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Approach to Spatial Data Infrastructure Development for Spatial Planning in Serbia

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1 ABSTRACT

Spatial data infrastructure (SDI) represents a socio-tehnical concept that aims to create a context for cooperation and exchange of data and information between a certain spatial data community's stakeholders. Thus, the aim of SDI concept development is to establish a common and spatially supported platform of organized information needed for making right decisions relevant for economic progress, good governance and sustainable development in general within a certain domain or jurisdiction. Today, the majority of launched SDI initiatives are on the national level that is by some authors identified as the crucial one for evolution of this concept in general. Additionally, recent research has proven that SDI developments have become prevailingly social phenomena since interactions between community stakeholders appeared to be critical for achieving purpose of SDI concept and vision in general.

Recent socio-economic issues in Serbia and existing practice in domain of spatial planning have proven strong need for new, systematic approach and efficient mechanisms towards sustainable development of its territory. In a narrow sense, this systematic approach should include clear responsibilities and participation among spatial planning stakeholders within spatial development monitoring and evaluation process and identification of sustainable development alternatives, where the whole process should be supported by appropriate GIS-based information platform. On the other side, this new approach along information platform should support consequently mechanisms and tools for efficient and continual sustainable development alternatives and decision-making on resources and existing capacities development in Serbia. Finally, in a broader sense, this new system should provide basis for realistic and sustainable spatial development policy definition and, along it, conditions for its optimal implementation strategy identification.

Therefore, recent activities in the Republic Agency for Spatial Planning (RASP) have been oriented towards building basic database model for projected information system that would be followed up by spatial planning SDI in future. This latter should become platform for efficient and effective communication and coordination among spatial planning SDI stakeholders in Serbia. However, it would be also expected to provide input for translation of spatial data and information into knowledge that support continuous, informed and timely sustainable decisions making and development alternatives creation and management employing planning support systems (PSS) and decision support systems (DSS) technologies.

Thus, aim of this article is to propose an appropriate approach, i.e. model for spatial planning SDI development in Serbia based on present database model and its development concept, as well as to describe recent activities on the same and discuss expectations for PSSs and DSSs.

2 INTRODUCTION

The well-known Bruntal Report's definition of sustainable development assumes development that meets present generation needs without jeopardizing capabilities of future generations to satisfy their own needs as well. This means that sustainable development encompasses sustainable management of all three main spatial systems, namely social, economic and environmental/ecological ones, as well as their relationships. Besides spatial dimension, sustainable development definition above assumes, also, dynamic dimension of those three systems. This includes need for monitoring of three systems and their relationships through time, i.e. during generations, and collecting and storage of information series on systems' statuses as well as taken management actions. (Shcherbina et al, 2010; Feeney et al, 2001)

Today sustainable development presents dominant governance approach to resources management. Thus, modern societies are build different information and communication management capacities –namely, tools, instruments, models, etc.- for spatial development status monitoring and evaluation, on one side, and for making sustainable development decisions, policies and strategies based on dynamic relationships among social, economic and environmental phenomena, on the other. (Williamson et al, 2006) Therefore, it could be claimed that data and information have critical role for management towards sustainable development goals

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achievement: economic progress, good governance and environmental responsibility. (Shcherbina et al, 2010)

On the other side, data and information and their organization is main focus of the SDI paradigm, which is a part of Al Gore's (1998) Digital Earth (DE) vision of „a multi-resolution and three-dimensional presentation that…enable discovering, visualisation and true understanding of an enormous quantity of geo-referenced data and information about social phenomena and environment on our planet". (Craglia et al, 2008) After 15 years of DE vision launching, SDI concept today is developing and evolving its paradigm within different domains and levels of public sector, both in developed and developing countries, where national level is found to be of critical importance for SDI paradigm development in general. (Rajabifard et al, 2000) From the early development, SDI concept was considered as prevailingly public policy analysts' tool, needed for informing different public policies and sustainable development decision-making, and which was generally implemented by legal mechanisms. (Craglia et al, 2008) However, some recent analysis has decline SDI firstly claimed decision-making functionality (Feeney et al, 2001), and instead they positioned SDI as important facilitation tool, i.e. supporting information platform for various models and infrastructures for professional judgment, like PSSs, and policies decision-making, like DSSs.

