

GIS diffusion, NSDI and the public debate in Greece

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SUMMARY

The paper's primary objective is to assess the process of GIS diffusion in particular Greek administrative organizations of local and regional government, during the last five years. It also attempts to interpret the findings on the basis of a wide range of factors. Focussing on the operation of the Greek public sector and the Greek academic community forms a complementary objective. To start with, the findings of two surveys conducted in 1999 and 2004, assessing GIS diffusion in the country, are presented. Subsequently, we proceed to a brief presentation of a conceptual framework - stemming from a previous historical approach of similar processes over a 15-year period (Karnavou and Gritzas, 2001) - forming the basis for discussion and understanding of the process. Thirdly, we present the basic changes affecting the GIS diffusion process that have occurred in the country during the five-year period.

KEYWORDS: *Conceptual framework, GIS diffusion, NSDI, Public debate*

INTRODUCTION

The paper's objective is to assess the process of GIS diffusion in particular administrative organizations, referred to below, during the last five years. It also attempts to interpret the findings on the basis of a wide range of factors. In order to better understand the Greek GIS environment as well as the contribution of this paper it is important to highlight a number of things. The Greek GIS community has for many years been indifferent to a number of issues made central in other countries. These include all sorts of questions that go beyond GIS applications and modelling. It is only in the last five years that spatial data infrastructure (SDI) issues have started to come up as legitimate discussion themes. In a similar context the Greek GIS community has paid little attention to evaluating the GIS diffusion process, questions of organizational settings for GIS systems and so on. It is characteristic that there is practically no tradition of the empirical and theoretical research looking at the previously cited questions.

It goes without saying that the aforementioned lack of interest reflects a series of important factors related to the immaturity of the Greek GIS exercise; it has been negative and will continue to be so if not reversed. It is perhaps worth noting that projects concerning the aforementioned themes are not favourably addressed by governmental organizations, which manage research funds and are responsible for information technology diffusion. It is also important to remember that indifference for case studies and evaluation procedures is the case for all kinds of information systems that have been operating in the country for many years.

The arguments in the paper develop as follows. Firstly we briefly present the findings of two surveys conducted in 1999 and 2004 assessing GIS diffusion in the country. Secondly we outline the conceptual framework (Karnavou and Gritzas, 2001) forming the basis for analysis and understanding. Thirdly we present the basic changes affecting the GIS diffusion process that have occurred in the country during the five-year period.

FINDINGS OF THE FIELDWORK

In order to identify the GIS diffusion rate in the Greek administrative system, 299 institutions were interviewed in 1999 and 2004. The organizations fall in the following categories: regional secretariats (13), second-tier local government bodies (prefectures) (54) and finally a subset of (232) municipalities including the largest first-tier local government organisations down to the level of province capital (according to the former administrative structure).

The basic thematic entities of the questionnaire in the first survey concerned the following issues: (1) the processes of systems' introduction, the way needs were identified and the extent to which they were covered, fields of GIS utilisation and application development, (2) integration of the GIS unit within the authority's organisational structure, (3) questions of data acquisition, updating, use and disposal, (4) questions of human resources and training, (5) technical infrastructure. The 2004 survey is at the moment based on a shorter questionnaire. A second round of interviews will be carried out in the near future. In this paper we present certain findings of the surveys reflecting quantitative aspects.

Approximately one in five (18%) of the questioned organisations possess a GIS system. The percentage is twice as big as that estimated at the beginning of the study period. It is worth noting that one third of the organizations possessing GIS five years ago do not continue operating the system.

Concerning the regional secretariats a significant change has taken place, with the rate of adoption of GIS reaching 85% from the insignificant adoption rate that was noted at the beginning of the survey (8%). However, one should stress the fact that in two thirds of regional secretariats, GIS cover exclusively the needs of the forest management departments.

In relation to the second-tier local government bodies, a lower proportion of GIS adoption is noted (11%) continuing the poor performance they presented at the beginning of the survey (2%).

