The application of web-based technologies in developing the knowledge network for planning and development is the topic of this paper. Despite the fact that the web phenomenon is relatively new in the profession and not yet entirely explored, there is evidence which suggests that e-services are amongst the most rapidly growing sectors in the profession today. Numerous e-technologies for planning purposes have already been developed, and often fully integrated into the planning practice. This paper explores the state of the art in the field, and discusses the way the e-based alternative could be utilized in everyday planning practice. At the outset, the existing know-how is presented, followed by the assessment of the tools against the principles of a good planning practice. The challenges to the alternative are highlighted in the last section, and debated vis-à-vis the observed benefits. Implications for concrete planning practice are at the heart of the overall discussion.

INTRODUCTION
During the last two decades the planning profession has undergone a tremendous transformation. Not only have the planning philosophy and ideas changed, but the overall framework for the planning discipline has transformed as well. While many factors have contributed to these processes and have influenced the development of the discipline, it is the development of the information and communication technology (ICT) that marks the era by opening up new frontiers for the profession.

Today, many countries place ICT high on their development agenda. Often, they rank it amongst the key determinants for the future urban development. Although alone it does not determine the urban future, nor does it guide and shape the cities independently of other forces - political, social, economic, environmental and cultural - its influence on development, and planning and management of cities and towns in particular, is unquestionable and ever increasing. The ICT phenomenon involves and underlines some fundamental changes in our ideas about society and the organization of space, and embraces fundamental transformations of our concepts of the relationship between peoples and territories, and indeed of the very concepts of humanity and space.

The World Wide Web, and more specifically, the Internet, was introduced on a large scale about a decade ago. It grew rapidly, first into a new communication channel, and then into a parallel economic and social domain. Today, e-space is not only a place where people meet. It is also an economic place, a powerful economic resource that fully participates in shaping development of many regions and cities worldwide. At the same time, it is also a place where part of urban/spatial development and management functions takes place.

The global electronic network supports mobility in space and time, and as such is relevant for any planning or development action, be it at a local, national or international level. Transparency, efficiency and economy, the key words of the e-option, support a call for information networking on the Internet to channel organizational and operational resources for planning purposes.

The intersection where the technology and planning meet, creates a point where the web based knowledge networks originate. While these new opportunities are of limited use today, tomorrow they may become an intrinsic part of the professional routine. This is the fastest developing sector in the industry, and it is taking place in response to the ever-increasing demand. Numerous e-technologies for planning purposes have already been developed, and often fully integrated into the planning practice.

This paper addresses and discusses the technologies available today. At the outset, the existing know-how is presented, followed by the assessment of the tools against the principles of a good planning practice. The challenges to the alternative are highlighted in the last section, and debated vis-à-vis the observed benefits. Implications for concrete planning practice are at the heart of the overall discussion.

ICT: CHALLENGE FOR THE PLANNING PROFESSION
E-services are amongst the most rapidly growing industries today. Remarkable results have been achieved in the area of urban planning and management. In more developed countries, there are hundreds of thousands of operating modules in almost every city or region. Some countries, like Italy or Singapore, have begun to gradually replace the traditional model of the face-to-face office work by the e-alternative. The situation is quite different in transition and developing countries, nevertheless there are examples of those who already embarked on strategies to successfully join the
world of the new knowledge economy. Estonia, Cyprus, Slovenia or Hungary in Europe, as well as Korea, Malaysia and Thailand in Asia, or Brazil and Mexico in Latin America, are among the leading countries and provide good examples.

Does "wiring" the nation and creating the "intelligent environment" affect the way we plan and manage our settlements? Are we approaching a new planning paradigm? Is planning diminishing? These are some of the frequently asked questions, calling for attention and research as the key issues the profession will be challenged with in the next decade.