In domain of spatial planning in Serbia today notable efforts are investing in building GIS-based tool that would a) support identification, planning and monitoring of sustainable development alternatives; and b) provide platform for making informed decisions, strategies and policies that would contribute to sustainable development scenario achievement. (Živković, 2012) Clearly, this tool in future should include implementation of PSS and DSS solutions adapted to spatial planning system and its jurisdiction's needs in Serbia. However, since both PPS and DSS functionalities and usefulness depend on available data and information quality and quantity, spatial planning SDI and its integrability and interoperability would be thus of crucial importance for future sustainable decision-making and development in Serbia in general. In other words, this implies that spatial planning SDI would have significant effects on emerging PSS and DSS infrastructures in Serbia, and that tackling of different technical and non-technical SDI implementing issues today could have direct impact on sustainable spatial development decisions and actions in future.

Therefore, this article aims to identify and propose SDI development approach or model that would be appropriate for spatial planning system establishment in Serbia. First, basic introduction to SDI paradigm and its development and evolution are going to be presented. After that, in Chapter 4, new methodological approach to sustainable spatial development in Serbia will be explained, and general description and objectives of initial model for spatial planning database (SPACE) and information platform (ISSPace) will be identified. In following Chapter 5 model for SDI development for spatial planning domain in Serbia is going to be proposed, along general assumptions on how proposed model would reflect on latter PSS and DSS technologies implementation.

3 SPATIAL DATA INRASTRUCTURE

3.1 SDI: Definition, components, structure, national SDI and development models

The SDI concept is usually defined as a set of policies, technologies and standards necessary for efficient collection, management, access, exchange and usage of geospatial data and knowledge within geospatial data communities –consisting of stakeholders, that is, users and producers- on global, regional, national and local levels. (Rajabifard et al, 2002) Therefore, SDI is usually described as a constellation of five basic components and their relations: people, access networks, policies, standards, and data. (Rajabifard et al, 2001; Mohammadi et al, 2008)

Since the first initiatives were launched, relationships between SDI components have been changing. (Craglia et al, 2008) At the beginning, the focus of SDI concept development was on creation of concrete products and/or services within single jurisdiction. Later, relationships between people, i.e. social component and data component have become critical for the SDI concept development in general. Therefore, today the focus of SDI development is on management of different stakeholders' rights, restrictions and responsibilities against data through the different cross-jurisdictional partnerships. (Feeney et al, 2001; Rajabifard and Williamson, 2002)

Thus, the originally dominant short-term product-based approach to SDI development, oriented towards content building, has been later complemented and dominanted by a process-based approach to

establishment of communication conduit that needs to secure long-term commitment of all SDI stakeholders to collaborate and exchange data between included jurisdictions. (Rajabifard and Williamson, 2002)

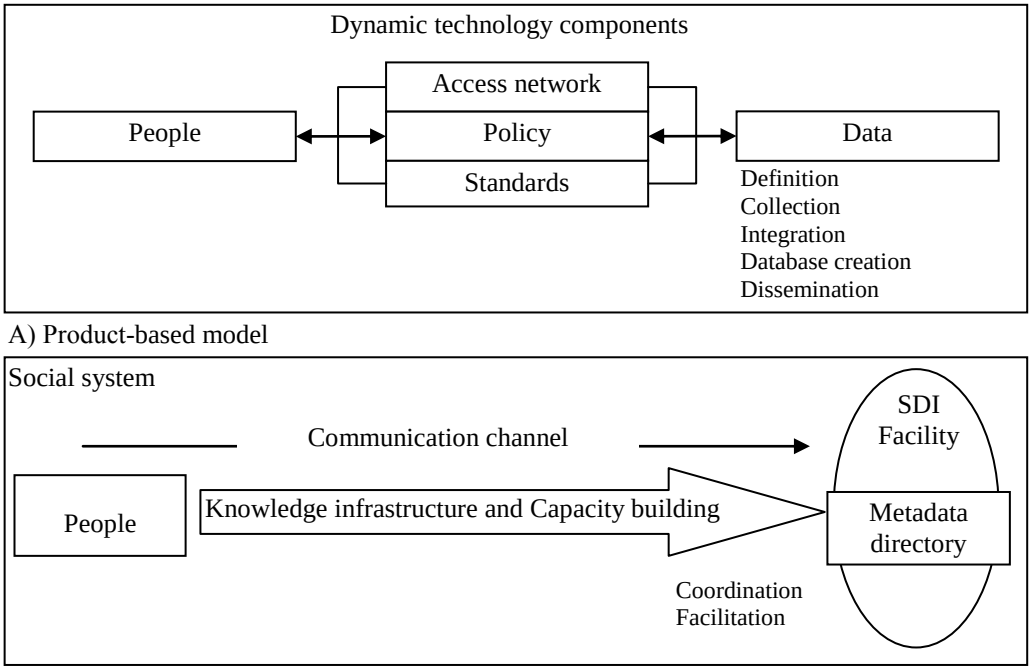

Figure 1: Approaches to SDI development. Product- and process- based models for SDI development (Rajabifard et al, 2002)