The municipalities seem to have improved their initial performance as the number of authorities possessing GIS is increased by 50%. However, the percentage of municipalities having GIS at present is only 15% of the total. In parallel, it is found that the system stopped to operate in more than one third of the organisations.

Percentages corresponding to different sub-categories of municipalities do not deviate from the aforementioned averages, except in two cases. Firstly province capitals present no improvement in the rate of GIS adoption. Secondly municipalities of the two metropolitan areas of the country, Athens and Thessaloniki, preserve their leading position reaching a percentage of 20% and 25% respectively. Nevertheless, the number of organisations that stopped operating the system in the metropolitan area of Athens is larger than the respective average.

CONCEPTUAL FRAMEWORK

We have argued (Karnavou and Gritzas, 2001) that GIS diffusion process both in terms of rates and percentages as well in terms of qualitative results can be understood on the basis of the following factors:

- the national administrative structure of the country in question,
- the range and quality of basic data,
- the existence of co-ordinating and strategic planning initiatives aiming at the improvement and diffusion of data,
- the existence of support mechanisms in the GIS introduction process.

Among the indirect success factors we should mention those related with:

- the level of planning, service provision and geographical data analysis practices,
- the content and the quality of public debate in the field.

We have interrelated these factors in a particular way leading to the formulation of a conceptual framework for explaining GIS diffusion. This framework is based on four premises.

The **first** one refers to the impact of past achievements on future developments. It is, therefore, argued that apart from a static evaluation of results, it is equally important for the assessment process to take into account long-term factors, development processes and developing dynamics. This approach leads by definition to a historical survey of institutions, organisational schemes, practices and processes in particular national contexts.

The **second premise** of the conceptual framework concerns the relationship between data demand on the one hand and established practices of planning, public service provision and geographical analysis on the other. Success or failure in GIS introduction initiatives is very much dependent upon those processes in society, which promote or frustrate the aforementioned practices and by so doing augment or restrict the need for geographical and socio-economic data. The use of data at a particular stage leads to the identification of shortcomings by users in different organisations, which in turn leads to expression of criticism and demands for change, gradually accommodated inside public debate. The process proceeds to discreet periods, each one ending in quantitative and qualitative improvements.

The **third premise** reflects the reasoning according to which public debate and the mode of its operation constitute a very significant success or failure factor. The means for public discussion are mainly conferences and general or specialised journals. In practice, public discussion is more effective when the groups involved develop their arguments and proposals in specialised, as opposed to general, journals, which act as a means of pressure by the commentators towards producers and administrators of data.

The subjects of data demand are (a) administrative organisations (central, regional, local administration), (b) academic institutions (universities, research centres), (c) private enterprises, many of which are directly or indirectly involved in planning departments, provision of services and geographical analysis process. Developments inside organisations of one category are in constant interaction with the respective ones inside organisations of other categories, so that negative as well as positive aspects in one sphere create chains of similar results in the other. This last reasoning forms in fact the **last premise** of the proposed framework.

PROCESSES AND CHANGES OVER THE STUDY PERIOD

In this section we briefly cite important changes that have occurred on various fronts, in the study period. Sometime before the starting point of the first survey important and long asked for transformations in the Greek administrative system had already taken place: (a) firstly the introduction, for the first time, of second-tier local government (1994) and (b) secondly the reorganisation of first-tier local government entailing the amalgamation and enlargement of existing municipalities (1998). The results of administrative reorganisation however leave a lot to be desired. It seems that the transition from the old to the new system has not been smooth. It is expected however that negative implications of change are in the process of being eliminated and the fruits of the reform will soon be delivered. On the other hand regional administration was to some extent strengthened mainly in terms of participating in the management of national and community funds and policies.

