THE GEOGRAPHICAL INFORMATION SYSTEMS IN LAND MANAGEMENT AND ENVIRONMENTAL EDUCATION IN THE E. E. C.

PAPADIMITRIOU F.
School of Geography, University of Oxford, Oxford OX1 3TB, England.

ΠΕΡΙΛΗΨΗ

Οι απαιτήσεις της αγοράς Γ.Σ.Π. στις χώρες της Ε.Ο.Κ. αποδεικνύουν τον δυναμισμό, την ποικιλία, αλλά και το πολλά υποσχόμενο μέλλον αυτού του κλάδου έ-ρευνας και τεχνολογίας.

Οι ανάγκες του ιδιωτικού τομέα, οι ανάγκες για περιβαλλοντική εκπαίδευση και για διαχείριση γαιών θα αποτελέσουν τους κυριώτερους παράγοντες επίδρασης που θα ρυθμίσουν την επέκταση αλλά και την καινοτομία στις τεχνολογίες Γ.Σ.Π. στις Ευρωπαϊκές χώρες σήμερα.

Ο ανταγωνισμός από τις αμερικανικές εταιρείες, η ταχεία ανάπτυξη των ανατολικοευρωπαϊκών αγορών, αλλά και η ανάγκη για παρακολούθηση, εκτίμηση και προστασία των φυσικών διαθεσίμων, θα είναι οι κυριώτερες μορφές ανάπτυξης των Γ.Σ.Π. στα επόμενα χρόνια.

ABSTRACT

The last years shifting market requirements in G.I.S. technologies in the E.E.C. countries prove the dynamism, the diversity and the promising future of research and development in this field . The needs of the private sector , the need for environmental education and the land management are the major influencing factors determining the expansion as well as the technological innovations in the field of the G.I.S. technologies in the European countries, now. The competiting american and the advancing eastern european markets, the customer - oriented approach, the need to monitor, protect and assess natural resources in G.I.S. technologies will unfold.

1. The G.I.S. technology diffusion and market in Europe and the E.E.C.

What seperates a general-purpose G.I.S. from one effective for business includes (Buxton, 1992) "business functionality, focussed analysis, speed in real time, easy learning curve, dual platform, low cost, packaging". Usually, researchers and infospecialists demand flexibility, accessibility, analysis, interfaces to other packages, while managers, decision makers and trainees require accessibility,user-

friendly package and interfaces. New trends in customer's needs show (Salgre, 1992) a change from a producer - oriented market to a customer - oriented one, an increased dialogue with data suppliers and advice from software suppliers. In that respect, a minimization of the customers effort in obtaining the information required and a simultaneous minimization of the suppliers' effort in delivering the information to the customers would consist the ideal customer - supplier relationship in the future G .I.S. markets.

It is quite probable that a Europe - based vendor community will be able to rival the American vendor community over the next decade (Newell, 1992) even over the next two years. Europe's great exhibition "Mapping Awareness" of G.I.S. technologies (established since 1988 in Oxford, displays a strong emphasis on applications in local govrrnment and utilities (retail marketing, resource allocation, health care etc.). As the local authorities do often have structural problems, the private (utilities) applications and needs for G.I.S. are stronger and forcing for a better output, though it is expected that the maximum range of applications (particularly in the land management), will assume their regional dimension soon (Papadimitriou, 1992). A significant marketing feature in G I S are the micromarketing - oriented large business due to (Buxton, 1992): a) tighter relationship between retailers - consumers and b) data explosion which resulted in the need for a new generation of technology to manage the data. This format of business is expected to grow in the years to come, in view of the increased need for user - friendly cheap G.I.S. From a statistical point of view (presentations in the E.G.I.S.- conf. 1991, 1992), we can get a picture of the present situation of the G .I.S. applications in Europe (Ottens, 1992) from which I summerize the following:

a) A definite increase in business applications took place.
b) Most of the governmental applications occured in the U.K. and in E. Europe.
c) Most of the business applications take place in the N.America, the S.Europe and in the Central Europe.
d) The countries heading first (three) with the most presentation proposals in E.G.I.S '91 were: U.K., Belgium, Netherlands. The countries of the E.G.I.S.'92 were U.K., Germany, Netherlands.
e) The U.K. and the N. Europe are heading the list in the field of theoretical, technical, methodological research issues.
f) The Benelux countries and the Eastern European countries are heading the field of application cases.
g) The Central European, Southern European and the N.American countries have displayed more education and training - oriented applications.

