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# An Integral Approach to the Modeling of Information Support for Local Sustainable Development—Experiences of a Serbian Enabling Leadership Experiment

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**Abstract:** Collaborative strategic decision making has to be widely informed, communicated and knowledge-based in order to innovate transformations toward local and global sustainability. It is unimaginable that this process could be effective without computer-aided information support, but the research indicates the utilization constraints within human capacities to recognize their usability and usefulness. These constraints seem to be even more challenging within the intensively transitional social contexts, such as Serbia. We argue that understanding the relationships between sustainability, governance, and planning in a specific social context has profound importance to gain usefulness of information support and to ensure its increasing utilization. Identifying the practical path of information support modeling requires an operational framework that encompasses innovative and socially valid initiatives. Therefore, an integral theory framework was chosen to comprehend all social influences on the information support of successful utilization. This article presents the integral framework of the information support's conceptual setting, which was used to build up community-based collaborative action research (CBCAR) as a transformative social learning process that enables information support utilization, and it was tested in six municipalities of Serbia. The implementation of pilot territorial information support (TIS) initiatives resulted in continuous and proactive local community efforts in information support development and usage.

**Keywords:** local sustainable development; modeling information support; integral approach; community-based collaborative action research; enabling leadership

## 1. Introduction

Environmental and urban sustainability has been often criticized as tempting and oxymoronic [1,2], non-critical in theory and very localized in practice, representing the quest for technocratic exits, rather than essentially bringing into question the nature of social relations in the city [3]. Therefore, planning theory evolved through the quest for realistic possibilities for achieving a social consensus on sustainable development [4,5]. With the recognition of the political nature of planning [6,7], public participation in rational decision-making [8] was also criticized as part of the ideals of a righteous city [9–12]. Thus, the collaborative planning approach is fostered as a continuous process of designing social transformations through dialogues and discussions in which planners, public officials and the public together try to decide how to manage the common aspects of society [13]. Therefore, the importance of the social context in concerning sustainability is emphasized. Current socioeconomic debate on regional and local development in Europe explores the cultural nature of planning [14–19]. It highlights the importance of a place-based approach, recognizing that sustainable

transformations are framed much more by endogenous forces than by exogenous factors [14–17]. The scholars introduced the concept of “territorialization” as the lever of local socio-economic sustainable development trajectories innovation. Applied through community-based collaborative action research (CBCAR) on local territorial capital transitions [15], it ensures the synergy with regional [18] and superregional sustainability [19]. The concept is also embedded in international sustainability policies on facing the 21st-century environmental and socio-economic challenges [20–22], which emphasizes the capability of local communities to comprehend complex problems and to enact strategic choices committing to achieve both local and global sustainability. The strategic approach is recommended as a powerful local decision-making mechanism to address multilevel competing interests and to demonstrate strong political commitment to initiate and preserve continuous social dialogue toward productive partnerships among development actors [23–25]. Within the strategic approach to sustainability, urban and regional planning should be tightly interconnected and governed to secure the synergy of actions [26–28]. Thus, local governance issues are also emphasized [29,30], refocusing the sustainability operationalizations toward the advancement of community organization [31–34], social competencies [35,36], and leadership approaches [37–40].

The main characteristics of Serbia’s post-socialist transitional process are social turbulences, obstructive initial capital accumulation and slow institutional reforms [41–44]. Under this continuing social dynamic, the former socialist “golden age” of environmental and social wellbeing nourishment through rational planning started to fade [45–48]. Despite new national sustainability policies and a strategic approach introduced by the law, very few tangible results are achieved [49]. The harsh academic criticism emphasizes the choices taken by the political and economic elites, which cannot be remedied through recently introduced collaborative planning [50,51]. Numerous environmental and social issues are out of mainstream national strategic actions and placed on the agenda of local communities which have no capacity to comprehend them [52,53]. However, the positive and proactive change force of this situation comes from outside Serbia. For two decades, Serbian transition was supported by diverse international–local capacities building programs that recognized information support as one of the most critical instruments of sustainable development [54]. Within the circumstances of fundamental conceptual reexamination of sustainability, governance, and planning paradigms, the research on information support to sustainable development in Serbia is at the same time highly topical and unfocused.

According to international sustainability policy norms, in the distressed social contexts, evidence-based strategic territorial decision-making has vital importance, and it is possible only with the support of wide-web-accessible and open-to-public-scrutiny information support [55–58], based on Geographic Information Systems (GIS) that enable active involvement of stakeholders in planning and implementation [59,60]. In the literature, this composite of information-communication technology (ICT) aided knowledge provisioned for strategy-making processes is defined as Planning Support Systems (PSS) [61–68]. However, despite the significant operational advancement of PSS over the decades [64–68], the comprehensive utilization of PSS support to planning is missing in practice in many social contexts. The literature review on PSS utilization in the strategic planning process within local communities indicates two main groups of practical barriers. The first one is the lack of usability in terms of user-friendliness, PSS accessibility, ease, and use efficiency in both individual and group processes [69–75], and the second one is the issue of usefulness in terms of validity, and credibility for planning in a specific context [76–82]. The complexity of PSS usability and usefulness identified within the planning agencies rise when explored from a higher organizational level, such as a local governance perspective [83–89].

The information support situation in the context of Serbia is even more complicated. The process of digitalization started in the 90s, lagging behind most European countries, but opened opportunities for e-government services and the introduction of the Geographic Information Systems (GIS) in the planning practice [90–94]. The early experimental research on GIS-supported planning in local planning agencies in Serbia indicated many constraints for its implementation in terms of usability

(technology, data digitalization, and collection, organizational and human capacities), but more importantly in terms of unrecognized usefulness within the local government structures [92–94]. The usefulness of quality information support to urbanization was addressed for the first time, within the new spatial plan of the Republic of Serbia (2010), promoting the information support as a norm of sustainability [95]. That initiated the efforts toward the national spatial data infrastructure (NSDI) development, which took almost two decades to be accessible through web services. The recent amendments to Serbian planning law (2018) alignment to European legislation and policies [96,97] introduced the local planning information system as an obligatory local government instrument and raised the concern of the local self-government majority. The long-term open question on how information support technologies can be introduced on a local government level in Serbia eventually reached the critical social attention necessary to construct coordinated social action.

This article aims to present the conceptual setting of the modeling process of information support for collaborative strategic planning for sustainability on a local self-government level and to discuss the lessons learned through its application within the six municipalities of Serbia. As the introduction of ICT supported collaborative planning in Serbian communities represents innovation, the whole process was envisioned as the collective “learning by doing” experiment. In that sense, we identified CBCAR as a suitable approach. However, the CBCAR raises the issues of evaluation of the achieved results and the scope of the gained information support usability and usefulness, and, furthermore, the issues of the impact on the overall social change and long term sustainability. Therefore, the conceptual setting of modeling was performed through integral theory framework to ensure the comprehension of all reality domains (cultural, socio-psychological and behavioral-systemic), and to develop the evaluation framework to follow up the post-experimental social impacts. In the second chapter of this article, we present the conceptual setting of an integral approach for information support modeling on a local governance level. Then, through the CBCAR, the operational methodological construct for the six Territorial Information Support (TIS) pilot initiatives was enacted, which we present in the third part of this article. The experimental process and gained results are described and discussed in the third chapter. The discussion of a developed conceptual integral approach to modeling in relation to the current PSS utilization debate is presented within the fourth chapter. The recommendations for future research are given within the concluding the chapter.

