Public administration GI-based web-sites for spatial planning

a comparative analysis

Campagna, Michele; Arleth, Mette

Published in:
CUPUM '05 : Computers in Urban Planning and Urban Management

Publication date:
2005

Document Version
Publisher's PDF, also known as Version of record

PUBLIC ADMINISTRATION GI-BASED WEB-SITES FOR SPATIAL PLANNING: A COMPARATIVE ANALYSIS

Michele CAMPAGNA
Lecturer
Dipartimento di Ingegneria del Territorio
Università degli Studi di Cagliari
Piazza d'Armi, 16
Cagliari, 09123
Italy
E-mail:campagna@unica.it

Mette ARLETH
Lecturer
Department of Development and Planning
Aalborg University
Fibigerstraede 11, dk9220
Aalborg Oest
Denmark
Email:marleth@land.aau.dk

Abstract:

This paper presents the results of an ongoing comparative study on the accessibility of Geographic Information at public authorities' websites in Denmark and Italy. Qualitative and quantitative mappings of the level of accessibility to GI in the two countries are made and the results are compared. The comparison shows differences in the situation in the two countries that lead to formulation of a number of factors that appear to be critical for the widespread implementation of the kind of applications in focus.

Keywords:, e-government, Planning Support Systems, Public Participation GIS

1 INTRODUCTION

In many countries, governments and local administrations promote initiatives to exploit the potential offered by the Internet giving citizens access to online virtual spaces on the Web where they deliver public sector information and services. Developments in web-GIS technology (Peng and Tsou, 2003) offer a plethora of tools for managing Geographic Information (GI) on the web. Those governmental bodies and local authorities whose mandates concern spatial development, started to publish GI contents on their web sites: according to their mandates, some of them publish on the web geographic data supporting planning procedures.

In the last few years a wide number of web applications have flourished throughout Europe supporting Public Administration e-government processes and supplying online services to citizens. Among them many were developed and are currently used to support specifically spatial planning process in various ways. Often applications are developed according to different models – with different objectives, different underlying technologies, different data models, supporting different tasks within different spatial government processes - but a common denominator may be found in their wide use of Geographic Information. Such applications have been referred to as Public Administration GI-based Websites or PAGIWEB (Campagna and Deplano, 2003; 2004; Arleth and Campagna, 2005). At present many PAGIWEB have been recognised to be successful while other have not achieved the expected usage.

This paper presents a comparative analysis on PAGIWEB developments in Denmark and Italy undertaken according to the methodology proposed by Campagna and Deplano (2003, 2004). The investigation has the overall purpose to give an overview of the latest development of PAGIWEB by monitoring their amount and characteristics. The method consists of the following steps:

- National spatial planning system analysis – the first step is the analytical description of the national planning processes, regulated by law and implemented in the practice in order to understand what space there could be to apply spatial ICT;
- Digital cities diffusion assessment – the second descriptive analysis depicts the overall diffusion of ICT and its use by Public Administration to support its institutional mandates;
- PAGIWEB search – this step consists of the comprehensive survey of existing PAGIWEB and record;
- GI Content / GI Technology Matrix (CTM) classification – in this step existing applications are evaluated and classified into categories as function of the Content of GI (eg: raw data, structured information, or multimedia data) and its scope (eg: general purposes, services to citizens, or planning support), and of Technology used to manage information (from simple web technologies to full featured online GIS).

- CTM spatialisation – the spatialisation of the results help to synthesise the outcomes of the CTM classification and to compare results of the analysis referring to different contexts in space and time.

This method has been applied to the Danish and Italian case study and a synthesis of the results is presented in the remainder of this paper. The comparison of the two case studies indicates a number of factors that are potentially critical for a widespread diffusion of high level PAGIWEB for planning support and public participation. Moreover aims of the study presented here is to discuss critical factors for success or failure of the applications by analysing the different geopolitical reference contexts. Conclusions and future development perspectives are drawn for the comparison on both the analysis method and on its actual results.

2 DIGITAL PLANNING

Computers have played a growing role as supporting tool in the planning practice since their early diffusion. GIS have followed this trend with a rapid evolution from early information systems for urban management (Huxhold, 1991) towards integrated Planning Support Systems (PSS; Klosterman; 1997). Several successful application were developed and sometimes widely adopted in the planning practices (Brail and Klosterman, 2001; Gertman et Al, 2003). GI information production and diffusion, according to standardised protocols for hardware, software, and data models, have led to the development of Spatial Data Infrastructures (SDI) at the global, national, regional, and local levels.