In principle, introducing the e-based option into planning procedures, does not necessarily lead to entirely new paradigms or planning models. Rather, the e-alternative is aimed at providing a supplementary means to facilitate and support the existing ones. Web networking is aimed at providing additional means to ease access to different information resources relevant for urban development and management, to sustain and foster further development of urban democracy, and to annex new forms of urban management to the ones we know today. Public services and resources thus become closer to their citizens, and different actors participating in the development process are provided with a new arena for developing dialogue, cooperation, and exchange. The ultimate goal is to construct a more comfortable urban milieu, and a more democratic and fair social environment.

The e-based alternative generates positive effects to all parties involved, from the individual to the societal level. The benefits could be summarized as follows:

**Individuals/Citizens**
- Offers alternatives
- Enhances public participation in the democratic process
- Enhances social and community life
- Provides instruments for carrying out activities
- Provides access to information and facilities
- Develops new skills and creative thought
- Supports cosmopolitanism and trans-localism
- Extends opportunities to integrate less privileged or otherwise marginalized groups

**Business/Corporate Sector**
- Supports business and economy
- Improves service delivery business-client and business-business
- Creates opportunities to improve delivery at lower costs
- Enables greater efficiency in job performance
- Opens the door to new business opportunities
- Provides opportunities to integrate into regional/international business/economic world

**Public Sector**
- Creates opportunities to government to improve service delivery at lower costs
- Provides potentials to improve quality of local urban management
- Supports efficiency of local governance and the quality of the decision-making process
- Improves quality of communication between local authorities and their citizens, and adds new opportunities for public participation in community affairs
- Provides a platform for communication and cooperation between different local bodies and departments
- Enables citizens to communicate with their governments in an easier and more efficient way
- Provides citizens with easier access to different information, government departments and bodies, etc.
- Supports democratization and public involvement
- Supports cosmopolitanism and trans-localism and is opening up an opportunity to integrate into regional/international wider framework.

**HOW DO WE CREATE A KNOWLEDGE NETWORK BY THE MEANS OF ICT?**

There is a wide range of web based technologies/tools available today, which could be used in planning, through a step-by-step process, to plan, design and develop the best solution. Some of them have been around since the advent of the Internet. Others have gone mainstream over the last few years. All of them can be implemented as part of a knowledge networking strategy.

While the web GIS, and the web GIS-based PSS are the most outstanding technologies/tools planners could employ today, there are many others which could also be used. The majority of technologies were not exclusively designed for planning purposes. On the contrary, they were invented and built up to improve communication in general, and it was only after they turned into the full use in other fields, that possible application in planning became evident, and their benefits for planning were recognized.

The most popular and most frequently used technologies/tools in/for planning, are the following:

1. Web site
2. Electronic Listserv / Discussion Group (E-mail newsletters)
3. Electronic Conferences
4. Electronic Journals/ Newsletter
5. Online Database/Sharing of Documents/Publications
6. Web GIS
7. Web based Public Participation
8. On-line Communities: Civic Web Network
9. Online Planning Studio
10. Online Planning Portal
11. Content Management System

**A Website:** A website typically serves as the foundation for delivering services, and the place where most people initially go to explore the types of services that are being offered. There are billions of pages in operation today, out of which many support planning. Numerous have been developed exclusively for planning purposes. Website is the most user-friendly instrument available today. Practically, there are no requirements for the specific technical knowledge or skills to use it efficiently. This makes it the most convenient instrument to be employed in planning, especially in the environment where capacities relevant for planning are underdeveloped.
ever-increasing trend all over the world. However, it is the www component that created a “big-push”, and generated new standards in the profession. GIS can store, retrieve and analyze information for planning purposes and aid in solving planning problems. It can serve as a database and as a toolbox. As a database, spatial and non-spatial data can be linked by a geo-relational model. Subsequently, data can be extracted from the GIS database and used for analysis. As a toolbox, GIS can allow for spatial analysis using its geoprocessing and elaborate cartographic modeling functions to generate answers to questions. The sophisticated web-based mapping software allows affordable online delivery of complex data such as land-use information, zoning, demographics, aerial photos, real estate site location, routing, as well as the analysis.

