Research and the development of the technologies of the Information Society applied to the environment

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This article mainly aims at presenting the research and development of technologies of the Information Society applied to the environment, in the framework of the European Union (EU) policies and action plans. First of all, the link between telematics and environment is explained: although these two fields may seem contradictory, they finally prove to be complementary. Telematics can contribute to a better environmental management and protection. Besides this, the market and employment in Europe in the case of the above two mentioned fields is presented, together with the EU policies towards this direction. The Telematics Application Programme’s main topics are also given in more detail. Last, the reflection task for the 5th RTD Programme (1998-2002) is presented and described.

The link between environment and telematics

Among many others, the following main key fields are addressed and co-ordinated by the current European Commission (EC) policies:
• environment (policy: Directorate-General XI);
• telecommunications (policy: Directorate-General XIII).

These two fields may appear contradictory: the first deteriorates and must be protected, the second is in full development and is undergoing such an expansion, that we already qualify the society of the twenty-first century as the “information and communication society”.

However, these two fields are complementary. The technologies of the Information Society will help to better preserve the environment and will contribute to a more effective management of it.

In daily life there are lots of situations that require us to care about the state of our environment. For example air pollution in urban areas such as Athens and many other places, river pollution in densely populated and industrial areas such as the river Scheldt, or the risk of industrial accidents in areas such as Piemonte (these specific examples are all addressed in the REMSSBOT project).

The potential of telematics systems in the problems just mentioned is immense. They allow automatic regulation of traffic in function of minimizing pollution and maximizing traffic efficiency and this all in real-time mode. They allow the interactive control of the emissions of the effluents of industries in rivers, and can inform the citizen and the authorities about the water quality. They make it possible to react more quickly and with more effectiveness in cases of forest fires, industrial accidents, floods or earthquakes.

The link between environment and telematics will increase in strength together with our increased attention to this domain. It enables co-operation and the exchange of information and knowledge. It is our duty to make the resources available to ensure the development of a field having such an innovative and potential benefit for society as a whole, for the citizen as well as for the economy.

Market and employment

The market and employment in the fields of environment and telematics is an important issue. The following key points can be addressed:
• according to figures from the OECD, the eco-industry has an annual output in Europe of approximately US$65 billion, with an annual growth rate of 8 per cent. It gives employment to 1.6 million European citizens.
• the EC task-force on environment-water has estimated the expenditure for equipment and services in the water sector at 30 billion ECU in the year 2000;
• in 1990 the expenditures of insurance companies for major disasters was estimated at 18 billion ECU;
• the market of the environment is in full growth: it accounts for a turnover of $250 billion at world level.

The characteristics of the European societies indicate that they only have a chance of long-term development, if research enables European companies and industries to enter the international arena in a competitive manner.

Merging the required international competitiveness with proper respect for the environment leads to the concept of “sustainable development” i.e. ensuring a sound basis for a balanced European economy for the years and the generations to come. This relation between competitiveness and the environment has its origin in the White Paper on “Competitiveness, Growth and Employment” (1993).

The 5th Community RTD Framework Programme (FP), which is in the process of adoption, is concerned with the underlying technological foundations for the relationship between competitiveness and environmental protection. This relationship has to generate
gradually: new approaches, new techniques and finally new markets.

The European Union policies in the field of telematics and environment

Within the framework of EU policies, two policies occupy central places: one is concerned with information and telecommunication technologies, and the other with the environment. The telecommunications policy and research is of direct importance in the transition to the Information Society; the environmental policy concerns us all in our daily lives, and in the EU context it is formalized in Article 130 of the Treaty on European Union which stipulates that environmental policy has to be integrated into the definition and implementation of other policies.

During the past 25 years, the environmental initiatives of the European Community have been developed by means of five Environmental Action Plans managed by DG XI. Currently a revision is in preparation (a Commission proposal – an amendment – has been sent to the EU Parliament and the EU Council of Ministers). The tendencies and priorities of this proposal concern primarily the integration of the environment in other policies such as energy, transport, industry, agriculture, research (with reference to the 5th RTD FP) and tourism.

So far the environmental policy of the EU has used three main leverage tools:
1. The legal instruments DG XI has available.
2. The institutional instruments, with the growing role of the European Environment Agency (EEA), particularly in the areas of reporting, analysis and synthesis of the European-wide state of the environment. The REMSSBOT project is a prime example of an RTD project in environment telematics, focusing on regional issues, that strongly interacts with the activities of the EEA, particularly in the important area of Environmental Catalogues of Data Sources.
3. The financial instruments which are numerous and include, for example, LIFE, PHARE.

Driven by the current transition from the industrial age to the Information Society, a fourth main principle has to be added to the previous three, and this is based on the technologies of the Information Society. It is the task of the information and telecommunication technologies to enable advanced forms of data collection, to process them in real-time, to minimize the divergence between the available information and the actual state of the environment, and to enable durable (sustainable) development.

