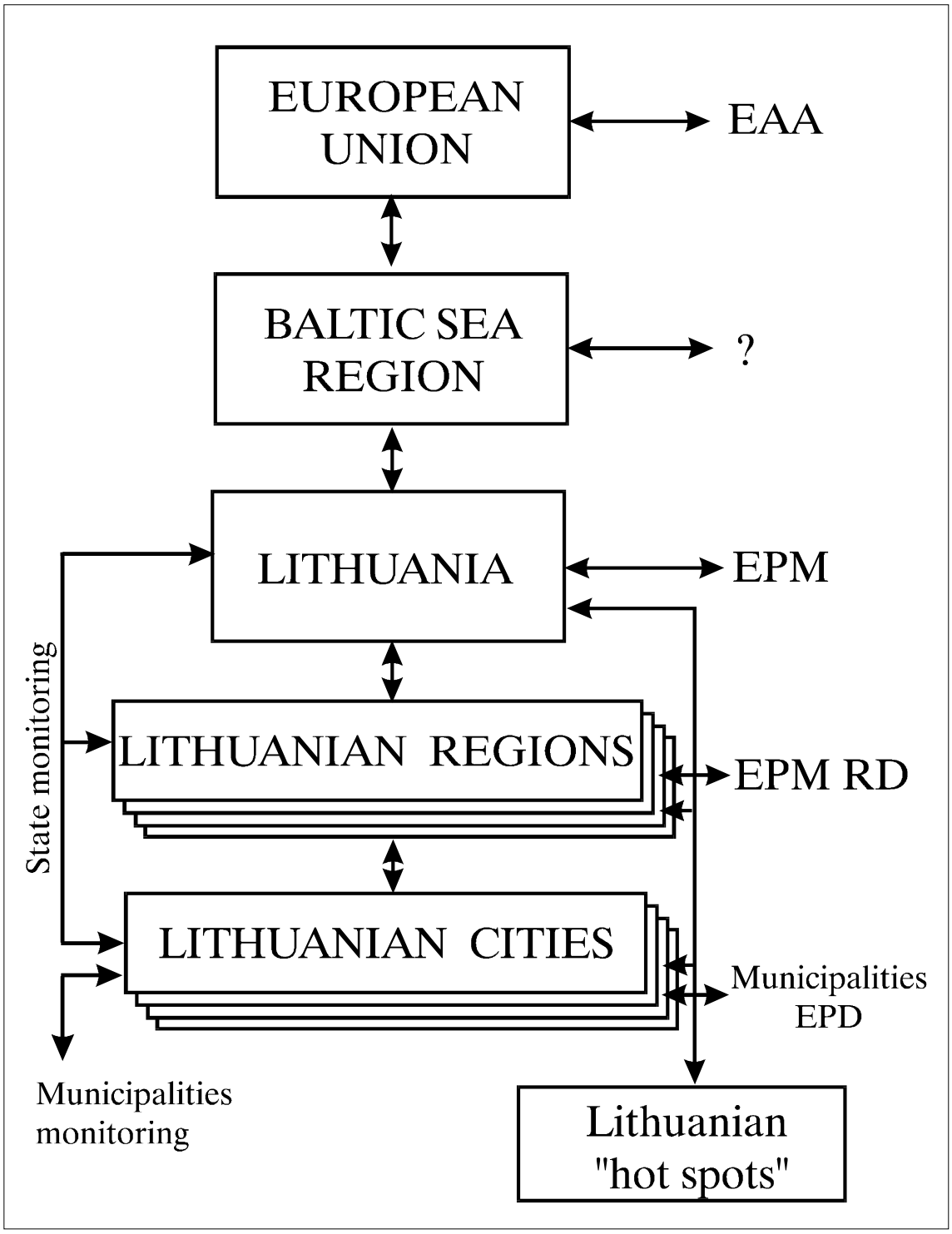

Figure 6.Air quality monitoring and management (local, state, regional)

The main functions of authorities involved in air pollution monitoring and management:

Environmental Ministry
Joint Research Center
Development of the strategy and methodological needs, control of compliance with law, general overview of monitoring data, reports to the Government and international organisations

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Regional Agencies of LEM
State monitoring, analysis of data, decision-making for air quality management, regular reports to LEM

Municipalities
Participation in the State monitoring program with financial support, carrying out of measurements, development of the monitoring network, data analysis, public information, air quality management, regular reports to RA LEM

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4 Conclusions

- Measurements and modelling techniques must be used jointly in order to assess ambient air quality at minimum cost.
- Two types of monitoring network should be practised in Lithuania in future: ***automated*** urban monitoring air pollution network and ***manual*** monitoring network.
- A few automated monitoring stations being part of the EU network must be equipped in accordance with the EU requirements.
- Municipalities monitoring program must be part of the state monitoring program and the state monitoring program must be part of the Baltic Sea region and the EU monitoring program.
- Monitoring is only part of the complex air quality assessment and management system.

General Trends and Challenges for Waste Management in Europe

Carlos García-Suárez [I]

1 Introduction

Traditionally, environmental regulations and environmental practices has been segmented depending of the type of media they referred to, i.e. water, air, land, etc. In current times, a more comprehensive holistic view is preferred by which we tend to understand that quite frequently many environmental aspects are interconnected and that the best way to minimise environmental impacts is by a preventive and integrated approach. For example, some problems in the area of waste might have been generated by a poor designs efforts, or by the generation of waste in wastewater treatment plants, or by the use of certain air emissions clean-up system. This is all to say that waste problems are not really just waste problems but that are general environmental problems.
However, if we opt to keep for a moment the traditional segmented view of the past. One could possibly say that waste related issues are the most present in area of our economic and social activity. Virtually everybody, at work or home is a waste producer.
Yet there is not a general European regulation limiting the production of waste. One can produce as much waste as desired as long as properly managed.
But, why is waste reduction so important:
Dealing with waste means a poor utilisation of scarce energy and raw materials
The handling and disposal of waste (transportation, treatment, etc.) has economic and environmental consequences that might affect air quality, water quality and soil quality
Un-proper waste management can cause serious environmental damage: e.g. Contaminated land and polluted underground

2 Waste management strategies

The 5th European Environmental Action Program has defined waste production targets. It indicated, for example, that the waste generated by the 2000 should not exceed the volumes produced in 1985. In addition, the EU have defined the current strategy on waste as compromising several key ingredients such as: prevention, re-use, promotion or recovery, minimisation of disposal, regulation of transport and definition of criteria for remedial action. A number of key-regulations have been issued in the last decade that materialises part of this waste strategy. Directives such as the well Packaging Waste Directives, the Council Regulation 880/92 on Ecolabelling and many others (see attached slides) are examples of this regulatory initiative.

3 Trends in Europe

The following trends can be signified in our opinion

- Greater role of Product oriented policies
- Use of LCA and Ecolabel type of tools
- Promotion of an Integrated Product Policy by the Commission

[I] Environmental Transport Planning, Madrid, SP

- Set up and achieve more demanding objectives for recycling and widespread implementation of the Packaging waste Directive
- Partial internalisation of external costs via taxes on packaging and landfill disposal
- Improve market for recyclable materials
- More "consensus" type of work for specific types of waste (in the line adopted by Priority Waste Stream Programme)
- More work will be done to obtain better waste related statistics
- Improved design and operation of landfill
- Tighter demands on incineration plants for both hazardous and non-hazardous waste

4 Role of Telematics in Waste

Telematics can play an important role in helping EU economic and social actors achieve the target and principles set up. For example, telematics can help in:
Developing internal markets for recycling of products
Improving general data collection mechanism
Gather more credible information for LCA type of exercises (e.g. Transport information)
Monitor environmental effects of the various waste disposal options

ITEMS PROJECT SNAPSHOT

PROJECT No: 27723	**ACRONYM: ITEMS**
TARGET MARKETS: It is expected that in the coming years most organisations and industrial facilities in the EU whose activities may have an environmental impact will adopt the ISO 14000 or EMAS standard for implementing their Environmental Management Systems (EMS). All of them have a clear need for an application in this trial application since it simplifies and reduces the costs of implementation, operation, actualisation and maintenance of these Environmental Management Systems. Although this application in principle is relevant for all kinds and sizes of organisations, the need for such an application is especially relevant for SME companies, since for these organisations the costs of implementation and maintenance of an EMS are particularly hard to bear. As a consequence SMEs are expected to benefit strongly from a "standard" market solution that can easily be adapted to their individual needs. **TECHNOLOGIES:** L**eading-edge IT technology** for building ISO-9000 oriented solutions will be adapted to the Environmental field (EMAS and ISO-14001). The software will be **tested** in a **real-life situation**, in different EU locations, **assessing its viability** and making sure that the obtained solution is marketable in the whole Europe. **Environmental technology** required for the proper functioning of a software supported Environmental Management Systems will be transferred from the Environmental consultants to the IT specialist to allow them enter into this specialised market, get an important knowledge about it and in the future design and deliver new IT solutions on it. **Software technology** will be transferred from the IT specialists to the Environmental consultants which will permit them to commercialise the ITEMS application as part of their offered solutions, both for	

large organisations and SMEs. The **technology** from both Environmental consultants and IT specialist will be transferred to the final application **end-users**, so that they can use and benefit from it in the future.