Adoption of either one of two SDI development approaches depends directly on a mandate that particular jurisdiction needs to establish. (Feeney et al, 2001) However, it is also possible to implement a composite product-process approach that secures advantages of both models, making thus development and evolution of particular jurisdiction more flexible as a whole. This is due to the initial raising of social commitment to SDI concept building, securing a common leadership and trust necessary for data sharing.

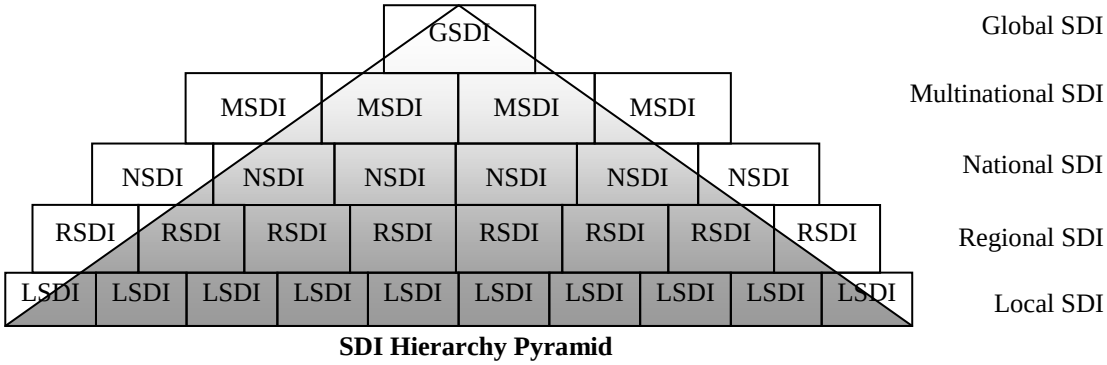

Figure 2: SDI spatial pyramid. SDI global hierarchical structure is the result of different mandates of the SDIs' jurisdictions on different levels, as well as within the same level (adapted: Rajabifard et al. 2002).

According to Rajabifard et al (2000), SDI components on national level have the greatest and direct impacts on development of the same components on the other levels in SDI spatial hierarchy, i.e. pyramid, national SDI initiatives have been identified to posses decisive role for the development of the global SDI concept in general. (Rajabifard et al. 2000) However, Carrera and Ferreira (2007), Nedović-Budić et al (2007) and Živković (2012,b) claim that future of SDI should confirmed and highlight significance of local and regional GIS-based information platforms, i.e. municipal and regional SDIs, for producing fine-grained and up-dated (re)usable spatial data and information in and for public, private and non-profite sectors. Also, these authors claim that this would be the most efficient and effective way of developing, maintaining and integrating national datasets in future.

Latest development and fast spreading of different Geo-Web services and Web applications in general, point to a vision of SDI development in future as an infrastructure or network of infrastructures build up of loosley coupled Web-GIS systems, which would be shared within a different hierarchical levels (vertically) and

areas (horizontally). (Carrera and Ferreira, 2007; Mohammadi et al, 2008) However, in order for promised advantages of information infrastructures, i.e. smooth flow and easy exchange of data via Geo-Web services through integration of distributed local/regional GIS/SDI to be achieved, number of technical and non-technical issues should be implemented today by social component of SDI. This fact confirms critical role of social component and social character of SDI paradigm development in general, which is already stressed at the beginning of this article.