A striking fact is the dynamic inflow of Eastern and Central European countries in the G.I.S. market, particularly Hungary, Chekoslovakia, Poland and

the C.I.S. (Galambos - Tosza, 1991; Kupiszewski, 1991; Mezosi, 1991; Svetlichny et al, 1992; Tikunov, 1992; Jankowski - Novogrodzki, 1992) which are very likely to display increased requirements for cadastral services of G .I.S. (Kuhn, 1992).

2. On the role of the G.I.S in Land Management in the E.E.C.

An overview of the recent G.I.S. applications in Europe would certainly reveal that land use applications are by far the most frequent or widespread ones. Land use and cadastral surveys of the Scandinavian countries should be the ones to start with: Norway (Engbretsen, 1987), Sweden (Falk, 1987), Finland (Ahonen Raino, 1988). Land and property information services find wide applications in the U.K. where the L.I.S. have been widely adopted by the local authorities of the country. Similar sort of expansion has taken place in the Netherlands (under the guidance of the country's National Planning Agency) as well as in Germany (under the auspices of the municipal authorities, particularly in Frankfurt and Munich).

Applications in soil map information systems are widespread in Belgium (i.e. Vandenbroucke - Van Orshoven, 1991; Desmet - de Jongle, 1991), while soil - based information for rural land use monitoring and rural zoning is advanced in both the U.K. and the Netherlands. (i.e. Bird, 1991; Zevenbergen - Groen, 1991). Various other aspects of land management have been sparsely considered, such as the mitigation of natural hazards in the U.K. (i.e. Pearson et al. 1991), the reallotment in Belgium, the management of natural habitats in the U.K. (i.e. Wilcock, 1991). Importance should be paid to the planning in the rural areas with G.I.S. in an E.E.C. context (Van Lammeren, 1992) as local or regional aspects of rural development may be found in sharp contrast to E.E.C. - induced considerations. In this respect, E.E.C. initiatives, (such as the CORINE project) would be wise to include physical planning in the future. The physical planning gains ground at the expence of the typical regional planning last years; the physical planning of the Randstad is a typical example which followed the general guidelines of the Dutch 1988 Fourth Governmental Memorandum on Physical planning. The software used was (Geertman, 1990) Arc Shell of E.S.R.I's Arc Info and SPAT of the National Phys. Plann. Agency, while the Arc - Macro- Query (AML) language had been used to assist non - specialists in the use of some important functions on the G.I.S. Another software used was the SPANS, to assess the groundwater thrats with a G.I.S. analysis E.E.C. - wide. (Thewessen et al, 1992). Obviously, where increased mathematical modelling functions are required, raster formats are best suited. Appart of the U.K.'s outstanding RRLs (Regional Research Laboratories), applications of G.I.S. for regional planning and development purposes are often encountered in other European countries, like Greece (i.e. Despotakis et al. 1992) and Italy (i.e. Pelagatti et al, 1991).

The G.I.S. applications in land management constitute from my point of view,

a good foretoken of future advances in physical planning E.E.C. - wide that could formulate the basis upon which regional planning can develop, in good terms with E.E.C., national, regional, local, physical or legal requirements and constraints.

3. The G.I.S. in Environmental Education in the E.E.C.

Though the incorporation of the G.I.S. in environmental education consists a rather unknown subject so far, I shall attempt to tackle some of its prominently interesting aspects. Whether intended or not, G.I.S. serve a double purpose: tools for geographical analysis as well as means for research training. The broad incorporation of the G.I.S. in the local authorities (Black, 1992), along with the necessity for G.I.S.- education for students in agricultural and environmental sciences (de Bakker, 1992), may lead to increased implementation of G.I.S. education at the undergraduate level (Koussoulakou, 1992), as well as to increased organization and coordination of user - groups, already involved in the G.I.S. research.