## **2. The Conceptual Setting of Modeling the Information Support to Sustainable Local Development through the Integral Theory Framework**

The research field on ICT supported planning developed for more than half of a century. The information support evolved from computer data processing, through GIS-based information production and participatory GIS generating knowledge, to current spatial intelligence support relied on complex computer modeling [63–65]. Since the 90s, with the collaborative approach to planning, the research was refocused toward Planning Support Systems (PSS) [61–68] that combine a variety of developed tools and models. The planners became fascinated with GIS since this is adaptable to different planning subjects, “chameleon technology” effectively provides useful functionalities to maintain, explore, analyze and display spatially relevant data in accordance to the information needs of a wide range of users [63–65]. However, Klosterman [63,64] emphasizes that reliance on information support could lead to putting aside other “soft” planning aspects which cannot be supported by ICT tools. Thus, the significant practical limitations of computer-aided information support are noted within the social or cultural side of the planning process [69–81]. The literature on PSS utilization indicates two main groups of constraints, issues of usability, or user-friendliness, and the usefulness of PSS usage in planning processes [69–79]. Despite the increased user-friendliness of PSS over the years, the performed research indicates that decision-makers and planning professionals still see the most significant benefits from visualization, while the PSS developers emphasize spatial analysis, scenario and impact assessment, and evaluation [69–71]. The lack of awareness on PSS benefits and experience deficiency were identified as the main utilization barriers in practice [69–71], pointing

to the second major constraint identified as the lack of perceived usefulness in terms of validity, credibility, and purpose for the planning within the specific context [75–81]. There are valuable operative research efforts aimed to overcome this mutual misunderstanding between PSS developers and planning professionals and decision-makers [72–74] since the positive correlation between elements of user-friendliness and planning usefulness is established within some contexts [78]. The exploration of PSS user-experience preferences through consistent evaluation framework [72,73], and the objective, reasonable, understandable, and useful reporting methods of PSS results [74], could contribute to the refinement of PSS functionalities and their wider use in planning organizations. Following the Te Brömmelstroet [77,78] position that the research on PSS utilization should shift its focus on improving the quality of the planning practice. We started from the exploration of Serbian planning for sustainability practice and the search of possible advancements that could be gained with the PSS support.

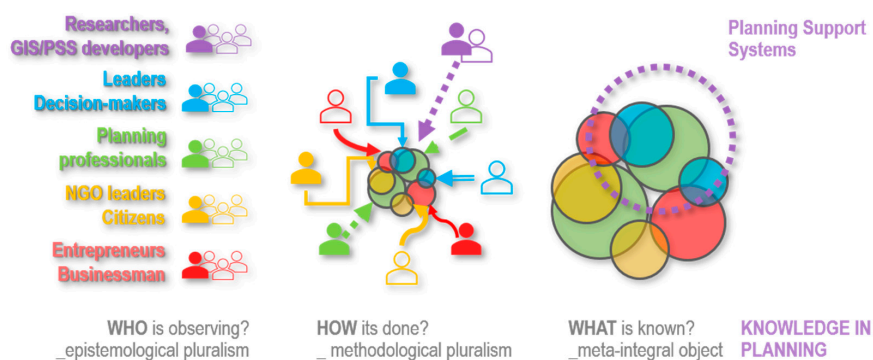
However, the issues on PSS usability and usefulness become more complicated when explored from the perspective of a specific cultural context, such as Serbia [90–93]. The experiences of several initiatives of basic decision support modeling through GIS that we implemented for the local planning agencies in Serbia and crucial lessons learned from this process align with the critical debate on user-friendliness and usefulness in other contexts [69–75]. The GIS acceptance and further utilization within planning agencies depended more on the professional's cognition and organizational capacities than upon the availability of technology or budget, and planning professionals resisted learning and changing their standard working procedures unless their motivation is gained [90,91]. The possible strategy to overcome these constraints interlinking the GIS modeling with the training program, not only about GIS/PSS as a technology but also on their instrumental usefulness in overcoming the planning paradigm transition difficulties [41–53] and gaining more appropriate planning outcomes for the local context [90,91]. This approach was tested in the Town Planning Institute of Belgrade and resulted in the successful and continued utilization of GIS-supported spatial modeling that was later followed by other city planning agencies [90]. However, these results were never upscaled to the level of the city government integrated GIS despite numerous initiatives. The primary constraint that city decision-makers declared was a lack of a regulatory framework for data integration and sharing, expressing only a declarative political determination with no operational initiatives [90,91]. Within the Serbian context, it is widely believed that ICT information support innovation is constrained by a lack of instructive regulations [92–94]. Later research on information support modeling within Serbia shows a persistent lack of political and institutional support to GIS/PSS utilization and all the difficulties that PSS developers have to face in practice [98–103]. Relying on these experiences and on the significant research on PSS usefulness [76–82], we decided to change the approach, searching for the answers on PSS usefulness issues in fields of social psychology, behavioral and organizational research.

### *2.1. The Integral Framework of Generating Knowledge in Sustainable Development Planning*

After decades of promotion, in Serbia [104,105], as in many societies [106,107], sustainability is present only in the life of the intellectual elite. Many researchers believe that gaining a successful sustainable practice requires a change of language [107], a new multi-perspective reality cognition [108], a fundamental change of the approach to generating and deploying knowledge in planning for sustainability [100]. According to the international recommendations that are promoted in Serbia, collaborative strategic planning starts with a territorial or urban situation diagnosis aiming to establish stakeholder's shared understanding of the context's challenges and opportunities [104,105]. It represents the process of inclusive communication and group learning aimed to enact the common "portrait" of territorial situation. This shared understanding represents the foundation for the stakeholder's consensus-building toward common choices and decision-making throughout the formulation of strategic, technical and action solutions [104,105] and, in order to be effective, has to be well informed, knowledge-based, and ICT supported. Since learning and innovation are vital for the sustainable development of local communities [106,107], this requirement could be at the same time seen as a

challenge and the opportunity to speed up the necessary transition, as in case of the Serbian social context. The purpose of social transition, from the post-positivist position [108], is the learning, the quest for knowledge, understanding, rather than an explanation. Therefore, we assumed the position of critical realism [109] in order to enable an interdisciplinary opening of research [110]. We used the Esbjörn–Hargens’s integral enactment theory [111–113] to assume a comprehensive ontological position on collaborative strategic planning for sustainability and then to conceptualize the process of generating and deploying knowledge throughout the process.