Technical issues	**Non-technical issues**			
	Institutional issues	**Policy issues**	**Legal issues**	**Social issues**
– Computational heterogeneity (inconsistent standards) – Poor/no metadata – Format – Semantic heterogeneity – Data Quality – Reference system and scale	– Inconsistent collaboration models – Differences in funding models – Lack of linkage between data management units – Lack of awareness of data integration needs	– Lack of awareness of data existence – Lack of legislation – Political stability – Inconsistency in policy drivers and priorities (sustainable development)	– Rights, restrictions and responsibilities to be defined – Copyright and IPR differences – Difference in data access and privacy – Licensing	– Cultural issues – different background of stakeholders – Capacity building – weak activities – Equity

Table 1: SDI implementation issues. Technical and non-technical issues associated with spatial data integrability and interoperability (Mohammadi et al, 2008; Williamson et al, 2006)

3.2 Spatial planning infrastructure and planning and decision support systems infrastructure

Sustainable development requires continual and integrated consideration and analysis of social, environmental and economic issues, as well as their evaluation and prioritization against current and planned land uses in order for potential development conflicts among those three systems to be minimized. (Feeney et al, 2001) Therefore, planning of sustainable development alternatives and making decisions adjusted to sustainable development strategies and policies require technologies with capabilities for modelling and handling complex spatio-temporal phenomena, like PSS and DSS combined with GIS advantages. (Shcherbina et al, 2010; Boerboom, under review)

Since both PSS and DSS outputs' quality highly depend on available data and information, both Feeney et al (2001) and Boerboom (under review) have identified reliable SDIs, meaning fully integrable and interoperable, as critical for collecting and storing of needed data on environmental, economic and social rights, responsibilities and restrictions. This means that SDI in future should provide comprehensive spatial and non-spatial data sets, and thus facilitate and optimize utilisation of different planning (PSS) and decision-making (DSS) technologies.

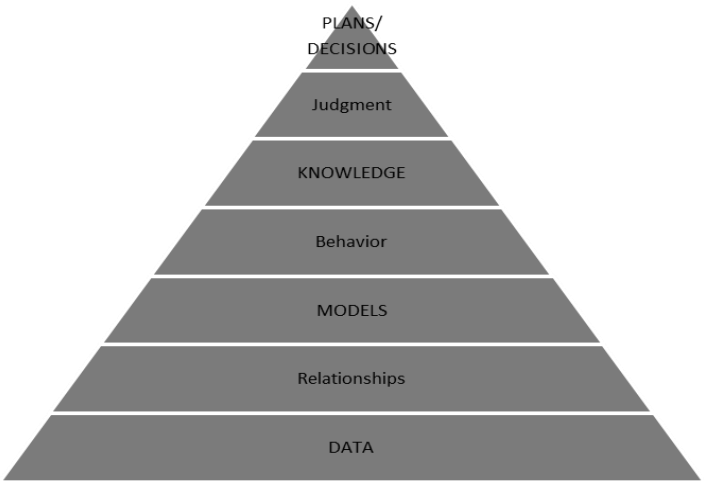

Figure 3: PSS and DSS. Value of data is increasing to judgement and decisions, where DBs and SDIs contribute with organized data on economic, social and environmental elements, their relationships and related rigths, responsibilities and restrictions (Boerboom, under review)

Finally, Boerboom (under review) goes even further claiming that in near future focus would be on development of spatial planning and decision support systems infrastructure (SPDSS-I) concept. This paradigm should emerge from loosely coupling of different PSSs and DSSs systems in infrastructures that would be relying on comprehensive and reliable spatial planning SDIs. And, unlike the spatial planning SDI general purpose to exchange data, SPDSS-I purpose would be exchange of relevant spatial planning knowledge and judgement. Thus, supporting the online creation and exchange of knowledge and judgement, SPDSS-I keeps a promise of creating conditions for transforming today spatial development planning and management procedures into continual real time process of sustainability status monitoring and evaluation in future.

4 SPATIAL PLANNING IN SERBIA

4.1 New approach to spatial planning and development implementation

Number, dynamics and complexity of prolonged transitional economy events within the territory of the Republic of Serbia require today different approach to their management, in order for sustainable character of spatial development to be preserved or (re)gained in future. Therefore, the latest Law on planning and construction (Law) (Official Gazette of the Republic of Serbia 72/09, 81/09, 64/10, 24/11), along the current Spatial Plan of the Republic of Serbia 2010-2020 (SPRS) and its Implementation programme for 2011-2015 (2011), have prescribed new approach, methodology for spatial development planning and, especially, implementation. This new methodology includes:

- Organizational model for early involvement, and continual, clear and direct responsibilities of relevant spatial development stakeholders in Serbia for identification and implementation of development alternatives, namely strategic priorities or projects (SP). These stakeholders would be also members of Serbian spatial planning SDI community in future; and
- System of social, economic and environmental spatial development indicators (DI) for territorial development status monitoring and evaluation. This system of DIs interrelated with SPs should form information platform for revision of existing and preparation of new spatial plans and other planning documents in Serbia.