One might thus expect to find a widespread diffusion of Spatial Information and Communication Technologies in the planning practice, but often this is not the case. The diffusion of GIS courses in the planning curricula is often weak, when not lacking (Chapin, 2002), as well as the GIS adoption within the planning research, as shown by the weak diffusion of GIS based study found in the planning literature (Surinach et Al, 2003). Nevertheless, a relatively small multidisciplinary community of researchers is working around the world to develop sophisticated PSS with encouraging results. Moreover, a growing number of applications are being developed by Public Administrations over existing urban GIS and developing broader SDI. The latter are often simple applications which supply basic services to citizens within a given spatial administration process.

The results achieved thanks to the implementation of sophisticated planning methods within integrated PSS, as well as the basic services distributed through the PAGIWEB are strongly dependent on the underlying planning process. In other words, it might be argued that the already mature technology should be integrated to design information systems tailored to suit a given planning process and not the other way round. Thus to better understand critical success or failure factors in PAGIWEB developments, the analysis of the planning system or process seems to be a necessary premise.

Hence, in this section the Danish and the Italian planning systems are briefly depicted in their main characteristics in order to support the discussion of

which opportunities the planning systems offer for further PAGIWEB development in supporting the spatial government practice.

2.1 Opportunities and threats in Denmark

Spatial planning in Denmark is mainly regulated by the Danish Planning Act. This law has three main characteristics: Framework control, decentralisation and public participation. The state establishes standards, but delegates substantial responsibility for achieving and enforcing these standards to the counties and the municipalities. The higher level of plans is the framework for and must not be contradicted by the levels below. The counties are responsible for handling larger environmental issues and planning and administration of non-urban areas; coastal areas, nature preservation and restoration, agriculture, natural resources, water quality etc. Urban planning and development are handled by the municipalities. Regional and municipal Master plans must be revised every 4 years and the revision procedure includes communication and debate with the public. During the last 5-10 years digital means of communication with the public in the participatory phases has been experimented with for various reasons including the attempt to involve new and more diverse groups of citizens in the planning processes. The general move towards e-government on all administrative levels has also had its effect on the number of applications aiming at serving citizens online and involving them in debates and participatory processes.

Public participation is no trivial task, and it requires dedication and determination from all involved parties to succeed. It cannot be taken for granted that participation by groups of citizens actually leads to different plans or a more just development since the process of empowerment through participation can be undermined by the motives of the traditional power holders (Carver, 2001). Threats to the participatory process may emerge from a lack of will from the planners due to a specialist's distrust in the publics' abilities to respond to the suggested plans in a qualified and relevant manner. But the most serious threat appears to be a lack of political will seen in some municipalities to perform planning and participation (Høgh and Pedersen, 1998). The very assumption that the population as such actually want to be actively involved may not always prove correct, as planners that really do make an effort to involve the public in the planning process often get very little response. The reasons for this can vary; one negative explanation can be that the population do not believe their involvement will make any real difference. (Krek, 2005) refers to this situation as a result of rational ignorance. A more positive reason could be that the population is generally content with the planning and development performed by the authorities and have trust in their judgements. For most Danish cases a combination of these and other reasons probably explains a low commitment from the public to participation in planning processes. To this point no investigation has proved that the presence of PAGIWEB substantially improves the participation, although a number of professionals (such as planners and software developers) express this as their general impression.

2.2 Opportunities and threats in Italy

In Italy, responsibilities for planning are given to the three administrative levels: the Regions, the Provinces, and the Communes. The latter are specifically responsible for the land use planning. Traditionally, according to the national planning law which date back to 1942, not much space is given to the public for public participation in a broad sense in the planning process with the exception of the right to object for a short time period after the plan publication. However since the first national planning law was adopted the legal framework regulating the land use planning practice has evolved with differences in the various regions, thanks to their autonomy in integrating the national framework with further regional regulations. In the last decades moreover in Italy both at the academic and at the regional administrative levels “new forms of planning” have been proposed – and in some cases implemented - in order to improve efficiency of the planning process where the national framework demonstrated to be not reliable. Within these developments, from a situation where the only citizen’s involvement was the right to present non-mandatory ex post amendments on Master Plan adoption, new forms of planning have been experimented with comprising a wider attention to participatory processes. In particular, at the local level the proposal of new forms of planning has been oriented to fostering dialogue not only among elected representatives and stakeholders but towards participatory forms involving those affected by the planning outcomes (Gabellini, 2001).