However, the issue is a bit more complicated than it might look at the first sight. Problematic factors acting in G.I.S. education and market may render a promishing research project difficult to accomplish. Seven such factors have been noticed by Leighton and Kutsal (1991), namely the following :

1) Number and type of the «geographies» served,
2) Number and nature of discipline served, more than one disciplines may be served with incompatible methods),
3) Number and mission of agencies served (the same agency may serve many areas),
4) Type and extent of funding,
5) Locations where data is maintaned (as restrictions on the use of data may hold under certain circumstances, i.e. security, police).
7) Administrative and protocol issues (correctness and completeness of data can be critical for the decision making).

Yet, different approaches as to the role of the G.I.S. in environmental education are also very important in future considerations : In example, the needs for G.I.S. in higher education (Paeccol, 1991) may be concurrent with the needs in environmental education (Gouveia et al, 1991), but in sharp contrast to the needs in specialised G.I.S. applications in environmental education, as set out by the I.T.C. diploma courses in G.I.S. for cadastral, urban and rural applications in developing countries. The vendor's perspective may be expressed (E.S.R.I. ArcInfo University Labkit) in terms of manuals and modules (Arcedit Arcplot, Starterkit).

A computer scientist's perspective may be expressed through the enhancement of relationships between data and image (visualisation), in a conceptual and explanatory context .

G.I.S. has been described as an "umbrella" technology that can serve in an integrative fashion for diverse data. Thus, the development of customised information systems using a variety of software products, rather than a single G.I.S. package on the one hand, and shared data between different agencies on the other, may result in exponential increase in complexity and diversity, rendering assessment processes extremely difficult to handle. Time consuming but effective G.I.S. consist a reasonably good starting point for future developments in environmental education. Geertman (1990) points out that "a common G.I.S. like ArcInfo is despite its limited analytical capabilities (too few options for mathematical manipulation and model interfacing), more appropriate meant for use by information specialists than by people preparing and working out policy in a specific area of physical planning". However, the shift from the fragmented - map, truncated - boundary, layered - databases G.I.S. of the "old" generation to the continuous - holistic G.I.Ss of the "new" generation, resulted in the coming of more user - friendly versions, which possess the inherent capability to become more suitable for environmental predecessors. Moreover, the predilection for problem - oriented and model -based rather than data based approaches (Birkin et al. 1990), will certainly lead both the market towards the desired ends. As for the integration of data, connected systems (with data leaving the one system to enter the other), represent a low but adequate level of integration for average applications in environmental education. Interfaced systems (exchanging data between two systems without leaving either of them) serve higher environmental education purposes as they may well form an effective tool for environmental decision making. Integrated system (with changes of data at anyone of the systems transferable to the other system) are the environmental education tool for specialists.

4. Conclusion.

The rapid expansion of the G.I.S. technologies in the E.E.C. countries last years brought about a pronounced change in attitudes and approaches towards environmental issues , the market dynamics and the scientific requirements. Both private and governmental enterprises appear rich enough in applications, thus contributing to an even faster growth in the field of theoretical ameliorations. The increased E.E.C.'s interest in G.I.S. is shown by the ESPRIT, COMMET, DRIVE, CORINE projects. Another initiative, provided partly with data by CORINE (in ArcInfo), was supported by the EC - Habitat Directive "Natura 2000".

The idea "Ecological network for Europe" consists of (Jongman, 1992): the core areas with optimal biotopes, corridor zones, etc. No need to say that certain countries have greatly benefited from their membership to the E.E.C., by promoting environmental , agricultural, constructions and other aims. One such is Spain, where the G.I.S. were used for the high - speed train (A.V.A.) between Madrid and

Sevilla, the National Cadastre, the 1992 World Expo housing, etc. Finally, two main results we get from the G.I.S. - market -Research today:

1) The greatest influence on the scientific - socioeconomic fabric is exercised by the environmental education, the technology diffusion and the needs of the public sector.
2) The most important recipients of the influences exercised are: the market requirements (primarily), the public sector and the technology diffusion (secondarily).

LITERATURE

Ahonen, P - Rainio ,A (1988) : "Developing a query system for joint use of spatial data in Finland ", in : (J. C. Muller, ed.), "Environmental applications of digital mapping", p. 77 - 86.

Bird, A.C. (1991) :"The role of G.I.S. in rural land use monitoring - current U.K. issues", E.G.I.S. '91, p.121 - 128.

Birkin, M. - Clarke, G. - Clarke , M. - Wilson, A (1990) : "Information Systems for urban policy appraisal", Sch. of Geogr., Univ. of Leeds, Jan . 1990. (mimeo).