Basic hypothesis behind applied methodology assumes that implementation of identified SPs should affect DIs' values, i.e. statuses, and thus generate or trigger planned development and identified sustainability goals achievement within certain territory. (Figure 5) Also, planned time framework for SPs implementation should be monitored, since the absence or presence of planned results and/or expected development progress should impose changes and/or adjustments of development alternatives both in sectoral as well as spatial plans and programmes in return. (Živković, 2012c)

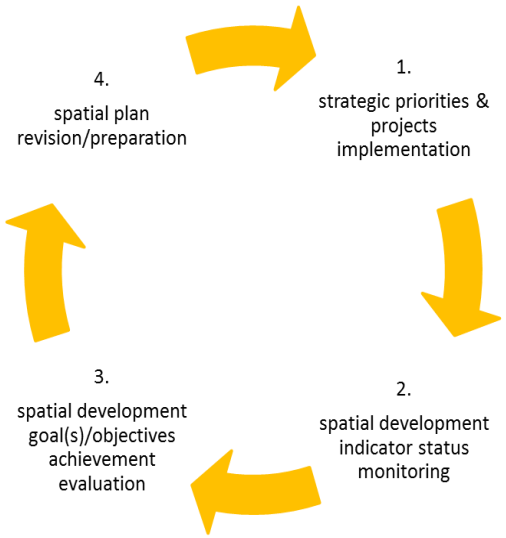

Figure 4: Territorial monitoring and evaluation concept. Integration of spatial planning cycle with territorial monitoring and evaluation elements, DIs and SPs, for spatial development implementation and planned goals achievement

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4.2 Information platform for spatial planning

In accordance with the mentioned Law, within a year after SPRS was enacted, the Republic Agency for Spatial Planning (RASP) has prepared its (SPRS) first (ever) Implementation Programme for period 2011-2015. (2011) Besides porposing the action plan for monitoring and evaluation of SPRS implementation using DIs and SPs, as well as recommendations for annual report preparation, Implementation Programme has described general concept and framework for establishment of information platform for spatial planning activities in Serbia.

Thus, this first Implementation Programme has identified aim, objectives and preconditions for establishment of spatial planning information platform to be modern GIS-based tool that would simultaneously (Živković, 2012a):

- Provide monitoring functionality for spatial plans and other planning documents implementation in jurisdiction of RASP in order to support revision and preparation of new spatial plans and planning documents; and
- Support data and information collection needed to RASP to annually monitore and evaluate spatial development status in Republic, and to communicate it to the Government and public in form of report now and in future on-line via Web portal using shared Web services.

Aim	Objectives	Preconditions
Simple and efficient management of data and information needed for making timely and informed decisions and policies for balanced and sustainable development of socio-economic-environmetal resources within the Republic of Serbia territory	- Build instrument to support preparation, adjustment, monitoring, evaluation and revision of spatial plans and other planning documents; - Implement standards into domain of planned sustainable development, in respect to applied technologiess as well as content of plans and planning documents; - Create preconditions for simulation and scenario methodologies implementation, as well as for automatization of other methods and techniques needed to spatial and urban planners; - Support creation of policies for planned development and sustainable management in Serbia; and - Develop capacity of spatial planning system, that is, its institutional and organizational frameworks, and especially human resources.	**Technical framework** - standards ISO/TC 211, OGC, W3C and others; - recommendations of INSPIRE Directive and Programme, Plan4all Project; - Serbian NSDI 'GeoSrbija' recommendations; - standards of sectoral ISs in Serbia; **Organisational and institutional framework** Development of appropriate institutional and organizational framework for ISSpace by implementing internationally and nationally adopted documents and best practices, as well as by development of local solutions, which would together contirbute to more efficient operation and management of spatial planning system in Serbia **Significant financial means** **Educated and skilled human resources**

Table 2: Towards comprehensive information platform for spatial planning in Serbia. Aim, objectives and preconditions for establishment of SPACE database and ISSPace (Živković, 2012a)

4.3 Information system for sustainable spatial development, phased approach

As a first step towards spatial planning SDI establishment in Serbia, RASP has planned in the mentioned Implementation Programme to firstly establish GIS-supported information system for spatial planning, ISSPace with database SPACE.

Due to the Serbian Government aspirations to join EU, both social and technical components of ISSPace and latter SDI would be accommodated to the needs and demands of INSPIRE, as European multinational SDI initiative.