EXPLOITABLE RESULTS:

Two main interrelated practical results will be obtained at the end of this project:

- Methodological and technological knowledge and experience for the implementation of IT-based Environmental Quality Standards (EMAS and ISO-14000) in industrial installations.
- An operative and tested leading-edge software application which supports such standards.

It is the objective of the industrial partners of the consortium to transform the final result of the project into a product. ITEMS will be commercialised as a Client-Server software application, composed for installations on one Server and several Clients.

ANTICIPATED OR DEMONSTRATED BENEFITS:

All partners are expected to benefit from the technology transfer process associated to this project. Environmental Consultancy firms will gain knowledge and experience from the IT sector, thus adding value to the services they offer. The IT company will gain knowledge and practical experience in the Environmental field, giving it an important insight in the needs of this sector for future developments. In principle all kinds and sizes of end-users that plan to implement Environmental Management Systems in the coming years may benefit from this application. However, especially SMEs are expected to benefit from this application, since for these organisations the costs of implementation and maintenance of an EMS are particularly hard to bear. SMEs will be greatly helped with a "standard" market solution that can easily be adapted to their individual needs.

APPLICATION AND ASSESSMENT OF RESULTS:

Application area is IT products supporting long-term Environmental Management objectives in industrial organisations. The ITEMS product is a computer-based tool to help and support industrial companies maintaining, monitoring and improving their Environmental Management System. Is focused on ISO-14000 and EMAS support.

INNOVATIVE ASPECTS:

Presently, the implementation of Environmental Management Systems according to ISO 14000 or EMAS is basically done through the development of a set of inter-related paper-based documents (the so-called Environmental Manual, Procedures and Working Instructions and Environmental Registers). This application will simplify and reduce the costs of implementation, operation, actualisation and maintenance of these Environmental Management Systems, since it will **automate** the all standard relations, document generation, procedures and other activities required by the ISO-14000 and EMAS standards.

Dr. Carlos García-Suárez
Director General (Madrid)

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General Trends and Challenges for Waste Management in Europe

First Pan-European Environmental Telematics User Forum

München, June 21st 1999

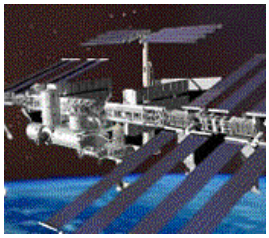
Saturday, June 19th 1999

"El Mundo", 2nd largest newspaper in Spain

- "International Space Station at risk by space waste:

  an old Russian rocket was 7km short of hitting the international space station"

  NASA recognises that the space station was very close to be destroyed and become just history"



- There are some 8700 old space ships orbiting the earth

Waste

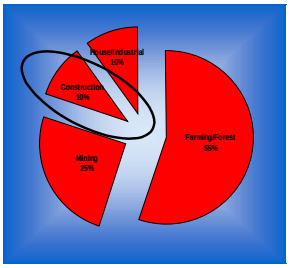
in an integrated environment approach

- The old "media" oriented approach when dealing with environmental issues is being surpassed by the trend to view environmental effects as a whole *(There is no point in cleaning water or air discharges at the expense of polluting to soil). In addition, waste is quite frequently an intermediate step towards air, water or soil pollution.*
- However, if for just a moment we keep the "old view" one can bet that "WASTE" is the most present environmental problem

---

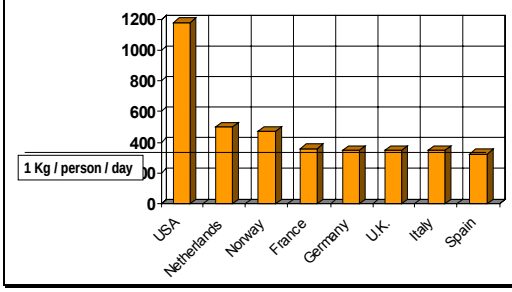
Where does waste come from ?

- Industries: e.g. During EMAS or ISO 14001 implementation in most factories it happens that almost anybody is a waste producer
- Citizens: we all are waste producers
- **Yet, there is almost no regulations with "waste quality" objectives in mind**
  (with the exception of the Directive on Packaging and Waste of Packaging)



Domestic waste vs Standard of living

(kg/person/year)



5th Framework Programme target

- Some targets have been achieved but in general terms we are far away from the objectives:

  Stabilising waste production at the 1985 level by the year 2000

It will actually grow by 30%

Why to worry about waste?

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① Waste means a poor utilisation of scarce energy and raw materials

② Dealing with waste is costly:

- The handling and disposal of waste (transportation, treatment, etc.) has economic and environmental consequences that might affect air quality, water quality and soil quality
- Un-proper waste management can cause serious environmental damage: e.g. Contaminated land and polluted underground

What happens to the waste

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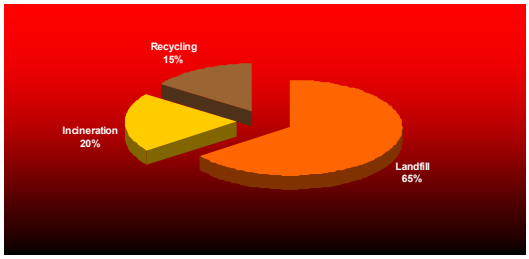

Great differences per country (domestic waste)

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Country	Recycling	Compost.	Incinerac.	Dump
Netherlands	28	18	31	23
Spain	10	11	5	74

% of glass recycling

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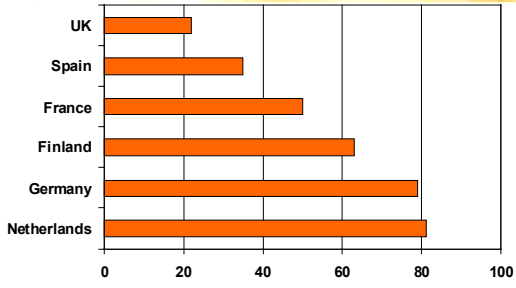

EU Strategy on Waste
Council Resolution May 7, 1990

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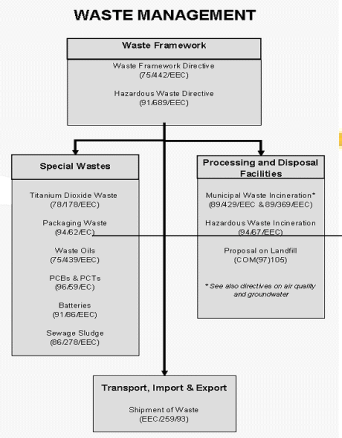
Examples of Regulations

•Prevention •Reuse	Ecolabel Scheme Integrated Product Policy/ LCA approach
•Promote recovery •Minimise disposal	Directive on Packaging+waste of pack. Landfill of Waste Directive
•Regulate transport •Remedial action	Trans-boundary movements of Hazardous Waste Directive

WASTE MANAGEMENT



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This is the only one that sets up specific targets for waste reduction

Unlike in waste or air:

•We do not have any regulations that limit the production of waste!