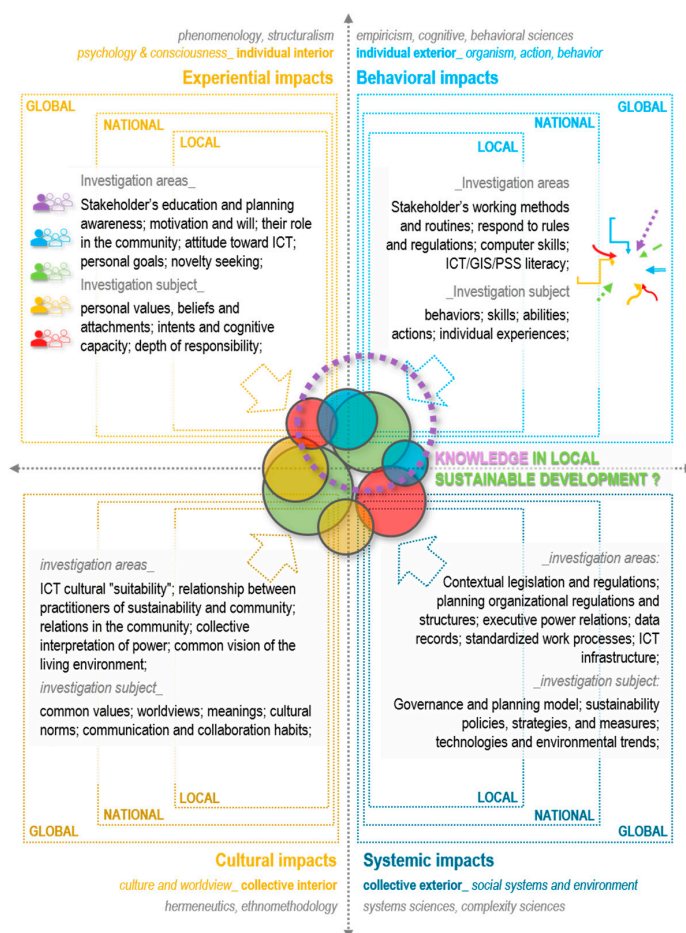
The integral enactment theory assumes that if the epistemological and methodological pluralism, emphasized by post-modernity, are known, then logically, ontological pluralism appears [112]. This position transcends both the positivist singular-object ontological perspective and relativist multiple-objects perspective on knowledge into an integral ontological position on knowledge in planning as an emerging meta-object that depends on the observers and their investigation methodologies [111–113]. It emphasizes the importance of interior reality domains (culture and psychology), which is also a crucial standpoint of place-based socioeconomic concepts of innovative and sustainable local “territorialization” [14–19]. The community-led local development, introduced as an instrument of achieving the sustainability of Europe region [96], promotes inclusive CBCAR as the key social learning mechanism that enables generating and deploying knowledge for sustainability [14]. The CBCAR refers to a group process in which community representatives and researchers, together perceive the specific nature and characteristics of their place of living, evaluating the common social attributes to resources and local peculiarities, and accordingly restructuring and reorganizing the space [15–18]. In other words, CBCAR describes the process of group interior change dynamics aimed to reframe the current local limiting beliefs and providing a new local meaning of territorial resources which could lead to more sustainable behavior [18]. It represents a collective and interdisciplinary knowledge building around the shared area of interest, the co-production of new evidence-based knowledge, which is inclusive, participatory, transformational and empowering [114,115]. This form of a new modality of situating the stakeholders (researchers, policymakers, practitioners, impacted communities) has a profound importance for enabling the science to productively address the different dimensions of challenges concerning the local development [116]. Within the CBCAR process, the co-created knowledge depends on the cognitive capacities of participants and the investigation methodologies used by a group [114,115]. Thus, the knowledge in collaborative strategic planning represents the reflection on how the stakeholders’ group perceives the investigated situation (Figure 1). If the local planning group is strengthened with outside cognitive authorities (for example, partnering communities, planning professionals from other contexts, the researchers whose profession is to comprehend the existing global theoretical, conceptual and operational knowledge on sustainability) then the probability to enhance the co-created knowledge scope is larger (Figure 1).



**Figure 1.** The knowledge as an emerging meta-object of community-based collaborative action research (CBCAR) in strategic planning for sustainability.

Comprehending reality, according to the integral theory, must combine the inside—or interior (cultural and psychological)—and outside—or exterior (behavioral and systemic) domains—which

are represented through the quadrants [113]. The quadrants represent four mutually irreducible dimensions of reality, or four unique simultaneous ways of looking at the same phenomenon: (1) individual interior (“I”: psychology and consciousness), (2) collective interior (“We”: culture and worldview), (3) individual exterior (“It”: state of the organism and behavior), and (4) collective exterior (“Its”: social systems and environment) [111–113]. There are at least two ways to use the quadrant model for investigation: (1) the quadratic approach, generating the dimensions of individual cognition of certain phenomena or (2) the quadrivia approach, referring to the different perspectives of seeing the same phenomena, which could be explored by assuming the first-, second- and third-person perspective of investigation [111–113]. According to Brown’s analysis on the sustainable development concepts promoted so far [117], the problems of sustainable development in practice have been mainly approached by acting from a collective exterior domain, attempting to influence the human behavior (individual exterior domain) through the systemic changes of social order. The effects of these attempts on the dynamics and powers that occurred within the individual consciousness (individual interior domain) or cultural attitude (collective interior domain) were largely ignored [117] so that, in many cases, it reduced the effectiveness of sustainable initiatives [118–122]. According to the integral practitioners, the currently dominant systemic approach to sustainable development will be more effective if it is replaced with a comprehensive, synergistic response that considers the impacts and forces occurring in all quadrants [117–124]. Thus, we established an integral framework for a quadrivia CBCAR analysis to comprehend all influences on generating and deploying the knowledge in a sustainable development method on a local level (Figure 2).



**Figure 2.** The integral framework of comprehending all reality influences on generating and deploying the knowledge in sustainable development planning.

As illustrated in Figure 2, a collaboratively enacted knowledge base for planning in the examined context will be influenced by the individual cognition and experiences of the stakeholders, their usual working methods and routines, the cultural worldviews and attitudes toward information support, and by numerous social systemic and environmental issues. Hypothetically, in the case of the desired increased utilization of PSS in planning practice, within the context that has a highly developed local communication and collaboration culture and that is supported with governance, technology, and other systemic instruments [59,60], the levers of effective actions toward the increased development and usability of PSS should be searched within the individual interior quadrant, motivating the stakeholders to change and accept new routines. The various good practices in northern American countries show that motivated communities, supported with adequate skills and technological enhancements innovate their organization toward PSS utilization [88,89]. These experiences led this research toward the exploration of the strategies that motivate stakeholders' behavioral changes.

## 2.2. The CBCRA Leadership Strategies to Initiate Behavioral Changes

According to the research within the field of social psychology, the long-term changes in human behavior can be expected if the proposed new action resonates with the individual value system and cultural norms [124,125]. Thus, the long-term commitment to sustainable development is a voluntary choice of an individual which is based on the deepest personal motives embedded in his values [126], and if the personal motivations are missing, the expected behavior will not manifest [127]. Additionally, many scholars underline that sustainability problems are persistent and difficult to overcome in some contexts due to differences in the cultural value systems within the community [128]. Sustainability researchers often emphasize the global crisis of values, the need for change in thinking, a shift in beliefs, or to develop new social values as the basis for a new understanding of human aspirations and achievements [106,107]. However, Brown and Riedy [127] emphasize that despite the broadly recognized importance of personal and cultural values, most sustainability operational frameworks and approaches do not account for their relevance, nor give attention to how values are created or how they change, consequently leading to difficulties in implementation. Thus, it is considered that the social change strategies that address issues of individual and cultural values systems are vital factors of sustainable development reinforcement [126].