Web GIS. Most data have a geographic component, and geographic information systems and web-based mapping (sometimes called Web Geographic Information Systems, or Web GIS) take full advantage of it. GIS has been around for more than a decade, with an
geography. SWN is exclusively oriented towards issues and needs that are identified as local. It serves local citizens, and addresses local population as a target group. The Civic Web Networks are developed, operated and maintained in order to:

1. Supply local population with relevant information on local issues and needs;
2. Provide a forum for real-time communication between citizens and their governments;
3. Enable participation and involvement of local population in the local management;
4. Improve service delivery to citizens by introducing different e-services;
5. Improve service delivery to business and support for local development;

Online planning studio. This is a complex and comprehensive Internet based setting, within which all or the majority of the planning tasks and assignments are being carried online. Normally, it includes and combines many different technologies for different phases or stages of the plan making process.

There is a specific group though, known as Planning Support Systems (PSS). Born only recently as a further extension of GIS, PSS provides a new perspective on computer-assisted planning and can be seen as a continuation of analytical trends. "It offers a model for combining a range of computed-based methods into an integrated system that can support the planning function. GIS, three-dimensional models, and decision-making tools, constitute the core components. PSS can analyze a variety of socioeconomic, transportation, environmental, economic, or land-use data, and demonstrates the outcome of various assumptions and policy decisions. By changing certain assumptions, the user can see the resulting changes in real time, or accelerate to see predicted changes, as a series of maps, charts, graphs, and in some cases, three-dimensional simulations of the resulting community or region. PSS could be adaptable to a wide variety of situations, level of information, and size and type of area" (Klosterman, 2002).

Among the most recently developed are "What if?" and "CommunityViz".

CommunityViz™ is an ArcView GIS-based decision support system for community planning and design application. The software is unique in that it fully integrates the words, numbers, maps and images that planners traditionally use for planning purposes into one real-time multidimensional environment. The tool provides a fully interactive, 3D-realtime environment in which citizens and professionals alike can clearly understand proposed plans for their community. This is achieved by enabling the GIS (Geographic Information System) to modify data on the fly, linking it to real-time photo-realistic 3D visualizations, and adding the fourth dimension (time) through the use of agent-based forecasting. CommunityViz is a series of three modules built on ArcView GIS, and these are: Scenario Constructor, TownBuilder 3D, and Policy Simulator (Kwartler & Bernadr, 2001).

What if? is a scenario-based, policy oriented PSS that uses GIS data to support community-based processes of planning and decision-making. "It incorporates procedures for conducting land suitability analysis, projecting future land use demands, and allocating the projected demands to the most suitable locations. The system allows users to create alternative development scenarios and determine the likely impacts of alternate public policy choices on future land-use patterns and associated population and employment trends. It is easy to use, can be customized to the users' database and policy issues, and provides outputs in easy-to-understand maps and reports. What if? Does not carry out a single exact prediction of the future but a range of alternative scenario-based forecasts, which in turn reveal a range of potential futures. In other words, this system can be used to determine what would happen if" (Klosterman, 2002).

Online planning portals. Planning portals are not built for the professionals only, but for all parties interested in planning issues. They can share information, best practices, conduct research or exchange, interact with each other, locate Internet resources, etc. Online planning portals are meeting places, but they are resource places as well.

Some governments have developed their planning portal. A good example is the ukonline.gov.uk, a planning portal developed as part of the e-government strategy. Some of the best known professional planning portals are KnowledgePlex, PLANetizen, and Cyburbia.

Content management systems (CMS). CMS is a tool that has recently been introduced, and to date only a limited experience has been gathered. The online database and a web browser constitute the main parts of CMS, however the advantage lies in the capacity to enable users to store information and to quickly update or add information. CMS makes web content dynamic instead of static; the most current information is always available on demand.

The importance of CMS for planning is tremendous, and possible applications almost endless. For example, if a city’s zoning code were managed in a CMS, updates to the code also would be reflected in real time on the city’s website. The core data gets stored in one central place, but can be published in multiple formats: to a website or intranet site, on a handheld, via e-mail, or even fax on demand (Christopher Steins, 2002).
WEB-BASED KNOWLEDGE NETWORKING AGAINST CRITERIA OF A GOOD PLANNING PRACTICE

How does the e-based option affect the way we plan and manage our settlements? Does planning benefit, do we, the professionals, benefit? Does the public benefit?