•...except maybe IPPC

Packaging Waste Directive

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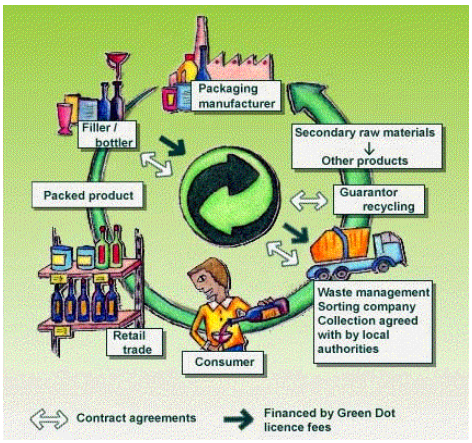
- Important points
  - It sets up specific target for recycling (between 25% and 45%)
  - It includes requirements for specific collection mechanism: Return systems, Integrated collection systems, it also makes emphasis in data collection as well
- Difficulties
  - The logistics involve is quite complex
  - Insufficient markets for used materials
- Sucesses
  - Wide adoption of German "Grüne Punkt" Logo
- Challenges: wider implementation across Europe and higher recycling / recovery objectives



Regulations for specific types of waste

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- Priority Waste Streams Programme (1991)
  - Used Tyres
  - End-of-life of Vehicles
  - Health care waste

  } Pending approval

Review of the European Community Programme Towards sustainability September 1998

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- *"to develop a framework for an integrated, life-cycle orientated product policy, which will address, interalia, the further development of life-cycle analysis, including the reduction of waste generated, and ...*

  ... will take into account implications for the internal market, in order to promote the development of cleaner products by incorporating environmental considerations into their design and minimising the use of persistent organic substances, heavy metals and substances with an irreversible impact on health"

Current instruments to incentivate LCA and Product "eco-efficiency"

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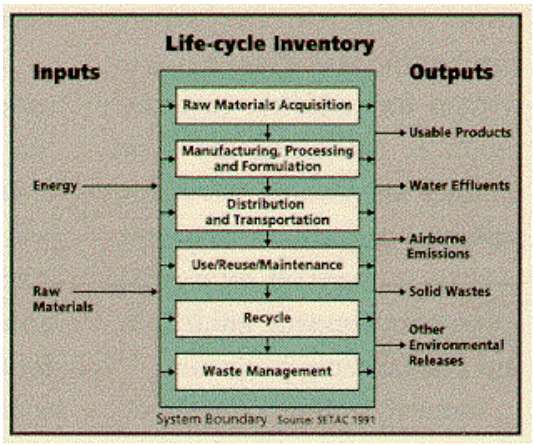
- **Council Regulation (EEC) No 880/92 of 23 March 1992 on a Community eco-label award scheme**
- ISO 14040 Family of standards
  - ISO 14040 LCA-Principles & Procedures
  - ISO 14041 LCA-Inventory
  - ISO 14042 LCA-Environmental Impact Assessment
  - ISO 14043 LCA-interpretation
  - *ISO 14020 - 14024 Labelling Systems*



Commission Decisions establishing ecological criteria for the award of a Community eco-label:

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- **washing machines**
- **dishwashers**
- **soil improvers**
- **toilet paper**
- **kitchen paper**
- **copying paper**
- **laundry detergents**
- **single-ended light bulbs**
- **indoor paints and varnishes**
- **bed linen and T-shirts**
- **double-ended light bulbs**
- **refrigerators**
- **toilet paper, kitchen rolls and other tissue-paper products**
- **dishwashers**
- **soil improvers**
- **mattresses**
- **paints and varnishes**
- **textile products**
- **footwear**
- **personal computers**

Recent Commission Work

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- May 1997, the following study was presented:

  Ecobalances for Policy-Making in the Domain of Packaging and Packaging Waste

- July 1998, a second complementary study:

  Analysis of Methodologies for Ecobalances for Packaging and Packaging Waste

  by Öko-Institut (D)

Current limitations to LCA

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- LCA analysis sometimes lack credibility because input data is averaged across very different regions
- There is always a "subjective" ingredient in the evaluation process, specially when comparing different environmental effects
- We really lack overall credible analysis, for example about the convenience to push for higher recycling objectives
- LCA is mostly used as a comparison tool, but a more wholehistic approach is needed: IPP

Trends in Europe

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- Greater role of Product oriented policies
  - use of LCA and Ecolabel type of tools
  - promotion of an Integrated Product Policy by the Commission
- Set up and achieve more demanding objectives for recycling and widespread implementation of the Packaging waste Directive
- Partial internalisation of external costs via taxes on packaging and landfill disposal
- Improve market for recyclable materials

Trends in Europe

Environment Transport & Planning
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- More "consensus" type of work for specific types of waste (in the line adopted by Priority Waste Stream Programme)
- More work will be done to obtain better waste related statistics
- Improved design and operation of landfill
- Tighter demands on incineration plants for both hazardous and non-hazardous waste

Role of Telematics in Waste

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- Telematics can play an important role:
  - Developing internal markets for recycling of products
  - Improving general data collection mechanism
  - Gather more credible information for LCA type of excersices (e.g. Transport information)
- In the 4 FP few projects were tackling waste related issues. But today we have a few excellent counter-examples
  - System for reuse of construction waste
  - System for better management of contaminated sites
  - Urban waste management at a regional level

Internet Information Platform for the Construction Industry

Martin Car[I]

1 Initiation

In 1997 the Technical University of Vienna, in cooperation with the City of Vienna, the Austrian Association for Recycling and Construction Industry, the Construction Industry Association, the Federal Ministries for Economic Affairs and for the Environment and other related institutions set up a working group concerned with the installation of a Construction and Demolition Recyclables Exchange. A testrun was successfully accomplished in western Austria and after several other federal governments had joined the project, regular operation began in summer 1998.

2 Contents of the C & D Recyclables Exchange

1. Secondary building materials of mineral origin:
   - total range of products (quality classes)
2. Construction and demolition waste of mineral origin:
   - uncontaminated soil
   - road debris and demolition concrete
   - construction and demolition waste
3. Humus and compost:
   - upper soil layer
   - organic composting material (quality classes)

The C & D recyclables exchange is not a trading platform for these materials. It only provides information about where, when and what type of material is in supply or demand, and who offers or needs it. The aim of the C & D recyclables exchange is to actively contribute to environmental protection, by reducing landfill quantities and promoting the marketability of recycled building materials.
Technically speaking, the C & D recyclables exchange is an MS SQL database application in the Internet

The target group addressed by the C & D recyclables exchange are building societies, recycling companies, forwarding agents, landfill operators, public and private customers, architects and consulting engineers. But also individuals who undertake to build their own house can check supply and demand an this platform.

Information about supplies/demands can be most easily recalled via internet and is provided free of charge.
Authorised users can also enter their supplies/demands via internet. Individual ID's and passwords are currently free of charge, a small subscription will be charged starting next year.

[I] Recycling-Plattform-Bau, Karlsgasse 5 A-1040 Vienna, AT
fax: +43 1 504 15 55, e-mail: car@brv.at URL: http://recycling.or.at

Figure 1.: The C & D Recyclables Exchange Start Page

The C & D Recyclyable Exchange is supported by:

- Federal Goverment of Austria
- Federal Ministry of Economic Affairs
- Federal Ministry for the Environment, Youth, and the Family
- The Associations of the Construction Industries