At the beginning of the five-year period Greece lagged behind other European countries in terms of certain categories of data necessary for a wide range of applications. Existing gaps could be highlighted as follows:

- The country's cartographic infrastructure (city maps in particular) remained grossly inadequate. Over and above other negative implications, this fact hindered the development of GIS in local government organisations, public utility organisations and private institutions.
- Digital cartographic databases (of small and large scale) formed a small section of existing conventional maps, which, as already mentioned, were limited in numbers and inadequately updated.
- A significant problem had also been the lack of reliable digital maps, for the purposes of population census, faced with inadequate drafts as substitutes. This entailed operational difficulties for the National Statistical Service of Greece (NSSG) itself, as well as for all those engaged in data use and analysis while frustrating geographical/temporal comparisons.
- An additional problem was an unprecedented delay in delivering data to users (research institutions, universities, planning institutions, Local Authorities etc.).
- Apart from those institutions, such as the National Statistical Service (NSSG), formally responsible for data collection, other institutions produced important data series as part of their own functioning. However, the above-mentioned data remained unusable, due to the lack of measures for: a) advanced organisation of the material, b) up to date digital versions, c) links of data bases of different origins with each other.
- A serious problem was also the magnitude of geographical units, for which social and economic data were made available by the National Statistical Service (NSSG) to data users. Indeed, not only these units were very large in terms of population and area, they also exhibited unacceptable differences of size following administrative delineation. It is more than obvious that geographical research should rest on detailed geographical analysis entailing very small spatial units, capable of highlighting variations inside particular areas and facilitating comparisons from area to area.

Despite the fact that there have been some initiatives and improvements during the last five years, digital cartographic databases for key scales (1:1.000, 1:50.000) are either missing to a large extent or obsolete. A great opportunity for definitively changing the state of Greek data infrastructure was given under the third Community Support Framework (CSF). In the absence of a central coordinating body for data production and NSDI, it was the Secretariat for Information Society (SIS) that was confided with a coordinative task, alongside its primary responsibility of allocating funds under the third CSF to ministries involved in data production. The SIS personnel lacked knowledge and understanding of GIS and NSDI issues. An attempt was made to face the inadequacy by an ad hoc committee with no executive power -consisting of ministry representatives and invited experts-consulting the Secretary for Information Society. Given the lack of executive power of this committee (and the neglect of expert advice) on the one hand and pressures by individual ministries for the satisfaction of their (undocumented and irrational) demands, the result was an allocation of funds for cartographic databases which leaves a lot to be desired. Instead of a unified and rational proposal for the production of missing databases, particular ministries have put forward proposals and demands for funds serving myopic perceptions of what is important.

Decisions regarding particular maps, cartographic databases and associated products to be dealt with by each data producer agency were taken in early 2003. Among all contracts to be conducted between producers and private firms for implementing the particular measure, very few have been signed so far. It is therefore obvious that no funds for spatial data production under the 3rd CSF have so far been absorbed while the ending point of the 3rd Community Support Framework is approaching.

A lot has been written regarding the mode of operation of the Greek central administration, its causes and effects. The experience of the Operational SIS Program, in the context of the 3rd CSF, clearly reveals the following key weaknesses: bureaucratic delays, neglect of experts views and (primarily) the prevalence of political pressures at the expense of open, articulated well documented discussions in the context of the particular committee.

Addressing a non-Greek audience one should at this point refer to the Hellenic Mapping and Cadastral Organization (HEMCO) and its intended role as enacted in 1986. As a result of the 1986 legislation Greek administration, unlike other countries, possessed a powerful legislative apparatus for data production and management extremely early. The articles of the law reflect a clear understanding of its mentors of the importance of NSDI as we understand it today. This piece of legislation has never been properly activated and implemented especially in terms of coordinating and unifying individual data producers, thus rationalizing the data production process. The introduction of the "SIS ad hoc committee" (2002) constitutes the first important albeit very problematic and insufficient attempt to coordinate data producers and initiate NSDI processes after 16 years (1986-2002).

It should perhaps be emphasized that even if bureaucratic delays had not occurred, SIS (and the associated ad hoc expert committee) could not tackle the entire process effectively due to its nature. The latter is an ad hoc institution charged with allocating funds for information production rather than a permanent, coordinating and monitoring agency, equipped with the appropriate expertise, experience and personnel.