Black, T (1992) : "G.I.S. in G.B. local authorities", E.G.I.S. '92 , p. 384 - 391.

Briggs, D.J. (1988): "The use of broad - scale G.I.S. for modelling and environmental impacts of landuse change in Europe", paper presented to the Polish Academy of Sciences, Radzikow , Poland.

Buxton, T (1992): "G.I.S. expected to meet micromarketing challenge", G.I.S. - Europe, Febr. 1992, p. 50-52.

Despotakis . V - Giaoutzi, M - Nijkamp, P (1992): "G.I.S. as a D.S.S. tool for sustainable development on Greek islands", E.G.I.S. '92, p. 173 - 185.

Engebretsen, O (1987) : "The Norwegian land accounting system ", in : E.C.E. - seminar on new techniques to collect and process land use data, Gavie, Sweden, vol.2 :response papers.

Falk, T (1987): "Landuse information for physical planning and land consolidation in Sweden ", Proc. E.S.R.I. 7th User Conf., Redlands , Ca.

Galambos, J - Tosza, I (1991: "G.I.S. application in Hungary ", E .G.I.S., p. 518 - 528.

Geertman, S (1990): "G.I.S. as a support system for designing and evaluating urban expansion alternatives ", Urb. and Reg. Inform. Syst. Assoc., Proc., annual Conf. vol.2, p. 164 - 174.

Jankowski, P. - Nowogrodzki, L (1992) : "Polish G.I.S. use increasing rapidly", G.I.S. Europe, Feb. 1992, p. 40 - 42.

Jongman, R (1992) : "European data for a European ecological network", E.G.I.S., p.29 - 37.

Kuhn, W (1992) : "Approaching GIS-Issues in the new Democracies ", E.G.I.S., p. 465 - 473.

Kupiszewski, M (1991) : "The transfer of new technology : the development of G.I.S. in Poland ", E.G.I.S., '91, p. 581 - 591.

Koussoulakou, A (!992): "G.I.S. education in the Netherlands:profile and prospects", E.G.I.S. '92, p. 84 - 93 .

Leighton, D.H. - Kutsal, M.D. (1991): "G.I.S. as an integration platform", E.G.I.S. '91, p. 621 - 636.

Mezosi, G. (1991): "The potential productivity of landscape types in Hungary", E.G.I.S. '91, p. 728 -737.

Newell, R. G. (1992): "A U.K. vendor's perspective of the G.I.S. market" G.I.S. - Europe , Feb. '92, p. 36 - 39.

Ottens, H.F.L. (1992) :"G.I.S. in action", E.G.I.S. '92, p. 1 - 8.

Papadimitriou, F (1992): "The geographical information in spatial context and the modern requirements", Diepistim. Epitheor. , vol. 5, p. 39 - 42.

Pearson, E.J. - Wadge, G. - Wislocki, A.P. (1991): "Mapping natural hazards wit spatial modelling systems", E.G.I.S. '91, p. 847 - 855.

Pelagatti et al (1991): "Design and implementation of a geographic information system: the case of Regione Lombardia", E.G.i.s. '91, p. 856 - 865.

Salgre, F. (1992) :" A geographical data interchange environment for Europe", E.G.I.S. '92 , p. 1502 - 1511.

Tikunov, V (1992) : " Teaching of geoinformatics in Moscow University", E.G.I.S. '92, p. 423 - 430.

Thewessen, T - Van de Velde, R - Verlouw, H. (1992): "European Groundwater threats analysed with G.I.S.", G.I.S. - Europe, April, p. 28 - 33.

Van Lammeren, R. (1992): "The future of the rural areas in the European Community: The importance of extending G.I.S.", E.G.I.S. '92, p.38-47.

Vandenbroucke, D. - Van Orshoven, J . (1991): "From soil map to land information system", E.G.I.S. '91, p. 1156 - 1164.

Zevenbrgen, M - Groen, j. (1991): "Hi - tech policy making: implementing G.I.S. in a Dutch rural zoning", E.G.I.S. '91, p. 1271-1281.

De Bakker, M. (1992): "Necessities in G.I.S. - education for students in agricultural and environmental sciences", E.G.I.S.'91, p. 351-357.