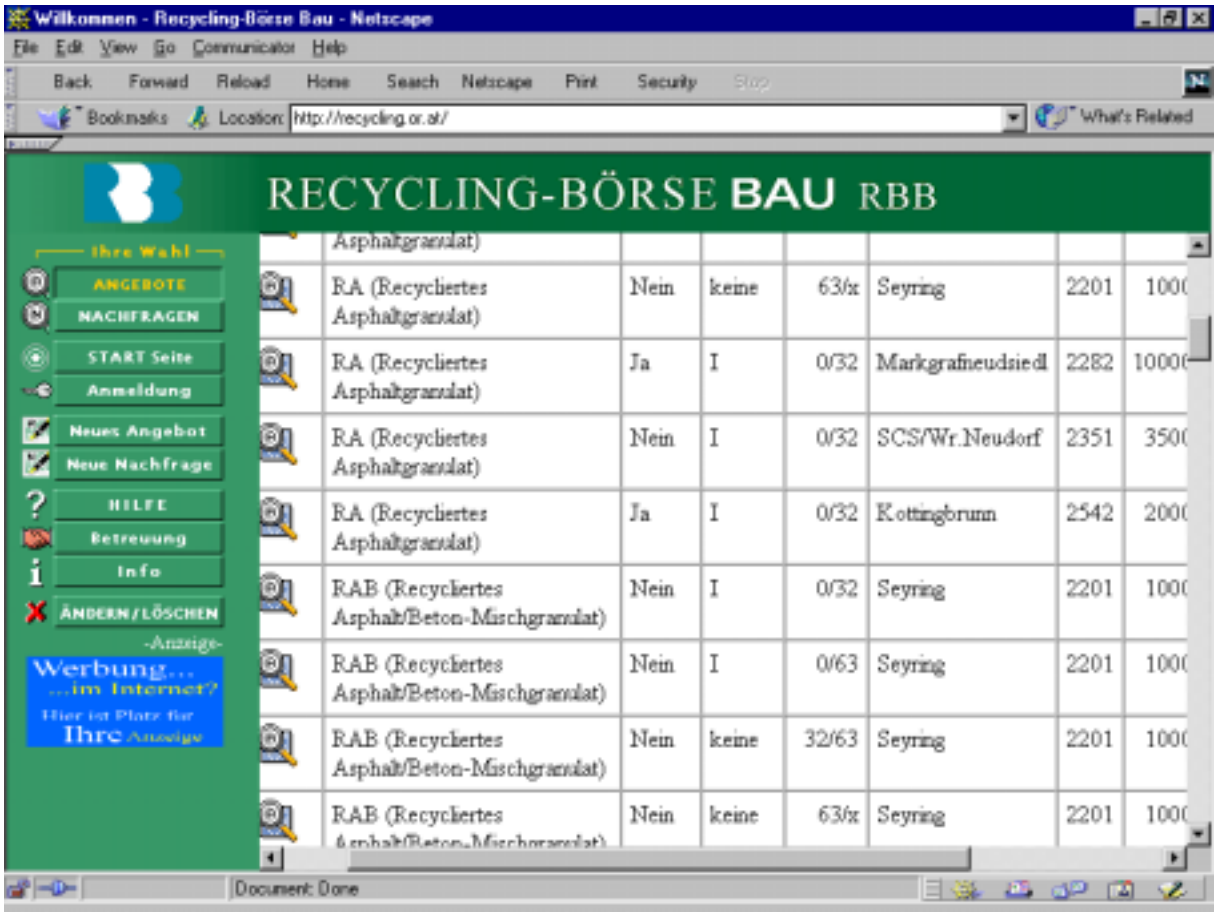

Figure 2.: An excerpt of the C & D Recyclables Exchange: Supplies in Lower Austria

RA: Recycled Asphalt-granulates

RAB: Recycled Asphalt/Concrete mixed granules

GIS Integrated Contaminated Sites Management

Werner Flacke[I]

Abstract

Objectives of the COSIMA project were to develop an integrated GIS-based Contaminated Sites Management Support System (CSMSS) to assist experts in identifying, registering, assessing and remediating sites. The project's task include: Definition of a common site examination strategy, definition of a uniform data model, and GIS-integration, i.e. to provide access to all relevant geographic data and to provide all analysis tools to support decision making. Whereas 2-D-analysis is standard in GIS, a special focus of the analysis tools lies in the additional dimensions of time and depth.

3 Site examination strategy and driving forces

The following site examination strategy was agreed. It refers to each individual site. Besides the evaluation of one specific site it is important to manage the status of all sites and to priorize further activities. I.e. the current status in Cologne is that there are about 800 registered sites. The uniform data model includes site-status (intial phase, risc analysis, assessment, remediation) and priority amongst many other site attributes.

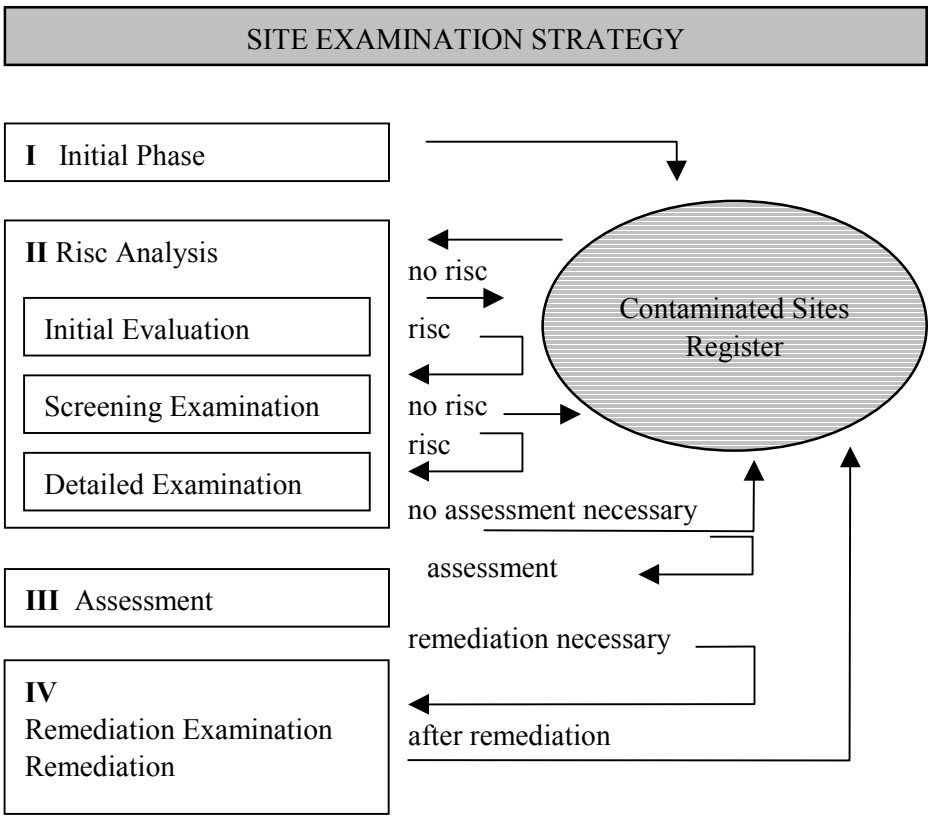

Fig.1: Site examination strategy.

[I] ESRI GmbH, D-85402 Kranzberg, DE,
phone: + 49 8166 677 0, email: w.flacke@esri-germany.de, URL: http://www.esri-Germany.de

The driving forces for contaminated sites management have environmental and economical background:

- Severe contamination caused through industrialisation endangers nature and human beings.
- Continuous urban agglomeration and encroachment on green areas creates the necessity to recyle historic industrial sites.
- Manual work flow must be substituted by efficient, integrated software tools.
- Urban development and planning has to be able to attract investors by offering high quality sites.

4 System architecture and data

The graphical user interface is hosted by the GIS, ARC/INFO. Geographical data for online access are in coverage format and are accessible file-system wide. External data in other formats such as the parcel- and building inventory require conversion tools. An ORACLE database contains all attribute data which are shared by another application, UMsys. Regulations concerning limit values are also shared by the two systems. Basic data management tasks (creating an object, deleting an object) are synchronized by the use of stored procedures. The GIS application manages all metadata. The GIS application stores the user's work as themes, views and layouts permanently. It provides rich analysis functionality, which covers also the dimensions of time and depth. Final results are published as maps by the GIS application and as reports by UMsys.