Neither disagreements in the context of the committee nor the frequent bypassing of experts views were made known to the GIS community even less to the wider public. An opportunity was therefore missed for exerting pressure for a rational allocation of funds and the satisfaction of existing requirements for reliable data. This is only one expression of the poverty of public debate.

At the beginning of the study period we have underlined the fact that GIS introduction processes at the local level had been immature and not based as they should be on feasibility studies, serious system design and other prerequisites. It was suggested that the situation could only be improved if local authorities and other organizations were given support and know-how from the appropriate central and regional bodies. No serious initiatives in this direction were adopted during the study period. It is worth mentioning that a very important measure – inscribed in the context of a wider potential supportive apparatus (Karnavou, 2002, Karnavou and Gritzas, 2001), proposed by SIS at the first stage of consultation, publicized in the web- aiming at the production of exemplary GIS applications, facilitating local authorities and avoiding both duplications and unsuitable GIS applications, has recently been cancelled.

The content of the Greek public debate and the range of GI issues involved have traditionally been rather limited. Despite improvements, which continue slowly, the themes of conferences and seminars reflect an undue emphasis on applications and modelling at the expense of data quality issues, questions of strategy, co-ordination, interoperability and spatial data infrastructures. The improvement of public debate could mainly stem from academic and non-governmental initiatives. The potential impact of the remaining key actors, i.e. the public and the private sectors, is rather limited almost by definition. The former, being responsible for the inadequacies depicted so far, is bound to adopt defensive attitudes, while the latter is mostly concerned with restructuring practices (to face competition) on the one hand, and meeting data demand for its own interests on the other, rather than taking initiatives for rationalizing processes or provoking the generation of advanced administrative practices and legislative framework.

The unsatisfactory impact of the activities of university departments and their research priorities on the process of overall improvements of public practices is part and parcel of the fact that the former have been preoccupied with technological and applications-oriented subjects. Greek research is moving extremely slowly into the fields of national data infrastructures and the associated Greek particularities, GIS policies and strategies, human attitudes to GI systems, documenting and evaluating GIS education etc. To take one example it is entirely indicative that the empirical research forming the basis of this paper, looking at the GIS diffusion project, is only the third conducted in the country. Previous works are those of Assimakoulou (1996), Karnavou, Dermanis, Gritzas, et al (1999), Karnavou and Gritzas (2001), Karnavou (2002).

As already mentioned research and funding institutions are rather indifferent to funding the aforementioned topics (in contradistinction with technological and application-oriented research). As it is the case with universities of other countries, Greek universities could play an important role in drastically changing these priorities, yet they have not so far undertaken this task. The poverty of the academic debate in this particular area results in the reproduction of existing research funding patterns which in turn leads to very limited changes of practices.

Moving now to Non Governmental Organizations (NGO) it is equally true that they could have played an important role, as it has been the case in other countries. HellasGI is the only Greek non-governmental organisation operating in the field of GIS and GI. Deprived as it is of any financial support, based on entirely voluntary work, its achievements could only be the object of praise. However over the six years of its existence and despite the objectives mentioned in its charter, HellasGI policy has concentrated on organizing seminars and conferences, avoiding a dialogue with ministries and organizations on NSDI, cartographic data sets, data quality etc. It was in the last (periodic) Conference of 2004 that pressure from the audience was exerted on the Council to take initiatives, to become more extrovert and address central authorities regarding NSDI.

For some time the exclusion or limited attention paid at particular issues and activities has been intentional rather than accidental. An important and brave move to the opposite direction was made in the last quarter of 2004. In September of 2004 a letter written by the council was sent to the Minister of Environment (Planning and Public Works) asking for immediate steps towards a NSDI. In the absence of an established, legitimised channel of communication the letter has remained unanswered so far.

Regarding the content, range and impact of the GIS /GI public debate it is indicative as well as unfortunate that there exists only one journal specializing on GIS and GI, it has come up very recently and is of informative rather than scientific orientation.