The instruments are already there, and the planning profession is well aware of their existence. However, if we are to introduce them systematically, we should explore some specific questions of their performance, in order to maximize the benefits and minimize the possible shortcomings.

An instrument, or a set of instruments, good for one part of the planning procedure (process), may not be suitable for the whole process or for its every phase. Some of them could be extremely useful for a particular situation, or a specific project only. Notwithstanding their usefulness, a careful scrutiny of their applicability reveals that often their use is conditioned, for its every phase. Some of them could be one part of the planning procedure (process), an instrument, or a set of instruments, good for the first time there is a communication standard, and a required part of the procedure, participation and public involvement become a question of communication ever since the advent of their profession, and especially since technological advancement.

While planners have been confronted with a question of communication ever since the advent of their profession, and especially since participation and public involvement become a standard, and a required part of the procedure, it is by introducing the e-based alternative that for the first time there is a communication option that can be used efficiently. Different technologies provide the service for different stages throughout the whole planning process. Simple data access or data/information exchange can be made even with the simplest tools, and technical requirements for their use are practically minimal. Access to people can be made in the same way. However, it is the most sophisticated technologies that have the highest potential to substantially increase the efficiency and effectiveness of planning. They provide the interactive real time communication that can be employed throughout every planning stage, be it a pre-planning survey, plan-making itself, or the decision-making process. However, the technical and know-how requirements for their use are substantial as well.

**Applicability**

Not all technologies/tools are equally functional. Some of them may be employed throughout the whole planning process, while others may provide good service only for part of the process, or serve at a particular stage. The more sophisticated they are, the broader and more extensive, but their application may be intensive as well. As for the perspective of a single use, it is interesting to observe that complexity and refinement of the instrument do not always play a major role. For example, a simple web site is a very useful instrument for many pre-planning activities, and in terms of its performance ranks as equal to the most sophisticated ones. However, it is not the same as for the other procedures.

In the plan-making process, decision making, and procedures for monitoring and implementation only the most sophisticated rank as very successful, while the more simple often are of no use. Web GIS is a good example of a superior tool, while Online Planning Studio is the ultimate working environment we strive to achieve. Technical requirements for their use however are quite high, and many countries and communities, for the time being, can hardly afford them.

**Quality of planning**

Quality of planning may be assessed against a number of parameters. However, it is a group of basic principles that every good planning practice relies on, against which the potential of the e-based technologies is being evaluated here:

1. Efficiency (performing in the best possible way and in the least wasteful manner);

### Table 1: Communication mode by instrument

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Exchange</th>
<th>Access Data/Information</th>
<th>Access People</th>
<th>Interactive Communication</th>
<th>Real Time Communication</th>
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**spatium 31**
2. Effectiveness (capacity for producing a desired result/effect);
3. Collaboration/cooperation (capacity for enabling two or more parties to work together effectively);
4. Transparency
5. Public involvement
6. Equity of access

In general, all technologies contribute to the quality of planning, and enhance the quality of its performance. Some of them contribute more though in respect to a particular criterion, or a set of criteria. The general rule - the more sophisticated the more effective the instrument is, does not apply always and everywhere. For example, a website ranks as good as some of the most sophisticated ones against the criterion of effectiveness, transparency and to some degree is relevant for public involvement and the equity of access. The fact that even the simplest technologies (instruments) may substantially improve the planning practice is an interesting observation, especially with regard to the common argument that financial and technical limitations restrict their use.

The majority of instruments meet the criterion of providing or improving the transparency of the planning process. They may also be used to enhance collaboration and cooperation among the stakeholders in the planning process in general. Some of the instruments are likely to increase the efficiency and effectiveness of planning, while quite a number can be employed to support public involvement and public participation.