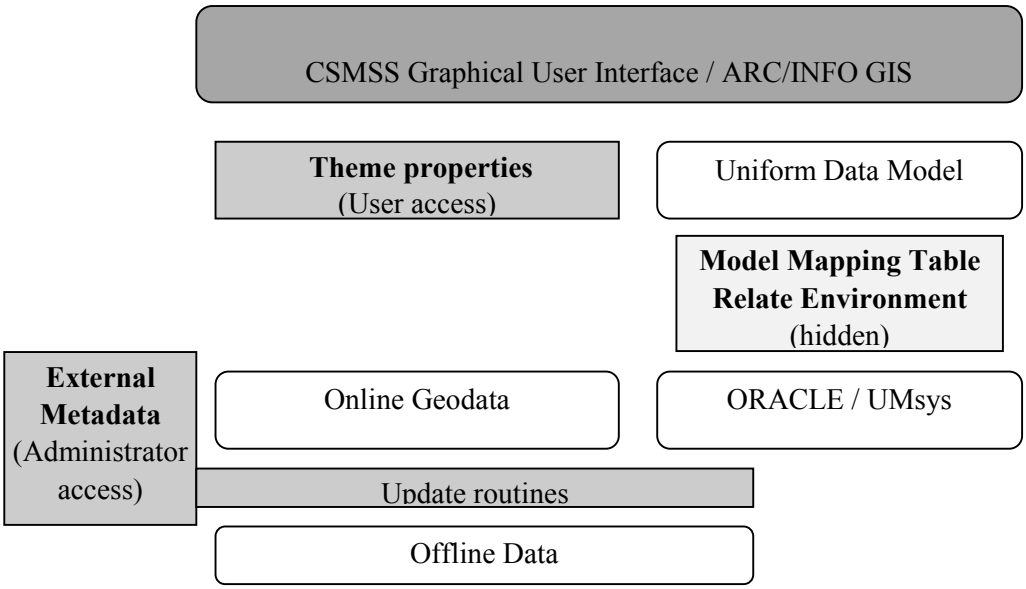

Fig. 2: Architecture and the role of metadata

Metadata describe type of data access and validity of the data. They include:

- Level of data integration (original source online or offline, path, url, local copy, ...)
- Type of data (Alphanumeric, Geographic, Vector, Raster, ...)
- Format of data (Coverage, ORACLE-table, tiff, sqd, ASCII, Excel document, ...)
- Level of Intelligence (Background data, descriptive data, static keys, dynamic keys,...)
- Type of Contents (Admin. Boundaries, geology, infrastructure, properties, buildings, ...)
- Type of source / owner (Planning department, cadastral department, ...)

- Last update
- Geographic extent
- Update process
- Update cyclus

These metadata are external to the CSMSS (editible by the administrator). Inside the CSMSS there are metadata on how the data are used (theme properties, editible by the user) and how the UDM attributes can be accessed from another database application (invisible to the user).

CSMSS-data sources include following regional and urban authorities and their data:

- Mapping agency: Topographic maps, cadastral maps (Automated Real Estate Register, ALK)
- Local council (statistical department, planning department): City development plans, census blocks, spatial reference system, streets
- Geolocical agency: Geological maps, soil maps
- Environmental department: Water protection zones
- Local water-, gas- and electricity- supplier: Wells, sewers, facilities
- Site investigator / planning applicant: Site information
- Developer / contractor: Measurement data
- Adminstrative actions: UMsys database
- Standards: Knowledge database

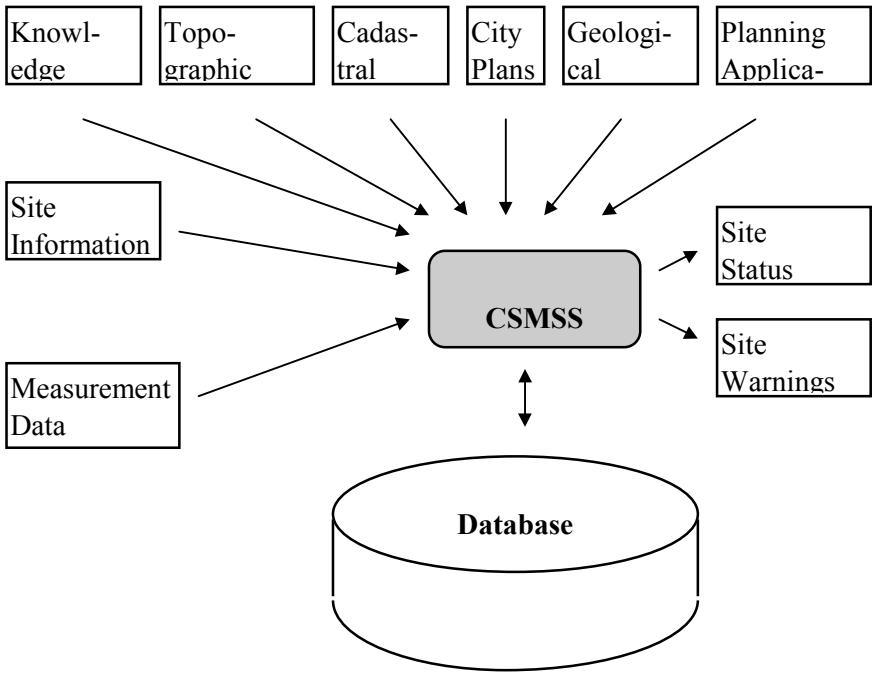

Fig. 3: Overwiew of the inputs and outputs of the CSMSS

UMsys-data are mapped against the Uniform Data Model on the basis of attributes. Access to the data is created dynamically after reading the mapping table. The technology behind it is the ARC/INFO-relate-environment. For each attribute an internal meta data structure holds following information:

- Plain text which describes the attribute and is used in the user interface
- COSIMA name of the attribute
- COSIMA table
- Class of geo-objects to which the attribute belongs (site, fixed equipment, ...)
- Primary key used by the class of geo-objects
- UMsys attribute name
- UMsys table
- Foreign key used by UMsys

This mechanism is the basis for the transferability especially with respect to the uniform data model.

5 Practical experience

The installation of an integrated solution requires a process of integration. The City of Cologne had been in the process and still continue. The product which has been developed fits into this process.

The product which results from the COSIMA project must be offered as a software product plus consulting. It has to be adapted and was designed to be adapted. The common elements between the project sites Bologna, Cologne, and Cork lie on a conceptual level (site examination stragey, uniform data model and GIS integration). That background provided a good experience with respect to transferability.

The data which are involved use to be very valuable and often must be shared by other applications. In case of geodata it may be necessary to convert them from other data formats. In case of attribute data the contents of an existing relational database can be related to the logical data model defined in COSIMA. The City of Cologne uses UMsys to manage environmental attribute data, workflow and documents.

The major tasks in this project belong to the fields of system integration, data availabilty and data entry. The experience can be summarized as follows:

- GIS expertise is required. This was the case in Cologne.
- User acceptance can be improved by role-specific training and in the future role tailored clients are envisaged.
- There was just enough time to enter a sufficiently large amount of test data (sites and measurments).
- There was not enough time to capture sufficient amount of historical data.
- Visualisation is a valuable and effective way to check data.
- Attrinute data of sites and measurements could be shared by another application „UMsys“.
- The interface to UMsys prooves the transferability of the system.
- The GIS-application-core could be reused to host the management of biotopes and traffic noise assessments.

Telematics for Waste Management in the Rhône-Alpes Region

Pierre FLORI[I]

Abstract

The information system on waste in the Rhône-Alpes Region (Sindra project) is a decision-making and assessment tool designed for (domestic solid) waste managers. This tool uses Internet communication technologies and sets up interactive relations, on the one hand between the users and the database, and on the other, between the users themselves. These connections, covering the whole region, make up a network of partners that are all interested in improving their own management for the benefit of comprehensive waste management in the Rhône-Alpes Region.

1 Sindra: a tool designed for (domestic solid) waste managers in the Rhône-Alpes Region

1.1) A decision-support tool: provision of information that is relevant (adapted to waste issues) and reliable (continuous validation and up-dating).

1.2) An assessment tool for policies and actions undertaken: localised monitoring of actions (control board) and comparison with actions of other partners.

2 A tool continuously adapted to the needs of users

2.1) Concerted development of the information system (audit)

2.2) "Forum": venue for suggestions of users on the operating of the system

2.3) Organisation of network: "web master" for the hot-line, permanent concertation and organisation of theme meetings.

3 Project open to all local authorities in the Rhône-Alpes Region

3.1) Precision of network of partners, to just about the same degree as the telephone network

3.2) Systematic pooling of local data at different geographical levels: analysis and synthesis

3.3) Comparison between managers and transfer of knowledge

4 Interactive relations: managers - system and managers - managers

4.1) Consultation and input of data by each partner

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Tel.: +33 472 595 131, Fax.: +33 472 594 723, email: dee@crra.globalintranet.francetelecom.fr

4.2) Validation of data: a prerequisite to network distribution

4.3) "Forum" and "news flashes": communication between partners

5 Technical tool with a cultural and economic dimension

5.1) Tool requiring the commitment of partners and decision-makers

5.1.1) To show that the expected benefits reflect the level of investment

5.1.2) The performance of the system depends on the level of partnership

5.2) New management methods to be adopted by partners

5.2.1) Integration by each manager of standards, "external" definitions

5.2.2) Operating constraints: frequency and date of up-dating, validation / data control, etc.

