

ENVIRONMENTAL INFORMATION SYSTEMS AS A POSSIBLE SOLUTION FOR STRATEGIC DEVELOPMENT OF LOCAL AND REGIONAL COMMUNITIES

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ABSTRACT. – **Environmental Information Systems (EISs) as a possible solution for strategic development of local and regional communities.** The present era that we are living can be described as the “Information Age” as a semnificative general abordation for Information Society. No matter what area of science and technology we look at, it is more obvious that ever that we are dealing with an ‘information overflow’ without precedent in the history of humanity. Environment Sciences are no exception to this rule and recent advances in this field would have been unthinkable, unmanageable and unattainable without the support offered by modern information technology, in the sense of Environment Information Systems or Environment Informatics. The aim of the present paper is to introduce and to underline the importance of Environment Information Systems, especially in environmental protection, planning, management and, of course, decision making. This work paper is focused on the creation, management, use and role of Environmental Information Systems; at the same time, the paper explores the typology of EISs and examined the common definitions of them in the light of these major issues: the concepts of data, information and knowledge in EISs, the connection between EISs and EI, the problems and obstacles to the development of EISs and finally, the emerging demand for public access via EISs and EI to environmental information and environmental protection, engineering and research in Information Society.

Keywords: Environmental Information Systems, Information Society, local / regional development strategies.

1. INTRODUCTION

Science is at the base of everything that mankind has accomplished for the last century. Nowadays society would have had probably another view without our considerable scientific activities. As time went by a numerous scientific revelations helped reshape our culture and society progress throughout the world.

Scientific knowledge of the world has developed gradually through small steps and giant steps. Thus over time many successive scientific discoveries have contributed to the cultural heritage and progress. Most scientific elements are listed in the archives of humanity as routine observations and records contained in research reports and communications, each with its own importance in the mechanism of knowledge and information.

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The importance of discoveries (as Artificial Intelligence or Environmental Information Systems) is evaluated by its impact on the economic situation of the company or by the benefit that brings for a large number of people. Data transferring, modern transport, electricity and many others, are the "mature fruit" of epochal discoveries, purely scientific. A notable benefit is the cultural course.

Mankind rises with Artificial Intelligence understanding of the environment to which it belongs and, knowing better, and learning to appreciate it more and improve their environmental attitudes.

2. EVOLUTION AND DINAMICS OF ENVIRONMENTAL INFORMATION SYSTEMS

Lately, due to the facilities offered by new information and communication technologies (NICT) in all sectors of society and in all activities undertaken were imposed phrases such as information society, information age, communicational society, to refer in fact at one and the same reality, but from a different perspective, a new existential reality that prevails access to information and information culture formation.

In today's society, defined by the new reality, the success and survival of many companies, many categories of institutions or individuals with political or social responsibilities depend on their ability to locate, analyze and use effectively information resources. Moreover, the efficiency to which we refer, is directly related to achieving the goals of information, documentation or knowledge, and the existence of specific situations making certain decisions, optimize processes and application of methodologies for others.

Living in a context of modernization of all aspects of daily life, the time and space in their social dimensions are not insurmountable obstacles, I got to deal with a multitude of socio-economic aspects of life and not only issues generates documentation needs of increasingly particular and also becoming more complex, more accurate. Users by intrinsic need documentation always requires a far wider range of sources of information and documentation resources.

In agreement with the extraordinary development of the means of access to information, training documentary lies in the center of the global movement to form a "culture of information" regardless of the area of interest. Formation documentary, even the specific environmental sciences and individuals closely involved in this vast area, targeting use and better understanding of the tools and techniques of information and documentation. Moreover, the formation documentary was defined as "learning techniques of gathering documentation integrated into a set of steps of research procedures".

Since the Stockholm Conference (1972) in which were laid the foundation of the United Nations Environment Programme - UNEP (conference that coincided, moreover, with the entry into the international agenda of the term

"environment") - became increasingly evident that the collection and analysis of environmental data are of vital importance for humanity:

- We have to rely on science and technology, in their contribution to economic and social development, to detect, avoid or limit the hazards that threaten the environment and to solve environmental problems posed for the good of humanity;
- It is essential to provide education in environmental issues both younger generations and adults, taking due account of the less fortunate in order to develop the foundations necessary to establish public opinion and give individuals, institutions and sense of local responsibilities regarding safeguarding and improving the environment in all his human size;
- Will be encouraged in all countries, especially developing countries, scientific and technical activities in the context of environmental problems, national and multinational. In this regard will be encouraged and facilitated the free movement of the latest information and experimental data to help solve environmental problems...".

3. FROM TEORETICAL ABORDATION OF EISS TO THE PRACTICAL PERSPECTIVE OF EI

Following the development of spectacular science information, including artificial intelligence, on the one hand, and environmental sciences, on the other hand, appeared at the confluence of two science of human-environment with IT&C, generically called "Environmental Informatics" (EI). It has become unimaginable impulses which paved the way for unexpected perspectives, raising and restoring the current, on a higher plane and with a more comprehensive environmental issues that need appropriate solutions today.