Structures and elements of SPACE and ISPPace are planned to be scalable, flexible and adjusted to future smooth data and information usage and exchange between same or similar systems and infrastructures in Serbia and Europe (following INSPIRE Directive and Plan4all recommendations), and wider (through implementation of ISO and other internationally adopted technical standards). Also, recommendations of Serbian NSDI initiative GeoSrbija would be included. (http://www.geosrbija.rs; Živković, 2012b)

Database SPACE itself is projected to record and store, in the first phase, three basic types of data and information for spatial development planning: 1) plans' and datasets' metadata, 2) spatial planning data (including DIs and SPs) and 3) sectoral data. Metadata package (blue coloured box) would support development of spatial plans and planning documents register in Serbia and, thus, their identification and fitness for use assessment using basic information, like name and type of plan or document, its scope and scale, lineage information, responsible organization, reference dates, etc. Planning data package (yellow coloured box) would provide administrative information for each type of plan and planning documents in Serbia, as well as store contents for national, regional, special purpose area as well as municipal spatial plans, with capabilities for urban plans' content to be added latter as well. Besides administrative information and planning content, this package would also provide data on MEGAs and functional urban areas (according to ESPON definition), as well as store definitions and status values for relevant DIs and SPs within monitoring and evaluation module. Finally, sectoral data packages (grey coloured boxes) needed for some SPs implementation follow-up as well as for revision and/or new spatial plans and other planning documents preparation, would be stored in 23 separate packages. And, once the relevant sectoral ISs would be established, data from these 23 packages would be gradually substitute, that is, (re)used via certain Geo-Web services that would be shared within ISSPace and, latter, spatial planning SDI environment as well. This should be seen as second phase of ISSPace development.

Finally, the same approach is assumed for the other lower-than-national planning level and their data: once regional and municipal ISs and SDIs for planning would be established, plans and planning documents data would be (re)used and exchanged between those hierarchically coupled shared GIS systems and infrastructures via different Geo-Web services.

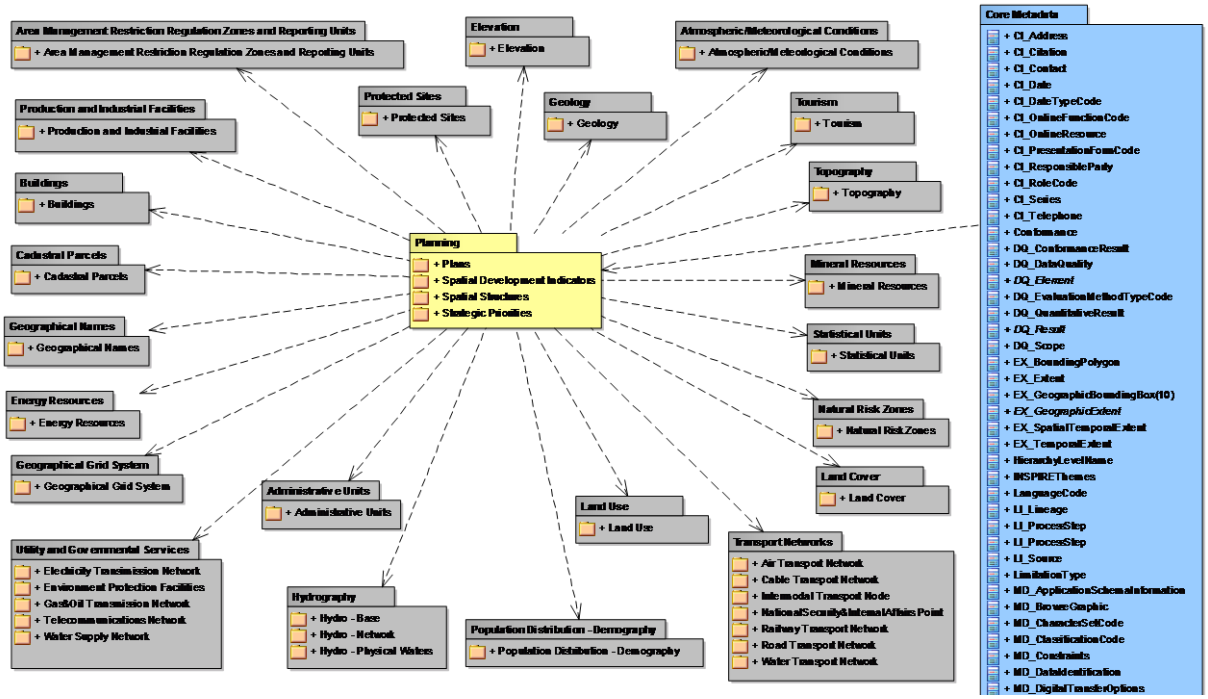

Figure 5: Basis for spatial planning SDI development. SPACE database structure (adapted: Implementation Programme of the SPRS 2011-2015)