6 System transferable to other regions and other environmental fields

6.1) Transferability to other geographical areas, regardless of their reach: universality of Internet

6.2) Transferability to other fields of the environment: integration of various environmental fields (cf. superposition of geographical information layers).

Panel Discussion: "Telematics Tools in the Environment Sector: The Real Contribution to Sustainable Development"

Panel Chair:
Siegfried Rupprecht: Rupprecht Consult-Forschung und Beratung GmbH, Cologne DE;
Technical Co-ordinator of the CAPE Project,

Panel members:
Nick Hodges: Leicester City Council; Leicester, UK;
Special Project Officer in charge for Transport and Environment Project on European and National Levels, Memeber of the ENWAP expert group
Joachim Lorenz: City of Munich, Munich, DE;
Top civil servant responsible for Environment and Health issues in the City of Munich,
Violeta Kauneliene: Environmental Center of Administration and Technology, Vilnius, LT;
The Environmental Center of Administration and Technology is a NGO in Lithuania, supporting the Development Implementation of Environmental Projects in municipalities;
Franz Jungwirth: Bavarian State Ministry for Development, Bavaria, DE;
Especially in charge for the regional Bavarian Development programme, in the area of air quality
Franz Josef Radermacher: Director of the FAW (Research Institute for Applied Knowledge Processing), Ulm, DE;
Steering committee member of the Information Society Forum of the European Commission
João Ribeiro da Costa: University of Lisbon, Lisbon PT;
Frequently involved in Environmental Programmes on European and national levels, member of the ENWAP expert group

The discussion reflects general statements from a variety of backgrounds and perspectives with statements concerning local, regional, European, and global levels. The following documentation offers a complete record of the panel discussion. The original recording can be found as real audio streams on the Internet at the following address: http://www.isep.at/conferences/.

1. Intro-statement Nick Hodges: "The aim of Telematics should be to raise the awareness of administration, politicians, technical staff and the public and to implement choice firstly by the public and secondly by the infrastructure"

As an example *Nick Hodges* sketched the situation of Leicester and the experience made with traffic demand management. Leicester is situated in the east midlands at the M1 motorway from London to the north; 400.000 inhabitants including the suburbs areas; Leicester was the first UK Environment City which was a challenge to act in an eco-friendly way. 1996 Leicester won the EU´s Sustainable City Award. NH presented a dispersion model with meteorological parameters (inversion layer) includes the motorway and shows hot spots near the city center (using AVIRO eulerian grid dispersion model) The model is supported by live emission data, live demand responsive traffic control data. Using active Traffic control it was possible to give priorities to some routes. So it was possible to relocate traffic queues to an open area. The pollution load was not reduced, but located to a more rural area. The politic dimension started due to its area was in other authorities area. Regarding to this fact the question has to be raised who is responsible for the emission (e.g. are commuters from the city's vicinity responsible for the pollution).

An alternative would be to brief the public and encourage them to come by public transport (rail or bus)

In an experiment with road tolling or a park and ride system with offering a quality bus it turned out that travel time by bus is 10 min, by car 25 min for the same distance.

2. Intro-statement Joachim Lorenz: Telematics and its role in information about health and environment related issues

Situation:

Munich has a 15year tradition with environmental information. The City Council encouraged to have environmental information for the public and for institutions. In the beginning, print media were used and an information office (Umweltladen, up to now) was established. Using telematics, a new era begins in terms of public information, also the EC esp. the TAP Programme enabled new possibilities.

Chances:

- Better knowledge about the environmental situation and information for public, administration and also institutions with better opportunities for information exchange. A legislative basis ensures the right of environmental information for the public (Rechtsanspruch, approx. since 1993).
- Telematics is the main tool for fulfilling the legal framework on public information. (data acquisition, data management, data dissemination, Internet, Intranet, info-kiosks).

- Telematics will help to raise public awareness and serve also as a tool for decision-makers (within the local authorities).

Risks:

- Telematics has to be a tool for improving the environmental situation and should not be developed as tool without keeping the objectives in mind.
- Data management and data handling has to be carried out very carefully and transparently
- Transport Telematics solutions may cause problems due to relocating of traffic and relocating of traffic queues, often followed by the relocation of noise and pollution emission.

Future priorities: (concerning city networks within Europe)

- Improving City-networks on a national and on an international scale, the European Union has an important role in the development and implementation of Telematics Solutions.
- Establish a standardised European indicator system to be comparable with Environmental data of other cities
- Telematics is a voluntary action in Munich! Problems exists due to the lack of personal resources within the city administration. Munich solves the problems partly with participating in EU Programmes.

3. Intro-statement Violeta Kauneliene: Problems for the implementation of Telematics in Lithuania as an example

Problems for implementation in Lithuania is that there exist no rules and no established procedures for providing environmental information. The public is not informed - or cannot be informed – on how they can access environmental information. Moreover, there exists only a low quality environmental information because there is a long delay for publishing environmental data. Most environmental information is restricted to reports on paper. A face to face communication is often needed to retrieve environmental information. In Lithuania the lack of funding, the lack of institutional cooperation, relatively low expertise in the field of IT are the main obstacles that have to be overcome in the future.

Raising awareness about telematics issues would also raise public awareness. This would support environmental management in general and support sustainable development.

Telematics should be a tool for the dissemination of environmental information and never become a goal itself. Attention and funding for the development and implementation on telematics should be given in a good proportion with other actions to maintain the principle of sustainable development.

4. Intro-statement Franz Jungwirth: The use and the benefits of Telematics for the Bavarian area with 71.000 km^{2}and 12.000.000 inhabitants

Protection of the environment has to be supported by the public and will be especially supported by a well informed public. Correct and timely information is the most sustainable way for environmental protection. The Bavarian state ministry uses the Internet as an information tool for general environmental information and background information as well as for very detailed information such as

summer smog by ozone or for a specialised background information about the recently ongoing discussion on electronic smog caused by mobile phones. Mr. Jungwirth sketched two examples where Telematics was used as a decision-making tool in Bavaria:

Risk Management for floods in Bavaria

The main tasks to avoid destruction by floods is preparedness and appropriate flood prediction. The total length of rivers within Bavaria is about 6000 km. The level situation is observed by gauging stations and this parameters are combined with meteorological data from the German Weather Service (DWD – Deutscher Wetterdienst) and with other parameters (such as topographic data). Telematics help in modelling and simulation of flood and is also a tool for landuse and landplanning. Finally it is a tool for political decisions.

Planning the train track for ICE München – Nürnberg in 1993

After a long and almost never-ending discussion about the new planned route for the track of the ICE (Inter City Express) from Munich to Nuremberg a digital noise chart helped the council to make a final decision about the rail-track.

The general framework for the use of Telematics is:

- A well established technical infrastructure to improve the communication between administration and institutions. An improved data exchange is necessary for decisions making.
- For an appropriate use of Telematics a training is necessary to have the benefit of environmental information. This training has to include all levels of the staff even up to the Minister.
- The Interface is one of the most important issues. Only a user friendly Information Technology will be accepted and broadly used and can be used as a service for the citizen.
- Raising the awareness of the use of telematics and its possibilities is also necessary even for high level authorities and politicians.
- Telematics is a tool that became more powerful within the last years and helps the public, the administration and the political decision-makers to create a more sustainable politic.

5. Intro-statement Franz Josef Radermacher: "If we are honest we are not on the way to a sustainable Society, we are on the way to a more and more unsustainable Society. We just use the word "sustainability" for marketing reasons."

"It is necessary to take a much broader view and - for the essentials - recognise that we only can be as sustainable as the world market allows us to be sustainable. We have to be competitive with the partners we have, also with global partners. We do not have the choice. How can we contribute to a global sustainable development? We are even in danger to lose the benefits that we have already reached. E.g. the liberalisation of the energy market - which is a consequence of the world market pressure - causes that the combined electricity/heat production cannot be financed any longer. Financing it can often be done only under a monopoly. Is becomes harder to finance reasonable things. A lot of money is used for social infrastructure. Problems may occur with the step out of atomic energy for Germany. The power is then generated in the Ukraine or in France and traded from there."