A recent survey on the regional legal systems in Italy showed that in only 5 regions out of 21 public participation is somehow mentioned in regional laws (Campagna and Deplano, 2003). However, forms of public participation are promoted at the regional and local level in sector planning activities, such as Environmental Impact Assessment, or occasionally in urban planning initiative. While there has not been found any institutional demands for PAGIWEB development to support public involvement in spatial planning in Italy (?), such kinds of applications might potentially be developed to occasionally support actual planning processes. Hence, within this framework the main purpose for developing PAGIWEB is public service delivery which from the spatial planning perspective means essentially informing the public and managing master plan normative implementation.

3 PAGIWEB ACTUAL DEVELOPMENT

The methodological approaches to the survey were slightly different in the two case studies due to the geo-institutional differences among the two countries.

The Danish territory covers about 43000 sqr kms (not including the selfgoverning regions of Greenland and Faroe Islands). The size of the population is about 5,3 millions. The public administration has three administrative levels; national, regional (the 14 counties) and municipal (270 municipalities). Whereas the physical size and population of the counties can be said to be fairly homogeneous, the size of the municipalities varies a lot; from about 1 millions (in the capital) to less than 3000.

Italy counts over 57 millions inhabitants in a 300.000 sqr kms wide national territory which is divided administratively within 20 Regions, 103 Provinces and over 8100 Communes with population ranging from several millions inhabitants to few dozens. These figures make it cumbersome to check every possible case especially at the municipal level. Thus, in the Italian case a first scan was performed searching for the existing PAGIWEBS visiting website of major communes and then scanning with the help of search engines and eventually looking at the papers and reports in GIS national conference proceedings and other technical publications. This first scan returned the majority of, if not all, existing applications. Then in the light of this first insight on the actual situation within the country, a geo-political approach has been adopted in order to check the percentage of all the Regions, major Provinces and major Communes which developed PAGIWEBs. It resulted that in 2001, 40% of the Regions developed PAGIWEBs, while at the provincial and municipal levels the percentage went down to 7%, and at the municipal level was below 1%.

Thus, given the sizes of the two countries, in Italy the survey was initially aimed at finding all the existing PAGIWEBs, which from the first evidences were in a small number. Conversely the survey in Denmark aimed at a comprehensive scan of the local administration within the country. Detailed descriptions of the surveys are given in the remainder of this section outlining the quantitative results. Qualitative results are discussed in section 4 and 5.

3.1 State of the art in Denmark

The Danish survey was performed in 2004. Access to Danish Public Authority websites was achieved through general portals, one for municipal websites generally, and one specifically for websites with GI about nature, environment and planning offered by the counties (Miljøportalen). In the case of the municipal websites, on each a search was made based on keywords (such as planning, maps, GIS). The structure and organisation of the municipal websites was very heterogenic, and the PAGIWEB was sometimes found in the most unexpected subsections of the websites, as well as in more foreseeable places. Based on this experience, it can not be guaranteed that all instances of PAGIWEB at the municipal level have been detected in the Danish survey, but since a total number of 270 municipal websites had to be examined, a time limit of 45 minutes spent on each municipality was set. 171 municipalities offered some kind of PAGIWEB on their website, ranging from basic static maps in local plans and municipal plans in PDF documents to advanced web-GIS applications with feedback tools. Detailed quantitative results of the survey have been presented in (Arleth and Campagna, 2005).

3.2 State of the art in Italy

The first Italian PAGIWEB survey was carried out in 2001 (Campagna & Deplano, 2002) and was updated in 2002/2003. Initially a quantitative and qualitative study on the diffusion and consistency of GI/GIS in Italian Local Authorities have been proposed offering a first insight focused on GI/GIS exploitation in the applications supporting (spatial) e-government initiatives. At the end of the survey the set of analysed websites counted the 20 regions, 31

provinces and 44 municipalities chosen on the basis of the three steps scanning search (Campagna & Deplano, ibidem) with respectively 7, 9 and 36 basic GI-based or full featured online GIS applications. After a second survey which extended the original set to a geographically more comprehensive set of 126 applications, the CTM methodology was developed, applied (Campagna & Deplano, 2004), and further extended (Campagna & Deplano, 2003).