In order for described planned technological supports and their advantages to take place in future, and for successful establishment of ISSPace and database SPACE in the first place, standardisation of the spatial plans'contents and other planning documents in Serbia has been identified as a critical initial precondition. These standards would ensure simple exchange and use of data and information stored within the other for spatial planning relevant information infrastructures, systems and databases, securing thus timely and informed approach to spatial development planning in Serbia in future. But, on the side of social component, for planned IS establishment and latter emerging SDI advantages development, improved capacity of human resources would be of key importance. (Živković, 2012a)

In addition, establishment of ISSPace and latter spatial planning SDI would support conditions for real-time continuity in monitoring and evaluation of spatial resources status and development trends in Serbia, and

thus transform set of today's discrete spatial planning procedures into process of planned and sustainable management of socio-economic and environmental capacities in the Republic.

5 APPROACH TO SPATIAL PLANNING SDI DEVELOPMENT IN SERBIA

5.1 Spatial planning SDI development model

Developing countries, like Serbia, are facing today the challenge to institute the SDI concept faster, more efficient and at lower cost. (Williamson, 2004) Therefore, spatial planning domain in Serbia should consider solutions and experiences found to be best practices in SDI establishment, and follow those lessons learnt in spatial planning SDI implementation.

Today in Serbia there is a general lack of fundamental and other datasets, and awareness and knowledge on SDI concept is generally low. (Nedović-Budić et al, 2007; Živković, 2012a, 2012b) Also, installed base and general infrastructure, both treated today as conditions for SDI paradigm establishment, are still in development in Serbia. (Nedović-Budić et al, 2007) Therefore, spatial planning domain should adopt approach that would facilitate simultaneous and coordinated development of all 5 basic SDI components (people, data, policies, standards and access networks) almost from scratch.

Therefore, spatial planning SDI initiative in Serbia should follow today favoured composite product-process development approach. This means that spatial planners in Serbia should initially focus their efforts on establishment of appropriate SDI community (people component), on one side, and establishment of communication channels needed for relevant knowledge dissemination and capacity building among stakeholders, which is prerequisite for development of other SDI components (like, data, policies, standards, access network), on the other (Figure 1.). This approach is, also, in line with and confirms today prevailing opinion on SDI paradigm as social phenomenon.

Additionally, framework for spatial planning SDI components and concept development in general in Serbia should include newly adopted systematic/methodological approach to spatial plans and other planning documents preparation and implementation; also, this framework must be outlined around expected functionalities as well as identified development aim, objectives, preconditions and content of database SPACE and ISSPace system (Table 2.). By this approach, development framework for spatial planning SDI would support both building necessary organizational and human resources' capacities for SDI, as well as solid socio-technical preconditions establishment for its consequent upgrading with DSS and PSS functionalities once SDI is established.

In other words, from proposed composite development approach perspective, spatial planning SDI community in Serbia should be initiated and evolve around those spatial development stakeholders' that are already involved within the spatial planning cycle. Consequently, relying on this initial SDI community, first communication channels for SDI development process-approach should be initiated around its database SPACE module for territorial development monitoring and evaluation (conceptualized in Figure 4.), and latter diversified following expected database SPACE and ISSPace functionalities, benefits and needed conditions and capacities acquisition (Table 2.). Finally, SDI development product-approach should be employed within different work groups that would be established around communication channels and composed of various spatial planning SDI stakeholders to produce particular product/service for mutually agreed non-technical and technical standards (Table 1.). Besides these tasks, some of those work groups would be working on establishment of preconditions for spatial planning SDI further enhancement by employment of DSS and PSS technologies for making knowledge, judgements and decisions on sustainable development alternatives and policies.

Finally, having the seeds of information society and NSDI still in the ground in Serbia (Nedović-Budić et al, 2007), and following principle of the national level SDI's components greatest impact on the other SDI levels' components within the spatial pyramid (Figure 2.), where regional and municipal spatial planning SDIs are yet expected to play significant role, RASP should take leadership role now and prepare preconditions for optimal Serbian spatial planning SDI pyramid evolution in future. Concretely, RASP should provide directions for domination of process-based development model on national –i.e. Republic-, regional and municipal levels, where product-based development model should dominate among various work-groups established within each of those levels and SDI initiatives with aim to develop particular

contents, like legal and technical standards framework, access and exchange policies preparation and maintenance, and other SDI and latter PSS/DSS -relevant conditions, products and/or services.