The global view of development and sustainability has always to be kept in mind. "We have so much of that *narrow local view* instead of what we need under a *broad world wide view*. The environmental

question and the question of sustainability will be decided world-wide and not only in Europe. The real powerful drivers will be e.g. India and China by starting doing what we now already do."

Many of our solutions are eco-efficient but under a closer view they are not solving the problems. They often even create greater problems.

Example: Road Traffic Management systems:
The better traffic management systems are handled the more capacity is given to existing traffic infrastructure as more traffic will be the result.

Example: Air traffic Management system:
Air travel time can be reduced by the use of air traffic management systems. The use of fuel will increase, free capacity will be used for more flight connections. As a result the market will drive the price down and finally there will be more air traffic as it was on the starting point.

"The question is :What can be done, what can Cities do?"

"One possible answer:
The Local Agenda 2000 is a good opportunity, but not in the way to save the world locally but to built new partnerships especially with developing countries. A suggestion is that every European town should have a partnership town with at least five time as many inhabitants. 20 % of the city budget should be used in the partnership region. This Global Cities dialogue would help to work on global solutions and would strengthen the network with others regions.
The biggest chance for a global dialogue can be seen in the Kyoto contract:
CO_2 emission can be addressed world-wide. That means instead of using a lot of money to have a little impact here, it is more efficient to use the money equivalent in China, India or other developing countries. That would also be part of the contract for cleaner production mechanism. This deals should not be misunderstood as "buy us out". We have to "buy us out" much more than now. We will have to spend more for social and environmental development around the globe. That will be the only chance to get things better."

6. Intro-statement João Ribeiro da Costa: "What is sustainable development?"

João Ribeiro da Costa pointed out that sustainable development implies predicting the future. From the past we see that a lot of predictions concerning the environment were wrong. It is clear that sustainability is a global affair and not an affair of a single country. Keeping in mind that sustainable development implies prediction and is global we can resume that sustainable development is a massive task. The solution of this task depends on the action of each of us on a local basis. Here telematics apply. As an example, Telematics means to have a network that connects people to the whole world. For the first time ever it is now feasible for us to act locally and to contribute on a global level. The only way to have sustainable development is to apply telematics at a local level and to combine locally available data on a global level by using available expertise.

7. First conclusion of the Chair

Siegfried Rupprecht resumed that all statements reflect a variety of backgrounds, and perspectives: on a local, regional, European and global level. Siegfried Rupprecht encouraged the floor to participate actively in the discussion.

8. Reaction from the Floor: Teemu Virtanen

Teemu Virtanen (air pollution coordinator for the Helsinki metropolitan area, FI) reacted to F. J. Radermacher concerning the task of delivering technology to developing countries. He stressed the importance of financing better technology in developing countries and promoting the use of better technologies. Teemu Virtanen highlighted the importance to encourage the European industry to contribute to a better environmental situation. He compared the requirement of an improved environmental situation nowadays with the exploit of flying to the moon in the sixties. If we invest in an improved environment we will also have the spin-off effect of the development of new technologies. These new products (state of art technology) should also be used to support developing countries.

9. Reaction from the Floor: Horst Kremers, Berlin

Horst Kremers required to have more detailed documentation of the results of projects funded by national science foundations or financed by the EC. Technicians from computer sciences need a lot of information about technical details. This information would also be necessary for the implementation of technology on new sites. The documentation of scientific projects is often not sufficient documentations do not compriese all information. Knowledge is not spread widely enough as it would be necessary for a satisfying transfer of already developed technology. Often the contractors do not report sufficiently about the results of their work and the funded projects are not supporting the information society.

10. Conclusion and questions raised by the Chair to F. J. Radermacher:

Siegfried Rupprecht: "What special action is demanded from decision-makers from regional and local levels? What are the demands in the telematics area concerning global networking, and partnership agreements with cities in developing countries? How can the development be changed and how can the development be challenged?"

11. Reaction from the Panel: Franz Josef Radermacher

Franz Josef Radermacher: "The main message is: Often the developed solution turns out to be the new problem. That is a historical fact and completely normal. New technologies cause new – and often greater problems and that is the driving force for new technologies with new problems on higher levels."

Concerning the statement of Teemu Virtanen and his comparison with the flight to the moon F. J. Radermacher mentioned that computers are responsible for a lot of new environmental problems by e.g. increasing mountains of electronic garbage. That problem is driven by the price-level of electronic gadgets as e.g. mobile phones are nowadays give-aways. "However, every year everything becomes more environmental friendly."It will turn out as a disaster if everybody on the globe has the same behaviour and uses as much resources as it is done in the high-technology countries." New technologies are only accepted if they are able to deliver new services cheaper as before. That is the real idea of the "eco-efficiency".
"Environmental arguments are often used only for marketing reasons. Consumption cannot be the way leading to a sustainable development. Believing in technology is not the way that leads to a global sustainable development."
Mr. Radermacher pointed out that it is more important to implement a fair global system for the use of wealth than to believe in technology. Therefore it will be necessary to have a fair way of trading the pollution rights. "After an agreement on that the market will find the best solution for the use of a limited amount of CO_2 emissions. That means that we have to take care of an appropriate global market system for selling CO_2 emissions. If this framework is set up in a satisfying way, the right of the market will do the rest. Setting up such a framework means also to have limitations in our lifestyle. That limitations will be caused by the limit of CO_2 pollution that is available for us. That implies that we accept that everybody has the right to use the same amount of CO_2 emissions. E.g. we would have to buy CO_2 emissions from other countries. Consumption would become more expensive here and - on a longer view – consumption will also become more expensive there. The consequence will be a social development in developing countries." I suggest that particular actions for towns could be to establish networks with other towns which would influence the global contracts. The benefits would be the support of towns in the south and awareness building for the real problems. The information of the public about this situation has to be enforced.

12. Reaction from the Floor: Stefan Jensen

Stefan Jensen (Ministry of Environment of Lower Saxony, DE): raised the - provocative - question if the EC should terminate their Telematic Programme and use the saved money for a transition programme for Eastern – Eastern European Countries to follow the path that FJR sketched?

13. Reaction from the Floor: Maria Kazmukova

Maria Kazmukova (Senior consultant in air quality, City Development Authority Prague, ENWAP member; CZ): "Technology is absolutely useful for the global development. Technology is the only way to search for alternative energies. The risk is to impose our way of living to developing countries. That would be the worst thing we can do for them also due to cultural differences.
Maybe the new technologies that would be invented can actually save our environment. Technology should be used to reinvent our use of energy. We have to go on in our technologies to find a energy which is more sustainable and more environmental friendly."

14. Reaction from the Floor: Ivica Ružić

Ivica Ružić (Center for Marine & Environmental Research of the Ruđer Bošković Institute, ENWAP member; HR) pointed out that there are two different things discussed in this panel discussion. He described that from his point of view Telematics is not a technology to change or save the environment. Telematics can only be used to exchange our knowledge faster, more efficiently, and cheaper. That

causes that we can react faster. Telematics can help to address the public and politicians more efficiently. Telematics does not influence the decision that is taken after the exchange of knowledge.
Ivica Ružić mentioned that the knowledge is nowadays collected all over the world and that we want to use this knowledge to make decisions. Telematics can help us to make right decisions.

15. Reaction from the Panel: Franz Jungwirth

Franz Jungwirth declared that the role of new technologies should not only be seen in a negative way. The development of new technologies offers the possibility of the reduction of energy consumption.
To answer the question of the chair of what can be done by local and regional decision-makers:
Any decision needs the acceptance of the public. Sustainability starts on a very small and private scale. Only when the idea of sustainability is accepted by a broad public, this public will understand and will agree to decisions on a global scale.