At the municipal level, the set chosen for the analysis comprehends 60 samples including all major municipalities for each region and those having a population bigger than 100.000 inhabitants. At the time the survey was conducted first in 2001 only few examples of municipal web-gis were found consisting of an extra set of minor municipalities excluded by the survey set. These few cases were very small municipalities within the same region which implemented very similar functionalities suggesting the presence of some institutional or marketing facilitating factor acting in the area.

The spatial distribution of GI-based web applications at regional level showed a certain homogeneity in the central and northern part of Italy, while the southern part faced the total absence. However these findings are currently in counter trend especially at the regional level where many Regions are developing new Spatial Data Infrastructure (SDI). Among them the Region of Sardinia is promoting the development of the Regional SDI according to the INSPIRE (www.inspire.org) principles. The SDI is expected to create a sound basis for future PAGIWEB applications, and thereby acting as facilitating factor. At provincial and local level the distribution showed a similar pattern while at local level a fairly homogeneous distribution was evident in the central-northern part of the country.

4 BEST PRACTICES

Beside the general overview of PAGIWEB developments in the two countries it is interesting to analyse in details the applications which have been found as best practices and how they relate to the corresponding spatial planning processes or tasks. To this end some examples from the two countries are described in the following of this section.

4.1 Best practices in Denmark

The results of the survey on the county level showed that all 14 counties have implemented web-GIS to provide plotowners, agricultural consultants, property handlers, windmill owners, municipal authorities and other professionals with updated information about regulations and zonings in the rural area. Not surprisingly the standard and sophistication of the county PAGIWEB are generally higher than the municipal applications. The functionality and level of sophistication of the county PAGIWEB varies slightly but they are all in the lower right part of the CTM. 10 counties offer their GIS data freely for download in XML/GML or software specific formats (MapInfo or Arcview). In the download sections the counties usually also link to freely

downloadable GIS-viewers like ArcExplorer or MapView. These services are partly a consequence of the Aarhus convention (UN ECE, 1998) that assures citizens in ratifying countries free access to data concerning their local environment. Formally seen this obligation is already fulfilled by the web-GIS, and the download option provides citizens with the necessary skills for a valuable extra basis for participating in planning processes. The download option only covers data that the county itself produces, as copyright agreements for the basic maps usually do not make such a free service possible.

4 counties have applications where the citizens are encouraged to make online registrations of occurrences of hogweed and other kinds of weed that spread vigorously in the uncultivated parts of the rural areas. These are so far the only instances of PAGIWEB where the citizens can act directly as data suppliers. A number of the municipal web-GIS' as well as most of the county web-GIS offers functions for "redlining"; digitalisation or marking of an area in the map and provides guidance on how to attach a screenshot of such a redlining to an email to the administration, for comment and questions. In this way the citizens can augment their comments and questions with GI, but they do not directly supply the application with new information content as it is the case in the hogweed registration. With the evolving WMS and WFS technology it must be expected that functionality where the citizens can digitalise and submit GI directly online will be an obvious part of future PPGIS, and for that development a closer examination of the experiences with the hogweed registrations should be made.

Another application worth mentioning is the 3D-model of North Jutland. In October 2002 the 3D-application was launched, using the TerraExplorer from Skyline software systems. In this application the users can fly above and investigate the entire county of North Jutland visualised in 3D by an orthophoto mosaic draped on a digital elevation model. The application enables the user to "fly" from one address to another, circle round specified targets and navigate freely in 3 dimensions. Buildings are extruded from the orthophoto as blocks, based on polygonal information from technical maps. This gives a rough but yet realistic impression of the surroundings. Different themes can be applied to the model, such as tourist information (with links to relevant webpages), bicycle routes, nature camp sites for hikers etc. But the model was also used for visualising different scenarios in the planning process of a large wind mill farm. In combination with electronic meetings these scenarios were valuable supplements to the more traditional means of debate and participation in the planning process.

4.2 Best practices in Italy

The overall study of the Italian situation showed partially different results. Information and services proposed at the three levels differ as well as the technology used to develop communication protocols which are essentially one-way type: in other words PA supply information (or services) to citizens but they are not likely to implement any form of public hearing to support the planning process. However, this is not surprising if one look at the planning

process which traditionally leave no space to public participation. However the situation is currently rapidly evolving and a new survey is urgently needed to verify latest developments.