5.2 Approach to SDI development and its implication for spatial development decision-making and policy management in future

Previous attempts to use SDIs for making decisions or creating policies and strategies have failed. (Feeney et al, 2001; Boerboom, under review) Since SDI main role is to organize spatial and non-spatial data, making of sustainable development decisions and definition of relevant policies and strategies in Serbia would require PSS and DSS tools to be implemented. However, the question is how proposed composite product-process approach to spatial planning SDI development in Serbia would reflect on utilisation of planning and decision-making technologies, as well as ultimate concept of SPDSS-I? Even being too early for exact predictions and impacts estimation, some assumptions on this issue are proposed in next lines.

Since PSSs and DSSs outputs' quality highly depend on available data and information, that is, on underlying SDIs' capacities to store and exchange various environmental, economic and social data, which are usually coming from different sources, proposed composite approach should have at least two advantages for building decision- and policy- making capacities in Serbia in future.

The first generally assumed advantage of proposed composite model refers to its dominant process-based approach and prioritization of spatial planning SDI community and communication components building. This means opportunity to involve knowledge workers and other experts -responsible for PSS and DSS tools development- among SDI stakeholders' community for the very beginning of concept development. Using their knowledge and expertise, these SDI stakeholders could immediately impact and optimize database SPACE, ISSPace and future spatial planning SDI solutions for PSS and DSS technologies implementation, and avoid thus maybe some future expenses for platform adaption. Also, as a second generally assumed advantage of proposed composite SDI development model for spatial planning domain in Serbia, where process-based approach dominante, knowledge workers and experts could -along the other work groups that perform on product-based approach- establish their own groups that would work on upgrading of mentioned SPACE's territorial monitoring and evaluation module from the beginning. On this way, they could further enhance preconditions for creating added values of prospective sustainable development models, simulations, PSS and DSS employment towards creating knowledge for right decision-making on development alternatives as well as forming judgement for policies and strategies creation (Figure 3.).

Finally, since predicted SPDSS-I concept assumes exchange of knowledge and judgement between PSS and DSS infrastructures, proposed composite development approach for spatial planning SDI in Serbia seems for time being to be irrelevant for the same.

6 CONCLUSION WITH DISCUSSION

Sustainability has become today leading governance principle for creating judgement and decision-making on spatial development alternatives. Thus, since sustainable development concept includes all 3 major spatial systems, namely environmental, economic and social, as well as their complex and dynamic spatio-temporal relations, modern societies are investing significant efforts in building tools to understand, predict and manage them.

On one side, sustainable development principles implementation assumes collection, processing, management, usage and exchange of significant number of various spatial and related data in an organized way, what is the actually purpose of SDI paradigm. On the other side, avoidance or minimization of conflicts among environment, economic and social systems for sustainability development character preservation, requires employment of different spatio-temporal modelling, decision and knowledge creation tools, like PSSs and DSSs technologies are. These tools have advantages to support mutlicriteria spatial analysis as well as dynamics of real-time development events, both features underlying sustainable development today.

Following need to develop further living and working conditions in Serbia, spatial planning domain works on establishment of information platform that should in short-run support systematic monitoring of planned development alternatives implementation, on one side, and evaluat their effects on identified sustainable development goals, on the other side. This first GIS-oriented solution for ISSPace with database SPACE as core should provide in the long-run basis for establishment of spatial planning SDI in Serbia by using today

favoured composite product-process development approach. This approach is suitable for Serbian still developing socio-technical and data capacities, since it provides advantage of overcoming locally existing development deficiencies by building strong human resources claimed to be of critical importance for building SDI concept today.

Also, relying on flexibility of composite SDI development model, which stresses importance of communication, facilitation, coordination and capacity building, this model seems generally more appropriate for establishment of fully interoperable and integrable spatial planning SDI, as prerequisite for latter optimal employment of PSS and DSS technologies' advantages. On the other side, pure product-based or process-based approach to spatial planning SDI development in Serbia would limit in the former case its future options to employment either PSS or DSS for single development purpose, while in the latter case employment of PSS and DSS would be restricted to mere exchange of knowledge and discussion of potentials rather than having some exact applications or results.

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