In the field of Community research, apart from the Telematics Application Programme (TAP), a number of activities relating to the environment have already been carried out:
1. Within the “ESPRIT” Programme (DG III), devoted to information technology (microelectronics, basic research, data processing, high performance computing...), numerous projects contain environmental considerations and components; however, without having a specific scope for the environment.
2. The Environment and Climate Programme (DG XII) is dedicated to problems such as water pollution, land pollution and the environmental effects of the use of pesticides (EUPHIDS project). These projects are close to basic research and contribute to laying down the scientific foundations for the European environmental policy.
3. As from the 3rd RTD FP (1990-1994) DG XIII has launched environmental actions in the TAP of a more dispersed nature, particularly in the transport and administration sectors. To mention a few examples: the QUARTET project and the management and planning of urban transport networks taking into account air pollution. Pilot experiments were executed in Turin, Toulouse and Athens. The EWTIS project addressing the marine transport of dangerous goods and taking into consideration the environmental consequences. The ENVIRONET project which involves more than 50 national and regional authorities and which is concerned with the exchange of information on air, water and river pollution.
4. The environmental research under the current TAP (1994-1998) is the first coordinated, systematic and formalized initiative to put environment into the frame of telecommunication and information technologies. It has a budget of 22m ECU, a portfolio of 18 projects, attracted 150 actively involved organizations, comprising industries, local authorities and research organizations, and it covers more than 20 cities and 25 regions. This telematic research bears the development of a series of new and powerful tools which will enable the citizens, industries and the local authorities to have access to information on the quality of the environment, establish the basis for informed decisions, and improve the quality of the environment.
The Telematics Application Programme

Some of the major points concerning critical topics of the environment sector of the TAP are the following:

- The management of air quality, water quality and water resources. Also the REMSSBOT project contributes actively to these domains. These telematics systems help the local authorities to compare environmental data to limiting thresholds. Other projects in this area are the EFFECT and EMMA projects dealing with air quality control and traffic in urban areas in Madrid, Stockholm, Gothenburg, Genova. The WATER-NET project assists the city of Barcelona and the department of Hauts-de-Seine in the control of the water quality for the production of drinking water.

- Other important issues covered in the environment sector of the TAP are the prevention and handling of catastrophes and risks, such as floods, forest fires, earthquakes, industrial accidents, marine pollution, etc. Projects to mention are DEDICS (forest fires), RADATT (earthquakes), ENVISYS (marine oil pollution in the Mediterranean and the North Sea).

- Further issues include public information on the environment. Many projects use Internet technologies, for administrations implemented in an Intranet, use ISDN connections and components of multimedia solutions, and often rely on GIS systems as an anchor interface. Moreover, numerical modelling and computer simulations, and multi-lingual systems are important issues covered by the projects. The multi-lingual environmental thesaurus under development by the EEA, in close interaction with a.o. the REMSSBOT project, deserves particular attention. Other projects touching on this issue are E-MAIL (environmental information to citizens in Corfu, Rhône-Alps, Tuscany) and TEMSIS (environmental information exchange between administrations and the citizens in a transnational area between Germany and France).

It is important to stress the role of the TAP within the framework of co-operation with the EEA and the CEO (Centre for Observation Earth) managed by the Institute of the Space Applications in ISPRA. Examples of this co-operation are the EMMA and the ECOSIM projects which have a direct involvement of the Joint Research Centre, the organization responsible for the CEO. Another good example is the EEIS project, which is expected to be launched soon, which is directly concerned with the integration of the Catalogue of Data Sources of the EEA and the Enabling Services of the CEO.

Finally, another major action launched this year should be mentioned, namely the Integrated Applications on Digital Sites (IADS). Eleven projects were selected with a total budget of 45m ECU. They will integrate a broad range of telematic applications and for a broad number of European sites. Environmental applications will be integrated into the services to be set up by at least three of the IADS projects. One of these projects, TITAN, acronym for Tactical Integration of Telematics Applications across Intelligent Networks, is based on the E-MAIL project of the environment sector. This project focuses on regional environmental planning integrating heterogeneous data sets, which is a key issue when setting up integrated services. Another project soon to be launched is EQUAL, acronym for Electronic Services for a better Quality of Life, addressing environmental monitoring and forecasts in urban areas.

Reflection track for the 5th RTD FP (1998-2002)

The European Commission proposed on 9 April 1997 its 5th European RTD FP. The new programme, which is currently under discussion in the European Parliament and the Council of Ministers, will cover the period 1998-2002. It should mark a double change compared to the four previous programmes.

First, it concentrates the effort of research in only six programmes – three “thematic” programmes and three horizontal programmes. The three subject programmes cover: Living World and Ecosystems, the Information Society, and Competitive and Sustainable Growth. Each of the three thematic programmes will include a series of key-actions.

Second, co-ordination between the various actions will be established, as well as more flexibility in management. This point was strongly stressed in the report of the committee chaired by Mr Davignon.

Besides this, it will be driven with regard to the environment. This subject finds a place at the level of the first research programme “Living World and Ecosystems”, within the key-action “Management and Quality of Water” and in the 2nd thematic programme the “Information Society” within the key-action “Systems and Services for the Citizen.”

The main research topics regarding the environment include:

- intelligent environmental monitoring, analysis, forecasting and decision support, in domains such as air, water, nature and bio-diversity;
- information and management support tools and systems for sustainable development (durable management of ecological resources), in areas such as the management of energy resources and other resources, clean technologies in production, etc.;
- real-time, high performance risk and emergency management systems and services for the prevention, the management and mitigation of emergencies, man-made or natural emergencies; including forest fires, earthquakes, floods, droughts, nuclear emergencies, land-mines, etc.

The time schedule of the 5th FP could now be estimated: during 1998 the adoption of the 5th FP and at the end of 1998 or beginning of 1999 the adoption of specific programmes and the first call for proposals of the specific programmes.