Public access to the public sector information is sometimes given to digitally support traditional informative task in planning and development. At the regional level this is true especially with regards to medium-to-large scale topographic and thematic data which are usually produced at that institutional level. In few examples (the Regione Emilia Romagna online cartographic service - http://www.regione.emilia-romagna.it/carto/reper/defaulta.htm - was found innovative in that) data are available for download. In the last few years several applications have been developed in the country at the national and regional level; many of these applications allow for data browsing and visualisation but not for download, at least for the general user.

The provinces, responsible for sector development, offer a wider variety of different applications even though at this institutional level PAGIWEB are generally rare and their variety make it difficult to identify common categories. While some applications were found at the provincial level which give access to topographic and cadastral database like at the regional level some other propose different thematic information concerning planning system and other cultural and environmental issues.

At the municipal level most of the applications are oriented to master plans publication; some applications are very basic in terms of data management and technology, whilst some other are developed enough to offer complete communicative frameworks. In the first case websites just offer the main planning documents such as zoning map and regulation, while in the latter many themes, analysis and query functions are available for the users. An interesting experience was found in the City of Turin where within the civic web portal an online GIS is accessible to the public (http://sit.comune.torino.it) and gives information to the local master plan, to cadastral information, and to the transport plan. beside this another application called Officina Città di Torino (http://www.oct.torino.it/) presents information about urban development initiatives coupling dynamic interactive maps to multimedia data. Both websites present information about city spatial planning but the second application appear to be improved in readability to the non-technical user which might find the use of a GIS interface not immediately intuitive.

In general in Italy therefore at the three levels the use of GIS is mainly dedicated to the publication of GI data for visualisation without exploiting possibilities for more effective urban planning or management support.

5 THE COMPARISON

After the description of the local planning systems and the survey of existing applications the results are classified by means of the CTM. The CTM is a tabular matrix built defining two nominal scales; of the first indicates the GI contents with regards to planning (rows) and the second one indicates ICT used to manage GI (columns). Detailed description of the CTM is given in

(Campagna and Deplano, 2004) and the specification of the scales adopted in this study is given in (Arleth and Campagna, 2005). The instances of PAGIWEBs found trough the survey are associated to the corresponding cell (GI content /technology) and the total number of occurrences summarised for each cell. Moreover the CTM can be spatialised representing the density of occurrences in the GI Content/Technology space graphically to perceive an immediate view of differences (figure 1 and 2).

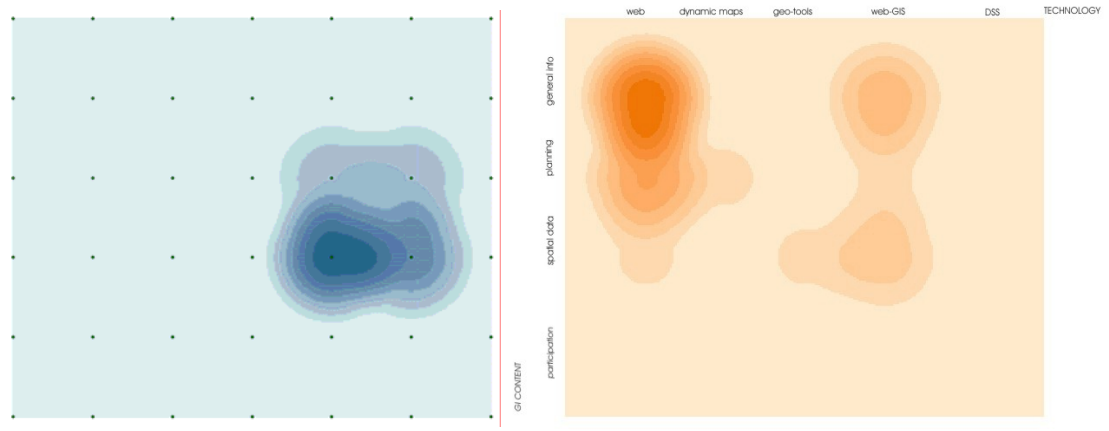

Figure 1: The CMT spatialisation applied to Danish Counties (2004, left) and Italian Regions (2003, right) The spatialisations are based respectively on 14 and 21 instances of PAGIWEB