16. Reaction from the Panel: Joachim Lorenz

Joachim Lorenz pointed out that only the best technology should be transferred globally. The trade of emission rights would not support the transfer of state of the art technology. The trade of emission would support the transfer of old and outdated technologies. Joachim Lorenz pointed also out the importance of the implementation of world-wide standards for emissions. It has to be kept in mind that the implementation will last some time. The implementation of world-wide standards for emissions will also demand the full potential of innovations of our industry and will cause the development of new state of the art technologies.
In the experience of the City of Munich with its partnership-town Harare, the capital of Zimbabwe Joachim Lorenz pointed out the possibilities of Telematics to improve the environmental and health situation in developing countries. This improvement can be done by using the whole potential of Telematics for disseminating the information on environmental issues.
Telematics will play an important role in building new networks and partnerships - even on a global scale - by the exchange of information across borders and long distances. This loss of distances is necessary to build global partnerships. The development of new high quality technology is important to have the security of a high rate of employment. “We have to save our human and creative capital by the development of new technologies.”

17. Reaction from the Panel: Nick Hodges

Nick Hodges mentioned that the benefit for the community itself is important. He pointed out that some transport management systems which work in Europe cannot be transferred to the United States because the cost benefit analysis does not work in the USA due to the low fuel price there. “The transport industry has a strangle hold by that and accepting that strangle hold would be the wrong way.” People in the neighbourhood of an industrial location want to have the pollution load of that location reduced and they will not accept the payment of this industry to a developing country with the aim to improve the state of the environment on the other side of the globe. (That means emission trading will hardly be understood by people who are directly affected by pollution). “Telematics can play a positive role in improving the environment: Telematics is a way to bringing information together. It makes us able to simplify data and present them at the appropriate level. That will help the public to understand and that will influence the way that the politicians decide how their community should be organised.” Telematics offers also the opportunity for people to change and choose e.g. by using telematics for teleworking or for studying on remote sites. Also high quality employees can stay in such remote or/and rural areas by using Telematics.

Coming back to mobility, Nick Hodges noted that there is the idea of road users charging. Some people agree to charging and see the benefit of using public transport, some do not. Nick Hodges pointed out the importance of having the choice and this should be a community decision.

18. Final Statement: Franz Josef Radermacher

Franz Josef Radermacher said that the Information Society Forum has been working for many years on that issues and Telematics is in the kernel of that work.
He sees that Telematics is the big opportunity for a better world, and it is the only mechanism that we have for development in the South. It is said that there is a factor 10 of improvement necessary for the next ten years and that can only be achieved with new technologies and with open markets. Telematics has to be used for economic reasons and not for sustainability reasons. "The question is: Does telematics help for sustainability?" "The answer is: It can help and it can make things worse. The major question is the question about global politics." "If we keep the WTO (World Trade Organisation) global regime or if we even extend it to investments and even extend it to services, if we just stay in the logic that we have now, we will end up all of us somewhere between US and Brazil with a "80-20" social system and we will end up absolutely not sustainable!"

"If we want to be sustainable we have to implement a European logic, that means we need a social ecological market system on the global scale, like in the EU with respect to the new accession countries. That means that the richer countries have to co-finance the social and ecological system of the poorer countries. That means we have to invest into co-financing standards systems. The poorer countries can only agree to standards and implement better technologies if that is co-financed, otherwise they will stay on a more unsustainable way. This model has to be transferred to a global scale. The North has to invest much more on a global scale for others to be able to lead them to better standards."
"The crucial point is to take money from the richer countries to invest it in other countries for more socio-ecological development. Taking money out here means to pollute less. We have to limit our activities by having things more expensive."
"The danger of the idea of building a green world here – in Europe – is to end up in a more polluted world and to have our social system destroyed. I would not be surprised if we would get a two class medicine within ten years, if we get privately funded top universities within ten years. At the moment we are seeing that our most important European achievements are destroyed by world market pressure and our illusion is to save it here. But the only chance is to build a global partnership."
It will depend on a European way to a global sustainable Information Society and it will take all the emphasis of our politicians for the next negotiations, e.g. the MAI (Multilateral Agreement on Investment), the Post-Kyoto, the Millenniums Rounds of the WTO and of the GATT (General Agreement on Tariffs and Trade). Once these agreements are signed, there is not much we can do any more. With the signatures under these global contracts all our dreams will be destroyed!"

19. Final Statement: Joachim Lorenz

Joachim Lorenz stressed the importance of the dissemination and the export of information out of Europe into all parts of the world. Therefore it is necessary to build networks and partnerships on national, international and on a global level. These partnerships would be necessary to have distances decreased and to have time for the task of information dissemination. Telematics is presently the only appropriate tool therefore. Building partnerships should also aim into new environmental standards.

20. Final Statement: Franz Jungwirth

Franz Jungwirth stressed the importance of the dissemination of information and knowledge about how to use this information on a global scale. Regarding to his personal experience with a Chinese partner region, with 8.000.000 inhabitants, he notes that it is very important to transfer only the best technology. That should also be a challenge for timesaving by the implementation of new technologies and by using the already existing knowledge. Besides it is very important to enforce the development and the use of new technologies in a broader way in the own country.

21. Final Statement: Nick Hodges

Nick Hodges: "Telematics enables us to raise people's awareness and to understand various things. The future lies in a good education of our youth to raise their awareness of impacts to the community. They can make up their mind how they want their community to function and what they feel to be their responsibility towards the "rest of the world"."

22. Final Statement: Violeta Kauneliene

Violeta Kauneliene: "Co-operation in a proper way helps development in general. Telematics has the function of a tool therefore."

23. Final Statement: João Ribeiro da Costa

João Ribeiro da Costa told as an example the story of the process of decision-making that happened in 1989: The objective of the Minister of Environment was to decide how to invest money in the textile industry for supporting waste water treatment systems The aim was to improve water quality of rivers. After the Minister consulted a River Information System where the water quality was visualized with all the details about pollution sources, an unanimous decision could be made.
For João Ribeiro da Costa that story shows the two faces of Telematics:

- Telematics helps locally by improving the decision making process. Having better informed decision-makers will lead to better decisions.
- Telematics can help to make things more transparent. E.g. if the data are available for everybody on the Internet, public awareness will be raised and politicians will have to respect this fact in their decisions.

In both ways Telematics can contribute to a more sustainable development.

24. Statement from the Floor: Wolfgang Boch

*Wolfgang Boch (*European Commission, Directorate-General Information Society Head of Unit, Applications for Environment Protection): "The prime issue what we are discussing is *change*. We want a certain development to change.

The question is: What are the driving forces for change? Telematics for itself can never be a goal. It can only be a means to support a goal and to support the implementation of an objective. The whole issue on environmental considerations have been largely – not only in the western world but globally – regulated by regulations. The consideration e.g. for the service market has been driven by regulations. So far in the environment. We have to invest much more in thinking, how can we revise the approach that the service market in environment is driven purely by regulations. The concerns of Mr. Radermacher are *who and what are the driving forces on this globe*, the driving forces are some rules of economy. If we were in a situation that there are economic driving forces to support voluntary agreements, voluntary actions, maybe there would be a lot of change. "

"Coming back to the question what is the contribution of Telematics to sustainable development: Telematics offers an infrastructure where new services can be developed for many purposes. There is the issue of becoming more aware, as an individual, as a manage or as a politician."

With regard to the early past the costs for Telematics and for the infrastructure are steadily decreasing by getting more advanced and getting more user-friendly. Today it becomes practicable that a Telematics tool for environmental planning purposes - e.g. where to place an industrial development area - can be handled by someone who can be trained in a short period on a tool that runs on a high performance workstation. In the past a cray – machine was necessary for that purpose. In this way things became reality.

"My concerns and issues are: How can we change the kind of evolution of driving forces in this process, and there we have to see how to make best use of the Telematics options. Telematics is not an answer to our problems but it offers options we should try to make best use of it."

25. Statement from the Floor: Maria Kazmukova

Maria Kazmukova: "Technology transfer and the transfer of Telematics helps. Telematics is necessary to understand the data which are available and to understand the consequences of our decisions.It is necessary to have easy access, better dissemination, better understanding of the Information Society Programme."

She pointed out the role of the ENWAP User "handbooks" ("User Requirements in Air and Water Management Systems" and " Good Practice Cases in Air and Water Management Systems for Europe") "The documents about the results of the Information Society Programme would increase the technology transfer and help the people in Europe to choose the appropriate technology. It should give the information what can be done by Telematics."

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