According to Beck and Cowan's evolutionary psychology [124], individual behavioral change is the natural response to changes in the environment or social conditions and is guided by basic cognitive processes:

1. Communication that is expressed in resonance with the value systems that people already have. Extensive research in the field of developmental psychology indicates at least three different subcultures within the global population—traditional, modern and postmodern—and each of these subcultures derives from different value systems or worldviews which give priority to different values [118,124]. How people behave towards the environment and toward others and which type of system they have will depend on which of the subcultures is dominant in their lives [118]. For example, the global sustainability norms in order to be communicated into the local communities are expressed through the value-based formulation of sustainable development goals [20–22] that resonate with the values of all, traditional, modern and postmodern subcultures. However, in order to give them locally specific meaning, the measurement and monitoring of the critical indicators are introduced, constituting the universal sustainability language [129–131].
2. Transformation through learning that encourages people to “move” into a new value system that takes care of others and the environment. Many scholars see the idea of changing the value system in humans as an extremely tempting and modern myth [127], but Beck and Cowan [124] emphasize that people can be inspired to change. It takes about five years for an adult person to switch to a new way of looking at the world [127] and the information, evidence, facts, and arguments are often not enough as different people with different views of the world literally see different worlds [124]. The ruling values in one individual are never completely uniform and rigid, as the

person passes through waves of maturation [119]. Thus, according to Brown [119], if the value center of a person is at a modern level, then this person will most likely react from this value system, but, also, in some occasions, from the next level of a more complex value system [119]. In the same way, the social collective progresses through its cultural development from the traditional, modern to the postmodern level [119]. Culture develops with the development of individual communication skills (discourse modes) and consciousness and with each subsequent stage of cultural development, the appropriate progress is achieved in the exterior expression of this collective—behavior and systems [119].

Therefore, the selection of an adequate learning approach, methods and techniques of communication and collaboration has vital importance for CBCAR effectiveness [132]. This is an organizational challenge since the CBCAR represents the communication and cognition capacity building process of the whole local community [133] and it has to be facilitated by persons that have teaching competencies [114–116]. Envisioned as the co-working learning process of researchers and local people, it requires the facilitator to respectfully understand the participants, to recognize their cognitive capacities and capabilities, and to motivate them to engage and contribute to the analyses and solutions formulation [114–116]. Therefore, McCarthy's 4MAT [134] system for knowledge transfer, learning and change leadership was used, which enables both CBCAR strategies. The 4MAT system recognizes four distinguished learning styles of people that appear regardless of age, sex or their cultural context: (1) learning through seeking meaning, most intrigued question by the question "why?"; (2) learning through analysis/thinking about ideas and concepts, most intrigued by the question "what?"; (3) learning through the testing of theories, thinking and experimentation, most interested in the question "how?"; (4) learning through trial and error, or intuitive search for hidden possibilities, most interested in the question "what if?" [134]. This concept also provides detailed methodical and didactical elaboration and the systematization of various techniques for group cognitive process facilitation that were used in the Serbian modeling experiment.

Finally, the issues of the CBCAR leadership approach have to be considered. The CBCAR groups can vary in its size and structure (inter/trans-disciplinary, intercultural, academic–practice, national–international) and have a formal and informal nature [135], so that communication continuity is very important. Communication can be performed in real life forms (conferences, presentations, meetings, workshops) or as virtual collaboration [135], but it is emphasized that spatial proximity encourages collaboration since it tends to generate more informal communication [136]. Conducting the process of knowledge translation in heterogenic groups can be very difficult [136,137] so it is recommended that facilitators do not control the process, but to focus to the group interactions with the intention to create healthy conditions for self-organization around relevant issues, serving to evolve the group's dynamic interactions [135–137]. According to current research in the field of organizational leadership, many scholars suggest a shift from an industrial, top-down leadership toward new, post-industrial, knowledge and digital era leadership models [138–143].

The complexity leadership theory [138,139] includes three entangled leadership roles—adaptive, administrative, and enabling leadership—that reflect the organization's bureaucratic, administrative, and the emergent, or informal dynamics which exist in a larger organizational hierarchy, such as local government [140,141]. When functioning appropriately, the complex adaptive systems, such as local strategic planning organizational system, provide an adaptive capability for local self-governance, while bureaucracy provides an orienting and coordinating structure [140,141]. Thus, the adaptive leadership approach aims to open the transformative social potential, finding creative ways to motivate actors to learn, change, experiment, and innovate new social practices and relations [142], guiding the system through small concrete steps that are in line with the community situation. The enabling leadership key role, on the other hand, is to effectively manage the entanglement between administrative and adaptive structures and behaviors, enhancing the overall flexibility and effectiveness of the organization [140]. Enabling leadership collaborates with adaptive and administrative leadership to decide which creative outputs of the adaptive subsystem are the most appropriate to move forward



into the broader bureaucratic structure [140]. Brown [139] emphasizes that enabling leaders can play an integral role in helping design and protect a “pro-innovation” organizational system environment.

### 2.3. *The Model of Information Support to CBCAR in Collaborative Strategic Planning for Local Sustainability*

Recognizing the twelve types of city intelligence that are at the heart of every community occurrence, Hamilton [144] opens new perspectives on information support services within the community. Hamilton [144] claims that the community cognitive processes expand through four evolutionary strategies: (1) enabling the inquiry of intelligence in order to foster a community’s ability to raise awareness; (2) enabling meshwork intelligence in order to foster new relationships and boost the creativity of the community; (3) enabling navigating intelligence by the creation of a community’s vital-signs monitoring in order to foster ecosphere intelligence; and (4) enabling evolutionary intelligence, i.e., cognitive capacities and the ability of the community to imagine and visualize the future in fostering integral intelligence of a “human hive”. The comparison of the content analyses of the CBCAR process organization literature [135–137] and Hamilton’s evolutionary intelligence strategies [126,144] indicated the CBCAR areas that could be ICT supported. Relying on Hamilton’s evolutionary intelligence strategies [144], all the examined PSS literature and good practices, and the international norms on quality information support to sustainable development on a local level, the conceptual Territorial Information System (TIS) model was developed [145]. The TIS model was envisioned as an evolutionary GIS-based PPS that enables the integration of both quantitative and qualitative territorial data through various ICT solutions to collect information and knowledge from interior and exterior domains, and could provide complex analyses and visual reporting through different complex spatial analysis models [145]. The main TIS CBCAR functionalities are structured in four main modules:

1. Inquiry module with several ICT functionalities that foster a community’s ability to raise awareness—The common spread-out usage of the internet has a vast potential for building a community’s ability to raise awareness on sustainability [99]. The inquiry module should enable stakeholders to represent themselves by expressing their aspirations and beliefs, to explore and recognize other sustainable development agents, to follow up their specific activities through user multicriterial investigation tools. A significant benefit is a possibility for stakeholders and ordinary people to provide information and become recognized as an active part of the community. This functionality strengthens the cognitive connection between cultural and behavioral domains. Through the user registry identification, public opinion research tools, open data, and meta-database, the community the information could be explored and personally validated. For the CBCAR leadership strategies, this module could support stakeholder analysis and improve the methodological design.
2. Discourse module with several ICT functionalities that enable community meshwork, intelligence fostering, new relationships, and the creativity of the community—the premise of sustainable territorial development is a synergy of community action and partnerships for change. It implies the process of stakeholder (including vulnerable groups) networking in order to raise the level and intensity of engagement in nurturing community values through informal networking. In order to avoid the possibility of those with weaker powers to remain outside the process, it is necessary that this function is supported through enabling leadership. The systematic support to social networking also fosters inquiry intelligence by increasing the intensity of social interaction and information exchange. Additionally, it contributes to the social support capacity by encouraging reciprocity and building trust among network members. Thus, stimulating the development of virtual social networks through a range of discussion services, discourse communication platforms, and knowledge libraries, topical good practices library, know-how partnerships support, etc., is one of the key components of information support for sustainable urban development

3. Vital signs monitoring module with several ICT functionalities that enables navigating intelligence—monitoring and evaluation of change has profound importance for the whole strategic process because it represents the moment of opportunity for collective cognitive growth upon performed actions. Change monitoring through the key indicators continues reporting and enables the achieved progress assessment and the evidence-based evaluation of strategic action implementation. This module should include Integral Vital Signs Monitor reporting on essential territorial resources changes, strategic plans/programs/projects process monitoring, strategic outcome and impact monitoring, displayed in an easily understandable graphical way.
4. Visioning module with several ICT functionalities that enables evolutionary intelligence—it should support the community cognitive capacities and abilities in conceiving and envisioning the future, identifying the values and criteria of living quality aspirations. Organized as a communicative multimedia tool that allows the exchange of several types of cognitive “messages” (visual, auditory, verbal), it could continually support the creation of a common vision of the future, enabling the translation between different sets of values. The visioning module has a key role in tailoring CBCAR strategies and in adapting all future communications to the “values” of all stakeholders. These module services are user-friendly reports of the much more complex spatial analyses performed through multi-criteria or scenario modeling instruments.

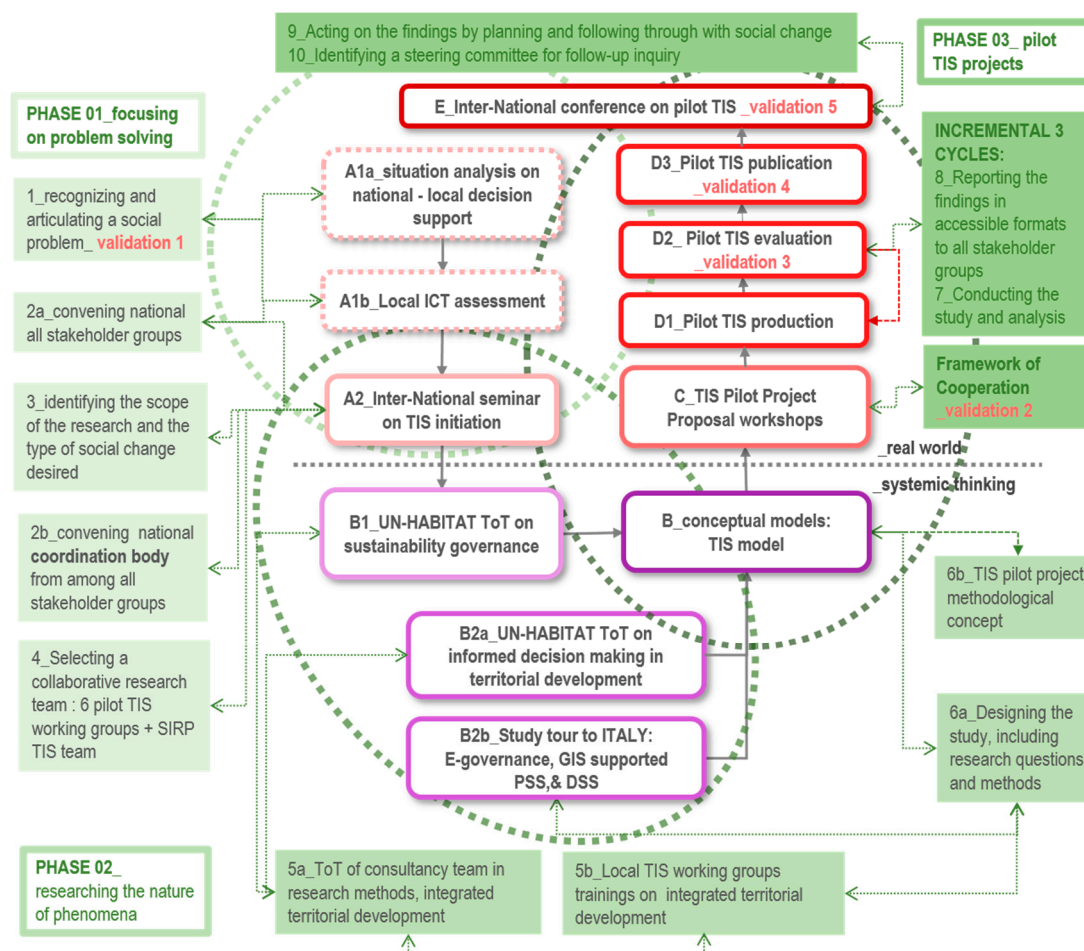
For the purpose of CBCRA formative and summative evaluation, the comprehensive criteria matrix was developed using the integral approach for each of the conceptualized functional modules.

### 3. The Pilot Territorial Information Support (TIS) Implementation Methodology

The chance to test the integral modeling approach (Chapter 2), practice and learn, was given within the UN-HABITAT Settlement and Integration of Refugees Programme in Serbia (SIRP) [146], under the 3rd program goal: “National institutions and six municipalities have developed capacities, information tools and implementation bodies to produce comprehensive strategic plans for local/territorial development and to implement subsequent sector strategies and action plans” [146] (p. 105). The information support modeling experiments were implemented within the local-self governments of Čačak, Kraljevo, Pantelej (within the City of Niš), Pančevo, Valjevo, and the City of Kragujevac. Considering the specifics of post-social transitional Serbia societal context and gained experiences in local GIS utilization (Chapter 2), reaching this goal implied profound CBCRA transformations in terms of the awareness and perception shift, reality cognition, practical knowledge, skills, and organization.