As anticipated at the beginning of the study period increasing data demand could have some beneficial impact on data production processes, on all its aspects and agencies. A substantial large part of this demand was accommodated directly by the private sector, either in anticipation of forthcoming demand or in the light of pressures experienced by large consumers urgently requiring a particular data set. Due to its very nature, the private sector has no reason or inherent interest to cause the change of attitudes of other agents of the data production system. In so far as profit is forthcoming, private firms are ready to produce GI products regardless of how costly they may become eventually for society at large. Similarly, they will not produce data that are necessary unless profit is assured.

The private sector has during the study period progressed steadily following a momentum initiated in the early 90s. A good number of Greek geo-information firms are competent in terms of infrastructures, expertise and productivity, some comparing favourably to their European counterparts. Given that the private sector is generally producing goods only when costs are covered and profit is secured, there have been two implications. When demand is related with large local authorities or powerful organizations (such as the Athenian Metro, the organization charged with the Olympic games etc) needs are swiftly covered by the private sector. In such cases the private firms have produced basic data (and GIS applications) either on anticipation or after an expressed demand. The former has often been the case given the associated anticipation of multiple disposal of the same product initially funded by the private firm. On the contrary the private sector has not covered anticipated needs of less powerful local authorities (and other small collective or individual consumers) due to the uncertainty of covering costs and profit making.

Data requirements for the Athens and Thessaloniki metropolitan areas (particular the former) both consisting of populous and affluent local authorities have been covered by the private sector with enhancing results for the viability of their GI systems. The result is the production of databases for

these areas (as well as other large local authorities albeit to a smaller extent) associated however with all actual and potential problems of maintenance, lack of quality certificates comparability of alternative products of the same content etc. On the other end of the spectrum data needs of a large number of local authorities are not met via the private sector in a similar way, resulting in data gaps further discouraging these organizations from adopting or stabilizing GI systems.

CONCLUSIONS

As shown GIS diffusion rates at the local and regional levels have been limited. In some cases a regression process has been depicted. The lack of central multiple, supportive frameworks frustrated to some extent the enthusiasm of local authorities - exhibited at the end of the 90s -in adopting and/or stabilizing GIS.

A lot of criticism has been addressed over the years at the nature of Greek central administration its practices and inadequacies, while at the same time positive recent changes (involving local administrative restructuring, improved practices, new technology introduction) have been acknowledged. Positive changes and achievements in the area we are concerned with in this paper are impressively less in numbers. It seems that introvert attitudes, piecemeal approaches and the satisfaction of personal or group-centered strategies do not easily give place to cooperative and coordinative attitudes. Issues of this kind, entailing the prevalence of power structures over effectiveness and scientific documentation, proved major problems and obstacles in the context of unprecedented opportunity offered to the Greek administration for ending up with up-to-date cartographic databases, NSDI and geographical information systems. For many categories of data and certain producer agencies it was the satisfaction of agency interest, rather objective data necessities, which prevailed.

Alongside intrinsic difficulties inscribed in the Greek public sector tradition, the aforementioned problems have their origin in the range and depth of the public and academic debate. The latter in turn reflects a number of factors among which dominant is the excessive interest of the research community on technology and application oriented subjects and the subordination of questions of policy, strategy, data quality and other associated questions. The Greek academic community, with some exceptions, seems to be deeply engaged in (significant) questions of GIS applications and modeling, marginalizing other important topics the treatment of which would have signified the transition to the mature period of GIS and GI that occurred in other countries more than one decade ago. Poor results are also due to the limited contribution of the NGO component, which remains much less developed compared to European and international counterparts.

According to the analytical framework of this paper positive interactions, between the public sector, the private sector and universities, with improvement effects on all, were expected; these have occurred to a limited extent, with few multiplying effects, reflecting rather weak communication channels between these entities. Additionally the framework implies a positive effect of the process of increasing spatial data demand on all agents involved, which has indeed materialized with main recipient the private rather than public sector whose reflective, anticipating and adaptive mechanisms proved poor.

Given the weakness of central administration no central or regional policies articulating supportive GIS framework were put forward. GIS diffusion was therefore limited both in terms of the number of systems as well as qualitative aspects of each system.

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