Classifications and definitions are objective requirements of any science, including Environmental Informatics, which often have reviewed and updated periodically. Classification and definition of concepts related to SIM and IM were conducted early in the study of environmental systems using computing environment, reflecting general level of knowledge about the subject matter at a time and purpose during research.

In this respect, the first classification criteria were based on the structure and role of different types of card, how IT environment could be employed and supported various research areas specific environment. Some of the EISs definitions abound in cascade, are presented below, exposing and source for complete examination and exhaustive exploration of the subject.

"Environmental Information Systems is an umbrella term for all related systems: Monitoring, data storage and access, description and response to disaster assessment studies environmental impact reports on the state of the environment, planning and environmental strategies, simulation, modeling and decision making. "

"Environmental Information Systems are an important factor in research, decision support, management and environmental policies. SIM implementation involves a number of requirements difficult to meet, even with today's computer technology. After a period of over 10 years of trial and error, failures and successes, studying SIM has matured considerably. The subject is constantly developing a systematic multidisciplinary work is changing rapidly, with changes in the IT sector and the environment. "

(International Symposium on Environmental Software Systems)

"Environmental Information Systems are computer systems using a variety of tools and technologies to facilitate the management and use of environmental data and information. Are interested in managing soil, water, air and species in the world which is all around us. But the primary aim is to ... data processing and artificial intelligence approaching"

(ESSA Technologies)

It is therefore apparent from the above definitions that there is a wide range of SIM Information Processing Systems Environment that can be differentiated due to the nature of information processing, according to which we have the following typology / taxonomy:

- **monitoring and control systems** (MCSs) - interact closely with environmental processes, such monitoring systems are used to perform automated measurements and control regarding water quality, air and soil, respectively noise and radiation exposure, while control systems aimed at directly involved in industry in monitoring and evaluation of working conditions and the evolution of technological parameters;
- **conventional information systems** (CISs) - are of interest for entry, storage / storage, structuring, integration, saving and presenting various types of environmental information in terms of documents, formal, semi-formal and informal, such as environmental regulations and reference literature;
- **analysis and assessment information systems** (AAISs) - environmental supports data processing methods making use of complex mathematical and statistical analysis and modeling techniques specific. This category includes, among others, various scenarios and forecast of the evolution / dynamics of environmental factors;
- **planning and decision support systems** (PDSSs) - directly supports the decisions taken by third parties by offering alternatives evaluation criteria and justification of decisions viability, assuming schemes and eco-management audit;
- **integrated environmental information systems** (IEISs) - can not be uniquely associated with a single class of simple systems, demonstrating an affinity towards multidisciplinary. Integrating a whole an impressive

variety of concepts, issues and computer components specific purposes latter category serves as varied as they are many, enjoying such great appreciation for distributed systems environment.

Starting with the '90 was born a new research area for studying and developing new and competitive card, known as Environmental Informatics, a universally accepted definition of Environmental Informatics can be seen as follows:

"Environmental Informatics is the field of research that deals closely with the development and management of Information Systems Environment"

as a shortened version of the definition given by Avouris and Page in 1995:

"Environmental Informatics is a special field of applied computer science which develops and uses information processing techniques for the protection, research and environmental engineering ... all the basic methodology and specific applications across an extensive and complex issues and aspects, including monitoring, databases and information systems, GIS, software modeling, environmental management systems, knowledge-based systems and data visualization environment..."

4. THE POSITION OF THE NICT IN THE CONTOURING OF THE ENVIRONMENTAL INFORMATION CULTURE

New informatics technologies facilitate early intimate, direct and immediate, user information without the need for any mediation systems. Better still, for reasons particular information needs required at some point, the user must prove knowledge of methods and techniques specific information and documentation, which includes fostering a culture information existence.

Acquire specific knowledge of new information and communication technologies expressive grafted on information provided by Artificial Intelligence culture each individual is in a process of development and restructuring effervescent as a result of various research environments, one of the most prominent by far the environment university.

The Academic level is where the changes driven by NICT are felt with extraordinary strength and is also the area where they intersect with the much needed information and quantifies the most diverse areas of interest. University, having also vocation education, and research is open to novelties, ready to assimilate recent research results, and to propose and promote new knowledge alternative, so for such an environment is indispensable documentary formation.

Information and communications technologies have produced unprecedented changes in society in all its aspects, comparable perhaps with transformations of the invention and widespread use of pattern, tending towards a transformation of economic life, social life and consequently cultural transformation, mentality and, not least, the daily life of each individual, information mediated by new information technologies has penetrated directly, with or without our will. The magnitude universe of informational activities, many forms of expression, diversity of instruments and information environment

technologies have produced major changes in the way people communicate, learn, do business, solve various problems and to relate to others and the environment.