The methodological approach to perform CBCRA in municipalities was built upon Peter Checkland’s Soft System Methodology (SSM) [147–151] as it was often used for information systems development [148]. The SSM is an action learning process that supports the heterogeneous groups to address complex problem situations, innovate their performance processes, and accordingly change the organization [151]. It implies the constant analytical “switching” between the real world and the conceptual thinking of the world [149], from a holistic analysis of different ways of understanding the situation of those involved in the problem, to applying the methods of systemic thinking in the conceptual modeling of socially and politically feasible operational logic [147]. The SSM application implies iterative perpetuation until the desired solution to the examined problem is accomplished. However, in the context of Serbia, the situation is more complicated. According to the contextual integral analysis (Figure 2), performed by the interdisciplinary consultancy team (national and international), it was concluded that the SSM modeling through CBCRA should have two distinct levels with two yet overlapping groups of stakeholders. The first level is applying the SSM to gain national stakeholders validation on the modeling approach, and the second focused on the issues of modeling within the local communities. In this case, the application of SSM within the specific two-level governance organization implies the optimization of a variety of stakeholder’s interests and common inter-organizational behaviors and therefore puts this research in the group of the critical action research [152,153]. This process is not only a matter of representing and explaining reality but a social phenomenon itself, which has material-constitutive relations with personal identities,

social practices, institutions, state and political structures, including the knowledge produced by researchers through the self-reflex component [154]. Accordingly, operational programming of the SSM application in each of two levels and through the iterations should also follow ten steps of critical action research. Integrating the SSM with the action research leads to the CBCAR process of the pilot TIS implementation being developed (Figure 3).



**Figure 3.** The CBCAR process of the pilot territorial information support (TIS) initiatives modeling approach national validation.

### 3.1. National Modeling Approach Validation

The first step of SSM was implemented prior to the final SIRP implementation document enactment in order to enable the formal validation of modeling CBCRA through the bilaterally signed project document. The communicative process on the unstructured problem situation analysis included both the Serbian national and local government representatives. Since the power relations between these two groups are very imbalanced with regards to traditional and centralized governance, it was realized that the local authorities must be empowered with academics in order to advocate planning innovations on a local level. However, since the role of the academy was also marginalized through the Serbian transition, the presence of the international consultants and representatives as a cognitive authority to facilitate and enable the process was extremely important.

This step was realized within the framework of the national workshop, involving all stakeholders representatives—from the targeted six local communities (political decision-making representatives, planning agency manager and professionals, information services and ICT technician), representatives of ministries and national agencies from the field of territorial governance and information services,

representatives of the national municipal association “Standing Conference of Towns and Municipalities of Serbia” (SCTMS), representatives of the academy—and it was facilitated by UN-HABITAT professionals. This initial workshop contained academic conceptual and critical case studies presentations (systemic thinking–initial concepts), facilitated thematic focus groups on local sustainable development problems, information support situation and operational problems, local organization capacities and existing ICT resources, and, in the end, semi-structured interviews of participating stakeholders. Throughout the process, a common understanding of the Serbian context is gained, along with general stakeholders’ recognition of the social problem and expressed willingness to engage in solving it. The conceptual modeling approach (Figure 3) was confirmed and then incorporated as planned activities in the SIRP program implementation document, which was validated by high representatives of the Republic of Italy, the Republic of Serbia and UN-HABITAT. This led to the second level of CBCRA modeling implementation.

### 3.2. Local Experiment Setup

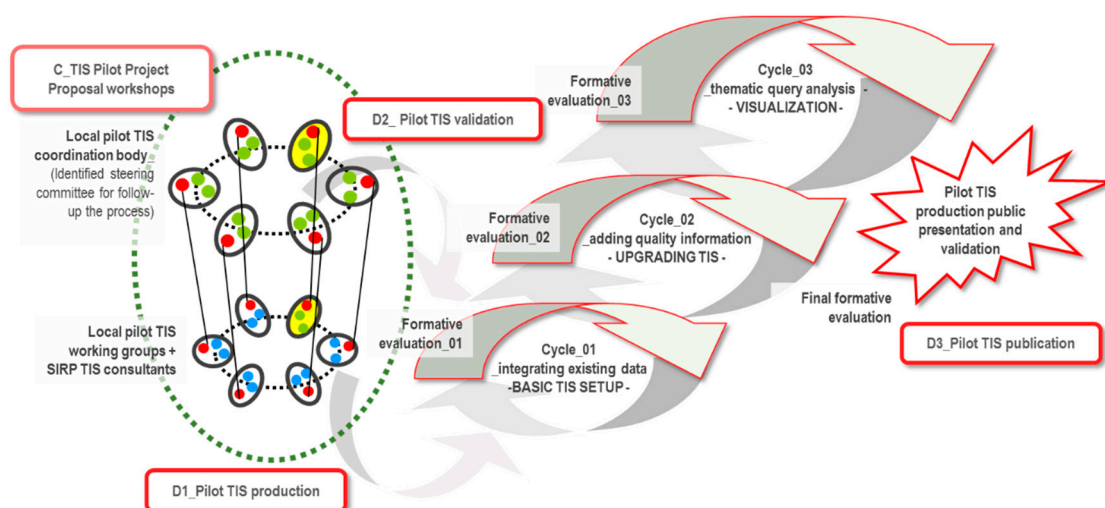
Through the processing of all gathered information (focus groups transcripts and interviews), it was realized that there is a necessity for deeper investigation on local specificities. It was noticed that municipal ICT capacities differ in terms of existing technology, available data records and human resources. Therefore, another SSM cycle was implemented through detailed unstructured problem situation analysis using the integral approach (Figure 2), this time with a broader group of local stakeholders, mainly from the local authorities’ different sectors and planning and management agencies (with the addition of a small number of national representatives). The important outcomes from these six workshops was a deeper understanding on local sustainable development issues and the establishment of open communication and initial trust among the academic consultancy team and local stakeholders, which enabled the conditions to perform a municipal ICT assessment through a field survey within the local communities. For this purpose, the common survey tool was constructed to obtain both quantitative and qualitative data on municipal ICT capacities. Through facilitated collaborative focus groups, upon a common content analysis of the Municipal Information Profiles (MIP), the local information support needs and priorities were expressed, and the main local stakeholders that must be involved were identified. The MIP content analysis showed that all targeted municipalities had minimal necessary resources (data, technology and human resources) to perform a small scale TIS exercise. However, as it was previously assumed, it was very hard to obtain a local political commitment for the implementation. Accordingly, it was decided to change the approach with the enabling leadership. The idea was to elevate the importance of the whole modeling experiment and, therefore, to gain enough political support. This was the moment when it was decided to label the local experiments as the pilot Territorial Information Systems (TIS) project, envisioning them as a seed of a future national TIS support to local strategic territorial planning and governance enabling both horizontal and vertical integration. Building stakeholder consensus on this common vision started with the wide stakeholder mobilization through the organization of the International seminar “Integrated Information Systems: A tool for managing the territory”, that was aimed to fulfill the SSM—Problem situation expressed step. That was the occasion to change the social dynamics by broadening the participant’s group with academics, ICT sector representatives and representatives of experienced local self-government from Italy (Municipality of Modena, Province of Prato) to present their already developed, implemented and utilized TIS governance support instruments. The seminar started with the TIS conceptual purpose and aim explanation, then continued with the experiences of the Italian partners’ presentations, followed by a query survey (through a questionnaire with mostly closed-ended questions) aiming to initialize the personal inner cognitive process of the Serbian participants on the TIS benefits and possibilities of implementation within the local context. The second session consisted of a facilitated open discussion upon the processed query results. The outputs of the seminar were given national governance general approval on the vision and expressed political commitment to perform the TIS experiments by targeted local self-government. This whole process lasted for one year.