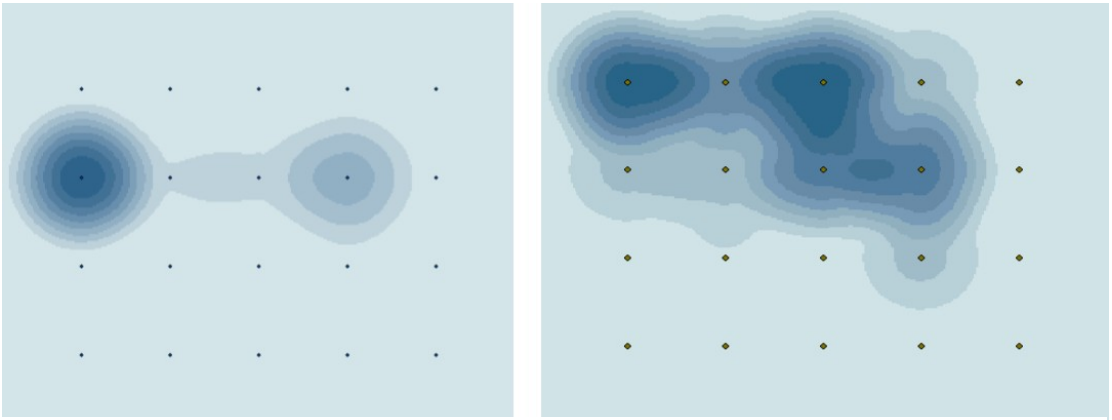

Figure 2: Spatialisation of CTM for the Danish (2004, left) and the Italian (2002, right) municipalities. The spatialisations are based respectively on 171 and 125 instances of PAGIWEB

It might be argued that PAGIWEB classified in the lower right corner of the CTM would be more innovative and more interesting to study from a technology point of view. It is in the lower-right that Collaborative Planning Support Systems would be placed, if existing: as a matter of fact such kinds of

applications have not been found in the two countries. Moreover it might be seen positively for the democratic aspects of the spatial planning that the citizens are offered as flexible tools for analysis and participation as possible, following the Ladder of participation (Arnstein, 1969) towards higher levels of citizens' involvement and empowerment. Nevertheless it can not generally be concluded that the higher CTM ranking PAGIWEB are better in serving any of these purposes than the lower ranking PAGIWEB. A simple application that is tailored for a specific use with limited but well chosen options for interaction can be much more useful to the average citizen approaching the participation with a well defined purpose than a totally flexible full featured online GIS with analytical capabilities (Campagna and Deplano, 2004) (Arleth, 2005). Yet the more advanced PAGIWEB still deserves prior attention. Ambitious and innovative implementations of PAGIWEB usually comprise more functionality than those that can be considered "necessary" for the tasks they should serve. By offering enriched capabilities it would be possible to explore new paths, leading to forms of use and usage that can not always be predicted and valued in advance. Thereby the development of new technology for online public participation becomes a joint effort of researchers, vendors providing the software, public administrations developing or adjusting it to their needs and ideas, and the public finding new ways of utilizing the resulting applications.

It can not be derived directly out of the survey results, but it is an acquired experience of the authors that the development in diffusion and level of PAGIWEB happens in jumps rather than gradually. In the Danish case at least three different "generations" of PAGIWEB (in terms of the technology applied) can be identified. As it is evident from the real practice observation each institution or organisation does not necessarily need to go through all stages, but can jump from generation 1 (or 0) to cutting edge, based on the time they make the decision to "go digital". For this the Region of Sardinia (RAS) is a good example. At the time of the Italian case study the RAS had no online GIS facilities. Nowadays the RAS are undertaking an INSPIRE compliant SDI implementation project.

Nevertheless, there appear to be organisations, institutions or persons who are always pushing the limit of technology implementation, who are more forward looking, creative and innovative than the general mean. Obviously there would be a clear interest in identifying the characteristic conditions that leads to such innovative environments, as creative use of ICT is said to be one of the main future sources of growth in Western Europe. However interesting this object of study may appear it is not the focus of this work. Correspondingly there appear to be organisations and institutions that are more sluggish in adapting ICT in general and specifically PAGIWEB. In between these extremes the majority adapts and use the technology in well known and well documented ways. If one accepts the starting point that mass creates inertia the ideal situation would be to minimise the heavy "tail" and create a homogeneous but high level of diffusion in the middle group. The focus of the following analysis is therefore to identify which factors may be critical for creating this kind of inertia.

With these premises, the results can be synthesised as following:

Denmark:

- The survey shows very uniform pictures within the two administrative levels and a clear difference between the two levels;
- The frequency of PAGIWEB is high, at the county level it is “100%”;
- The allocation of the different tasks of spatial and sector planning are very well defined, as are the provisions of involving the public in the planning processes;
- The PAGIWEB level is generally higher at county level.