University, and the university, through its education at all levels, must in such circumstances to ensure both students and pupils Information literacy, information culture and skills needed to use information resources to support, then, the conscience of society.

Information culture is meant to help people integrate into the new information society, to change the way social networking and positioning, to improve information and documentation spirit appropriate to know the new rules of the global game communication (rights , preserving the fundamental values of society and the environment, cultural and linguistic integration and so on). Electronic information resources changes the nature of information behavior, especially in academia and research.

Search and dissemination, processing and disclosure, information management are processes that have changed in the transition from traditional to modern information technology. Introduction of courses aimed at developing skills in the great universities of the world's information and to pre-university level, developing international programs and projects on the subject, signaling a change of direction in traditional educational models, Consecrated in factually, they made the transition the teacher education centered on the transmission of knowledge from it to the student-centered learning effective use of information resources, modern technology, and algorithms of computational mathematics.

A review of the above can be supported through the analogies between different types of data, especially the geo-referential, which acquires attributes of knowledge due to the contribution made by the use of environmental information, including a vast space is dedicated Geographic Information Systems and Geodesy.

Educational institutions are designed to provide graduates and minimal luggage not only knowledge and information skills that enable them to be efficient labor market and integrate professional and social information society. Regarding environmental specialists working in this or related fields, we can say that they need a large number of information and knowledge at each stage of the management and evaluation of specific processes. Also to develop a project and its implementation, they need to know and understand the conditions under which these processes take place. Analysis should be based on the best data and methods available techniques (BAT) and the knowledge gained from personal experience or come from other specialists. Traditionally, this information and knowledge are obtained as required by time by direct access to databases, reports and documents, the transfer of information and knowledge between professionals (managers, practitioners, researchers, teachers) and through contacts at rates training, workshops, congresses, conferences and symposia.

One of the modern trends of education in general and the protection and environmental engineering in particular, is to address training of future specialists in environmental matters and legal system based on domain-specific policies so that future professionals can make decisions and action based on knowledge and

experience. To improve management capabilities and environmental assessment specialists is necessary to be able to manage and implement concepts for effective and efficient environment that can be achieved through information software environment. Also must have knowledge and access to current information enabling them to take the best decisions. Given the above, information technologies act as fundamental and indispensable support for all components of basic and applied scientific research in the field of environmental protection, using the numerical simulation of complex interdisciplinary processes for monitoring and process control experimental laboratory facilities, and all applications in information transmission environment.

Environmental Informatics applies methods and information technologies for the collection, analysis, interpretation, distribution (dissemination) and use of the information environment. It also includes a wide range of disciplines that can be used to understand the specific problems related environment: artificial intelligence, neural networks, geographic information systems, global positioning systems, remote sensing, surveillance and mapping services, data storage technologies (databases), software engineering, mobile technology and the Internet.

In Romania, although the activities to highlight the subject of informatics leaning towards the environment are just beginning, it is noted interest alignment with international standards in the field, have set up a computer lab in the Faculty of Environment Energy - University Politehnica of Bucharest and purchased a computer system at the Western University of Timișoara, where the specialists, closely interested by the Environmental Information System development want to create an Institute for Environmental Advanced Research.

All this effort, worth appreciated, is dedicated to building understanding and application of information technology to solve possible environmental national problems.

The main goal of Environmental Advanced Research Institute in Timisoara is the creation of a research infrastructure strategic excellence to international standards to ensure the following requirements related to the integration of research projects in key areas of academic and research activities:

- environmental science with related fields: geology, geophysics, meteorology, biogeography;
- chemistry related fields: environmental chemistry, biochemistry, biotechnology, enzymology, chemistry technology, analytical chemistry;
- biology with related fields: ecology, ethology, biomonitoring, ecotoxicology;
- physics with related areas: environmental physics, biophysics, bioinformatics, physics of solids;
- mathematics and the related fields: mathematical modeling, biostatistics, applied mathematics;
- computer sciences with related areas: artificial intelligence - soft computing, parallel computing and distributed, computational mathematics, bioinformatics;

- social and human sciences with related areas: bio-economy, sustainable development and planning, ecotourism and marketing, environmental management; which then channels to ensure optimal transfer to beneficial owners - the economic and institutional actors.

Research carried out in the Laboratory of Environmental Informatics focuses on the implementation of ICT in monitoring and environmental assessment and determine the impact it has on human health, have as main objective the implementation of new approaches, innovative problem solving targeted focus using information systems environment.

5. CONCLUSIONS

Nowadays, Artificial Intelligence systems plays a specific well defined role in all areas of activity: production, service, management, monitoring, research, public involvement in decision making etc. and in almost all countries.

Environmental systems are based on the above considerations binding instruments in environmental science, can be defined as a collection of packet data and information, described by a series of specific indicators relevant for studying, monitoring and exhaustive exploration of the field and environmental issues. Each decade brings new challenges and new applications in environmental protection, especially EISs is involved in the activity of forecasting, selection of an alternative development to reduce the negative effects and more.

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