#### 4. Experimenting in Serbian Municipalities—Process Overview and Discussion of the Achieved Practical Results

The CBCRA process performed so far resulted in three main observations: (1) it was noticed that there is no common understanding of the strategic approach to local sustainable development, and accordingly of the purpose or norms of quality information support, (2) the academic consultancy team, although familiar with the whole process of conceptual setting of TIS, in fact, had no operational knowledge and experience in setting and implementing one, therefore, there was not enough of a national consultancy capacity to facilitate the local Pilot TIS Project Proposal enactment, and (3) the local professional's understanding of the GIS or TIS concepts was very poor and the operational knowledge and experience scope was even more moderate. Therefore, it was decided to perform two enabling leadership actions. First was a comprehensive Training of Trainers (ToT) program for academic consultancy experts and second one, a study tour to Italy to perform field research of the implemented Modena and Prato TIS programs. As a result, new specially-tailored-for-the-context-of-Serbia training programs were designed. Following the 4MAT approach, intensive focused learning processes were led by academic consultants and performed by applying two major thematic components: (1) basic training on the local strategic planning and management with the aim of building up local self-governments capacities to formulate and implement strategies through a participatory process that included specific "SmarTIS" training on the TIS purpose, aims and benefits, and (2) training on the governance and leadership competencies for municipal elected leaders and appointed officials. As a result of the whole conceptual modeling process, the approaches were tailored as an integral part of a comprehensive training program. Second was the local municipal representative's study tour to Italy. Being a pioneer provincial authority of the region of Tuscany for the development of a coordinated TIS and the related institutional regulatory framework, technical norms and standards, the Province of Prato has been a valuable partner for Serbian municipalities. The study tour to Italy represented an occasion for municipal working groups to learn about the experiences and pilot projects from the Italian Provinces, trends and future perspectives of territorial management and the use of information systems applied to territorial participatory strategic, integrated and sectoral planning. This whole process lasted for one year.

##### 4.1. Implementation of TIS Pilot Initiatives on a Local Level

Upon the CBCRA gained insights, it was decided to foster TIS initialization upon the locally identified specific topic, focusing on issues relevant to the development of the local context and as identified by local strategic documents and policies, enabling local motivation and political support. TIS project proposals workshops were planned as very demanding and cognitively intensive, both for the facilitators and the participants because it implied the collective investigation through the developed conceptual integral framework in order to establish the realistic scope of the TIS pilot initiatives. Therefore, the detailed workshop scenario was developed along with several group facilitation supporting tools. It was very important to gain coherent and realistic TIS project proposals that will be fundamental for local committed implementation but in line with the national validated vision. This workshop process resulted in 6 TIS Pilot project documents, which were validated with the signed Frameworks of Cooperation between the UN-HABITAT and the Municipalities. According to the conceptual framework, the incremental "step by step" SSM approach on the TIS modeling was assumed. In order to foster the practical aspect CBCRA, the "learning by doing" approach was programmed throughout the three incremental cycles (Figure 4).



**Figure 4.** The pilot TIS project modeling process within the local community.

It was envisioned that each cycle of implementation is followed by three types of evaluation and validation of the results—expert consultancy evaluation on the technical performance and modeling—local decision makers’ evaluation and validation on usability and purpose, and inter-municipal validation and experience exchange on the working processes and organization innovation in order to enable the testing and upgrading of the specific implemented technical solutions and the quality appraisals of the results. For this purpose, numerous CBCRA group methods and techniques were applied. Each cycle was programmed to have a standard framework of activities: (1) database and functionalities modeling to support users’ needs, (2) acquiring, processing and integrating data from at least three different institutions in order to support inter-organizational trust, (3) spatial multi-criteria queries and thematic maps publishing, followed by multi-level evaluation and validation.

Upon the signed cooperation agreements in each municipality, a Coordination Body was formed, consisting of local self-government decision makers to perform the administrative leadership function and to validate the benefits of the achieved results. This was envisioned as the chance for decision-makers to learn and raise awareness about TIS utilization benefits. Upon the Coordination Body decision, municipal technical TIS working groups were appointed, comprising of members from different municipal institutions, public companies, and different sectors in order to ensure an integrated approach to setting up and developing the TIS. Municipal working groups of experts and technicians followed an incremental process for the development and upgrading of the municipal TIS upon detailed action plans developed specifically for each municipality. The consultancy technical assistance and “on the job support” were provided throughout the process, which was additionally underpinned with specialized ICT/GIS training. For each pilot TIS, raw data and information have been gathered, integrated and shared among the involved institutions. Several CBCRA supporting tools have been developed and tailored to the needs of each specific case and delivered. The TIS results have been presented and evaluated in a series of local and inter-municipal workshops and validated through the Coordination Body’s reports to the Municipal Councils, within each of the three incremental cycles. In each municipality, the TIS administration centers were established and equipped with the info-kits (GIS software and hardware), with the responsibility of maintaining and the development of the TIS in the future. Prato and Modena technical staff were actively involved in the process of pilot TIS modeling and providing technical assistance to the municipal working groups, bringing their experience and transferring know-how on the methodological and technical aspects of the municipal TIS development. The need to institutionalize inter-organizational collaboration and set up rules and technical standards for the information flow within the municipality have become

more and more evident throughout the process of pilot TIS implementation. However, despite the numerous communications and prepared protocol templates, none of the municipalities used it.

The implementation of TIS pilot projects lasted for one year and was fully completed in five out of six municipalities. The final phase of TIS pilot project implementation included the public dissemination of the results through local public promotion events, publication on a local website, and the production of printed analog and digital material for further promotion and distribution. The publications displayed elaborated analytical and thematic maps, datasets and integrated data records, and were intended for different users, decision makers, public servants, experts, and citizens, to promote and raise awareness on the use and benefits of TIS.

#### *4.2. International Validation of Pilot TIS Initiatives Results*

The international promotion of the TIS pilot project's results was carried out at the 16th regional Urban Salon in Niš, winning the first prize in the category of the application of modern ICT tools in planning and within the cycle of international conferences "Cities in Dialogue" [146]. The conference "Development of Territorial Information Systems in the cities of Serbia—exchange of experiences and lessons" was organized by UN-HABITAT in cooperation with the Ministry of Infrastructure of the Republic of Serbia and the SCTMS. The main objective of the conference was to exchange key lessons regarding the establishment and development of TIS in Serbia, formulate key lessons and formulate recommendations for the future. The plenary part of the conference was an introduction to two parallel working sessions with the following topics: institutional organization of the municipal TIS and the technical solutions for the development of TIS. Representatives of numerous Serbian municipalities and cities and relevant national institutions and organizations took the opportunity to engage in a formulation of key issues with the aim of identifying the steps forward and actions to be undertaken towards the replication and upscaling of good practices and enhancing impact. It resulted in a joint document of recommendations toward the national governance for creating conditions for the development of TIS at the local level. Further steps have been formulated, aimed at establishing stronger horizontal networking of local communities and, accordingly, launching a "bottom-up" initiative to activate more intensive vertical coordination with the institutions of the national level of governance. In terms of horizontal integration, the connection was initiated through the SCTMS, aimed at sending an initiative to the Ministry of Infrastructure to coordinate further institutional linkage at the national level in order to launch a national project for the development of local TIS. The goal of this project would be the further verification of the TIS model on a larger sample of local self-government, which would serve as a basis for formulating national guidelines, regulatory and normative documents for the implementation of TIS in all municipalities of Serbia.