Italy:

- The survey shows a very diverse picture, especially at the municipal level;
- The frequency of PAGIWEB is rather low (compared to Denmark) specially at the municipal level;
- The allocation of the different tasks of spatial and sector planning does not seem to be very strict and well defined, especially this picture is blurred due to the variance in the Regional legislative frameworks.

Developing and maintaining PAGIWEB is a technically and administratively demanding task. To develop a PAGIWEB application the public authority has to either allocate personnel resources to programme the application or to allocate economic means to buy a ready made product from a vendor. Often the situation will require both kinds of expenditure. Public authorities are not likely to do this unless they have clear incentives of doing it. Possible incentives for building up PAGIWEB applications can be:

- Based in the legislation; the legislative processes carried out require public participation and information, in which case PAGIWEB can be a valuable tool;
- Based in administrative processes; the administration use a lot of time and energy to serve citizens with information and maps that change regularly, where for it seems a rational choice to build up PAGIWEB applications where the citizens can keep them selves informed;
- Based in a political wish to be/be regarded as innovative in environmental issues, ICT and PP.

A combination of these incentives would often be the case. One would expect, that if there are no demands from the legislation (however indirect that may be) and no immediate economic advantage, from a rational point of view PAGIWEB on Content levels higher than C1 (the lowest) are not likely to be implemented. Although experience tells us that decisions about such things as implementing PAGIWEB are not purely rational, it may be assumed that one critical factor for implementing and developing PAGIWEB are the incentives to do so based in administrative, legislative and economic demands and possible advantages.

The situation with most public authorities are that they are chronically under-financed (according to their own saying often their economic resources are

cut or targeted at specific programs such as hospitals, schools or road maintenance which are considered more urgent). It must then be taken as a basic premise that the budget for buying or developing PAGIWEB applications is often limited. On the vendor side the market of PAGIWEB enabling software to organisations with chronically low budgets probably be more attractive if many organisations would wish to buy (and pay for maintenance of) similar products. The combined efforts of vendors and public authorities in developing PAGIWEB applications are perhaps more likely to result in a general high level if:

- The tasks for which the applications are developed are well defined (scope of the application)
- The same kind of tasks must be handled (parallel) by a large number organisations (the market)
- The different organisations the developed applications are aimed for has a certain homogeneity when it comes to measures like size, employees, budget etc (few adjustments of the application needed)
- The organisations can benefit from a synergy in sharing experiences and self-developed adjustments to the applications
- The organisation is large enough to have a budget dedicated for GI and ICT

A second critical factor for implementing and developing PAGIWEB therefore could be the size and homogeneity of the “market” for developed PAGIWEB applications.

These factors must be considered tentative and are meant as propositions for further investigations. Earlier studies, such as (Bodum, 1999) have found no dependency between the size of the organisation and their adapting of ICT tools for planning, at least for the Danish case. Determining factors instead seemed to be less generalisable aspects such as in house resources of know-how and technology and a flexible organisation. The incentive effect of legislative demands is questionable too; at least the Italian case study does not show any existing direct dependency between legislative demands and frequency of PAGIWEB applications. These and other matters are being investigated more indepth in further development of this study.

6 CONCLUSIONS

From the analysis presented in this paper it appears clearly that both in Denmark and in Italy Public Authorities are making extensive use of GI in their web-sites. However the growing use of Geographic Information is not necessarily exploited to support spatial decision making through participatory practices. This may partially be addressed to the fact – or the belief - that planning systems in the two countries do not offer substantial possibilities for involving the public in spatial decision making or do not fully exploit existing possibilities. However, this is not completely – or necessarily - true as one might argue that innovative approaches might be experimented with, such as in Environmental Impact Assessment procedures, where participation could be supported through online spatial information systems (Fonseca Gouveia,

2005); this is only an example but shows the potential of such kind of application.

The results of this study show that best existing PAGIWEB do:

- give access to data;
- give information about planning regulations;
- supply services related to spatial management and plan implementation;
- give information about ongoing spatial development projects;

but do not

- involve citizens in the planning process

PAGIWEB development is still in its infancy from the planning support perspective. Political, institutional, organisational constraints should be cleared before implementing reliable collaborative planning support system online.

However, if on the one hand more research should be devoted to PSS experimentation and in general theoretical frameworks for PSS development, on the other hand the analysis of current practices seems to offer several interesting information concerning the capability of the public sector to acquire methodological and technical research developments on PSS based on the everyday practice needs.