**Challenges to the on-line option: Impacts vs. Affordability**

The ICT in general, and some of the technologies in particular, require a sophisticated environment in order to be implemented and to work successfully. Some of them can be successful only if corresponding know-how is secured, or technical infrastructure developed. The more complex and sophisticated they are the higher the requirements they impose. Only the simplest ones may work in the environment which exists in the majority of cities/countries today.

Discussion and literature on the issues of social deficiencies and problems are limited.
however, a digital divide has been recognized and discussed broadly. Recently it was placed on the world agenda: "At first sight, it might appear that new computing and communication technologies offer tantalizing possibilities for transcending traditional social and geographical barriers...the reality however, is very different and quite alarming; there is growing evidence that the main trends surrounding the application of CIT support processes and practices that intensify urban polarization" (GRHS:Habitat+5:2001). The dominant logic of the CIT- based development supports urban polarization, and tends to extend the reach of the economically and culturally powerful, thus contributing to the restructuring of human settlements (Graham, 2001). The uneven effects of such a process advance the idea of the heterogeneity between privileged and non-privileged territories or social groups (Bakis 1984, Bressand, Distler 1995, Allemand 1996). Therefore, there is a need to include into the course of analysis a number of other issues like- accessibility, or to address the question of social justice as well. The e-based option may become effective only under the condition that the majority of the population has a secured access to it, and sufficient know-how to use it. Only where there is a critical mass of users who already exist or are likely to emerge, the alternative may become a real option and serve the purpose (Bajic Brkovic, 2001, 2002).

These raise the issue of affordability vs. impacts. Affordable technologies have been identified those that require the least resources, both in terms of the technical equipment, and human capacity. It appears that, the more affordable technologies are, the fewer or less relevant impacts they create. On the other hand, the less affordable create more significant impacts.

This observation raises an important and interesting question on the perspectives of the e-planning option in different countries, in relation to the level of their development. It is worthwhile to mention the results of two recently conveyed surveys on the future of e-support planning, one conducted in the Caribbean region (Frojmovich M., 2002), and another in Serbia and Montenegro (Bajic Brkovic M. & B. Mitrovic, 2003). Although the two entities hardly have anything in common except that both belong to the developing world, the results obtained are quite similar. In both cases, the e-option exists, although on a rather rudimentary level. Both in Serbia and in some countries in the Caribbean, the strategy of e-government has been already adopted or is on its way. The implementation however, has hardly, if at all, started. Not only is there almost no interest among the professionals to introduce and experiment with a new practice, but also the overall attitude is rather skeptical. Affordability is the key issue of concern among the respondents, while the lack of adequate infrastructure, a weak know-how and a lack of support from the governments, are among the obstacles most often mentioned.

CONCLUDING REMARKS

Technology-based paradigms, such as that of the information society, provide a multitude of means to a multitude of ends. In this paper, a distinction has been made between the ends and the means associated with this paradigm. We explored the state-of- the-art of the means relevant for planning, but clearly it was the planning ends that guided our discussion.

On the global level, a momentum has been gained in developing the ICT based alternative for knowledge networking for planning purposes. There is a "digital opportunity" and apparently many efforts and actions are on the way not only to transform this opportunity into the advantage for the profession, but for development in general. Different instruments have been developed and brought into the practice. Their capacity to facilitate the plan-making and decision-making processes, to make planning more efficient, and to support the democratization of societies and extend public involvement, have been underlined and pointed out most often. It is on these premises that they gained their success in many countries by now.

There are still those who question. Would high-tech and high-touch technologies truly replace the traditional way we communicate in the profession, build our knowledge network, and participate in the planning/decision making process?

In addressing the concerns of those who are skeptical, it should be noted that the e-based alternative does not necessarily need to replace the existing and traditional mechanisms. It does however offer a more efficient alternative and as such provides an option. In fact, the new technologies offer the possibility, for the first time, to provide improved delivery at a reduced cost.

REFERENCES


BAJIC BRKOVIC, M: Planning in the

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Number of dots indicate the level: • fair •• high ••• very high