According to the formulated documents, the National TIS project was drafted to be submitted to the National Office for European Integration for EU structural IPA funding. The outcome of this initiative was interesting. Despite the positive preliminary assessment from the European Council Commission, the final project proposal was not officially submitted for EU funding. It remained officially unclear what the reason was for this outcome. The unofficial statements from some of the national institutions and agencies representatives indicated that the political power struggles occurred on issues of project management and implementation. The national TIS project raised several politically sensitive issues that could not be resolved by a consensus at that moment. As Gulelat Kebede, the Training and Capacity Building International Expert from UN-HABITAT Head Quarters noted, "the SIRP has sown some seeds in the form of fresh ideas, practices and tools and human and institutional capacities, but it did not leave an anchor behind to ensure that these seeds germinate, grow and multiply. In the transition reality of Serbia, where the state has yet to fully devolve power and where the municipalities still lack the capacity and confidence to take charge of their own affairs, readily finding a national anchorage is difficult, if not impossible" [146] (p. 198).

## 5. Discussion

This research demonstrated what comprehensively and thoroughly planned, facilitated inter-organizational CBCAR, empowered with several specifically and contextually designed training programs can achieve. The developed integral framework was of huge importance to design it as a demand-driven and result oriented process. However, the excellent, mostly unexpected results and the enthusiasm to CBCAR on the local level has not been capitalized to create an institutional anchor for continuity and sustainability on a national level. Following up the situation in Serbia, after the closure of modeling experiments, in relation to the development of information support to sustainable local development, from the top down, from the national governance perspective, nothing significant happened except the already mentioned changes within the general regulatory framework and advanced NSDI and statistical services. However, the national government perspective (expressed through EU progress reports, Section 4.1), it was still hugely centralized and with a traditional setting, unfortunately, did not notice the significant changes that occurred on the social “bottom” in local communities, within the society [145]. Due to numerous international support programs implemented in Serbia in last twenty years mostly directed toward building up local capacities, and SIRP is one of them, it can be noticed that the situation on a local self-governance capacity significantly changes. There are several direct and indirect impacts of the conceptual and experimental integral approach to modeling information support to local sustainable development in Serbia, that will be discussed here from the position of the main Serbian stakeholders—the local self-government and academic consultancy team and private ICT entrepreneurs that were involved in the process. The follow-up findings that will be listed here are the result of documents content analysis, web survey, and direct personal contacts.

The first group of impacts was directly related to the experiences and lessons learned through the TIS pilot experiments that occurred in the six targeted municipalities. Since the TIS pilot project closure, all six municipalities, including the one that did not manage to finish the publishing task on time, continued to develop TIS with which four of them were publicly accessible and interactive, enabling citizens to perform a spatial thematic inquiry through the web. All of the municipalities institutionalized the TIS units as a regular part of a local administrative organization that supports inter-organizational collaboration within the municipality including the civil or academic organizations. From the perspective of the Serbian context, this results in the first steps in overgrowing the traditional cultural patterns and limiting beliefs. Additionally, they have been very proactive within the specialized GIS section of SCTMS, sharing the experiences with other proactive municipalities on the issues of development support. Through this municipal network, several new international programs on information support were implemented and the targeted municipalities participated and further developed the municipal information support. Therefore, it can be concluded that the seeds of effective social transformation in these municipalities started to grow. The things that did not yet start to develop is the awareness of including the interior domains in strategic planning.

From the academic point of view, the whole research process including the conceptual and experimental part which was an extensive learning process that influenced further scientific research and academic curricula at all levels. The largest challenge for the academic consultancy team was to efficiently comprehend the theories, concepts, and paradigms that were behind the ICT support to the territorial planning and CBCAR process. This is due to the conventional technical approach to architectural and urban planning education that was in the base of the academic’s knowledge capacities. Despite the huge theoretical fundament and experience in urban planning, the lack of knowledge from the fields of GIS, sociology, social psychology, and organizational sciences implied a wide interdisciplinary opening. In the context of Serbia, the experts from these fields are not actively involved in the planning process. Thus, the local team could not be organized as interdisciplinary. Consequently, comprehensive conceptual research was performed as explained in Chapter 2. The Integral framework of knowledge in planning appeared to be very useful in furthering scientific research and academic education. It enables the academic researchers from Serbia



to orient within the enormous web of scientific results all over the globe and to enable evaluating their applicability within the context of Serbia. The expansion of the teaching methods and techniques learned through the experimental part of the research and the experiences in enabling leadership model, lead to the development of new academic curricula of several courses on GIS, CBCAR, and participatory strategic planning from the bachelor to the doctoral studies. Secondly, the impact was gained through the establishment of a new Master academic program with regards to Integrated Urbanism, which represents a huge accomplishment due to the still predominating resistance from the traditional professional structures. The graduate students are all employed and highly evaluated by employees. Additionally, the academic GIS lab was established and supported by the Serbian Ministry of Science. Through the established partnership with the ICT entrepreneurs that were networked during the project, the several experimental GIS territorial surveys are performed in a field of urban resilience and accessibility, etc. The most important academic research impact on social transition on a local level is a strong nongovernmental organization and governmental innovations boosted by the graduated students educated throughout the new curricula.

## 6. Conclusions

The need for informed decision making is growing at all levels of territorial governance, local to global and vice versa. The local sustainability is about finding creative ways for the social opening for learning, change, and experimentation that are aimed at social innovation and at creating new social practices and practicing new social relations. Responding to a global call for an end of the age fragmentation in the human sustainable development, the integral theory framework offers an important navigation instrument to the local leaders and planners, which enables them to have a much clearer way to get insights on the types of responses and strategies that are necessary to confront the sustainability challenges using all levers. If it is understood as community collaborative learning and action, the process of local strategic planning for sustainable development in order to be effective that it must be led, programmed, facilitated and supported with the appropriate combination of cognition tools and techniques in accordance with the problem complexity within the contextual social dynamics and stakeholder's cognitive capacities. Within traditional and less developed contexts, the leadership role is of profound importance. In order to engage all the available resources to orient and strategies toward the tangible results of CBCAR process, it requires specific leadership competencies and experiences. However, in the traditional governance model, competent leadership is not enough. It takes the presence of cognitive authority to open the possibility to change and social innovation.

Reflecting on the whole process, it would be of utmost importance to develop monitoring tools for this kind of social transition. In that sense, another survey following the developed conceptual integral framework could be performed, which would give a more precise and accurate picture of the possible outcomes and impacts of such social transition experiments. These finding could be used as a base to tailor the summative evaluation instrument. This instrument could also be useful for the development of monitoring functionalities and as a base of the collaborative definition of critical indicators.

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