The CTM classification method has proved to be a useful way to relatively fast build an overview of the diffusion of PAGIWEB. The scales of content and technology, C1-C4 and T1-T5 are nominal in nature but do also imply a clear progression towards more advanced tools and higher levels of interaction and participation. Although the allocation of the PAGIWEB to the specific cells in the CTM relies on judgement, and hereby is prone to a slight subjectivity, it is fairly easy to determine which cell a certain PAGIWEB falls into. Hence the resulting classification can be considered quite consistent and forms an adequate basis for comparison between the two countries. However, comparing absolute measures is not meaningful if the samples are not of an even size. Therefore the spatialisation of the CTM is a valuable tool to achieve a normalised result upon which analysis can be made directly.

The application of the CTM method has been found useful in the comparison of the PAGIWEB diffusion analysis in different context. Similarly it can be used to compare different time frames in the same geopolitical context to monitor evolution trends. The application of the method to other countries in Europe is desirable for gathering further insights on success and failure factor and best practices.

REFERENCES

Arleth, M. (2005), GI-Based Applications on Public Authorities Web Sites and their Non-Professional Users , in: Campagna, M. (Ed.): **GIS for Sustainable Development**. CRC-press - Taylor & Francis (forthcoming)

Arleth, M. Campagna, M. (2005) Accessibility of GI for Public Participation A Danish-Italian comparative study, **AGILE 2005 Proceedings**, Estoril (PT), May 2005.

Arnstein, S. (1969), A Ladder of community participation, **American Institute of Planners Journal 8, pages 216-224**

Brail, R. Klosterman, R. (2001), **Planning Support Systems: Integrating Geographic Information Systems, Models and Visualization Tools**, Esri Press.

Bodum, L. (1999), **Nye medier I lokalplanlægningen (New media in the local planning),** Ph.D thesis, Aalborg University 1999, Aalborg, Denmark

Campagna, M. Deplano, G. (2003), Local Authorities GI-based web sites and spatial governance: Towards an evaluation framework. **9th EC GI&GIS Workshop Proceedings**, A Coruña, Spain, 2003

Campagna, M. Deplano, G. (2004), Evaluating geographic information provision within public administration websites, **Environment and Planning B: Planning and Design, volume 31, N°1,** pages 21-37

Carver, S (2001), Participation and Geographical Information: a position paper for the ESF-NSF Workshop on Access to Geographic Information and Participatory Approaches Using Geographic Information, **Spoleto, 6-8 December 2001**

Chapin, T. (2003), Revolutionizing the core: GIS in the planning curriculum, **Environment and Planning B: Planning and Design 2003, volume 30(4)**, pp 565 - 573

Fonseca, A. Gouveia C. (2005) Spatial Multimedia for Environmental Planning and Management, in: Campagna, M. (Ed.): **GIS for Sustainable Development**. CRC-press - Taylor & Francis (forthcoming)

Gabellini, P. (2001) **Tecniche Urbanistiche**, Carocci, Roma

Geertman, S. Stillwell J. (2003), **Planning Support Systems in Practice**, Springer: Berlin

Høgh, M. Pedersen, L. (1998) **De manglende kommunplanrevisioner? (The missing Master plan revisions?), Masters Thesis, Aalborg University**, Denmark 1998

Huxhold, W. (1991), **An Introduction to Urban Geographic Information Systems**, Oxford University Press, New York.

Klosterman, R. (1997), “Planning Support Systems: A New Perspective in Computer-Aided Planning”, **Journal of Planning Education and Research,**

Vol.17, pp 45-54.

Krek, A (2005) Rational Ignorance of the Citizens in Public Participatory Planning, **CORP 2005 10th international symposion on information and communication technologies in urban and spatial planning and impacts of ICT on physical space**, Vienna, Austria 2005

Peng, Z-R. Tsou M-H. (2003), **Internet GIS: Distributed Geographic Information Services for the Internet and Wireless Network**, John Wiley & Son.

Surinach, J., Duque, J.C., Ramos, R. and Royuela, V. (2003) 'Publication patterns in regional and urban analysis: have topics, techniques and applications changed during the 90s?', **Regional Studies, Vol. 37, No. 4**, pp.351–363.

UN ECE, 1998: Convention on Access to Information, Public Participationin decisionParticipation in decision making and access to justice in environmental matters. **ECE Committee on environmental Policy**, Aarhus, Denmark