

Monitoring Urban Development: National Register of Investment Locations as a Tool for Sustainable Urban Land Use Management in Serbia

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Abstract. A stalled urbanization process in Serbia is an obstacle to the national economic growth. One of the reasons for that is a poor local economic development, which is caused also by the lack of efficient urban land management system in Serbia. Thus, in order to encourage sustainable urban development, local self-governments in Serbia need a new model of sustainable urban planning and urban land management that should include market-based instruments, like, investments, required for the urban renewal process triggering. Aiming to underpin this strategic ambitious, Serbian Ministry of construction, transport and infrastructure, Republic geodetic authority and Swedish partners are implementing a Project "Improvement of Investment Environment in Serbia" in order to establish a National Register of Investment Locations (NRIL) and related monitoring system, which would improve efficiency and effectiveness of decision-making process for the investment locations and urban land use management in general within 11 pilot local self-governments. Building of this register and its monitoring system would include development of an investment location data model, centralized database and 3 Web-based applications for the investment-related data collection and their interactive visualization using the Serbian National Spatial Data Infrastructure framework and advantages of its geoportal Geosrbija. Also, to increase the role of Serbian cities and strengthen corrective function of the urban plans and urban planning in general, one of the Project objectives is to provide a direct communication channel between the potential investors and local self-governments. Finally, it is expected that the Project results would be implemented in the other local self-governments in Serbia as well, and that they would contribute to the goals achievement of a recently adopted national Sustainable Urban Development Strategy 2030, as well as to some other strategic projects and initiatives launching in Serbia.

Keywords: Urban development · Urban land use management · Monitoring system · National Register of Investment Locations (NRIL) · geoportal Geosrbija

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1 Introduction

Along with the establishment of a spatial planning monitoring system, as an evidence-base platform for the national territorial development decision-making and policy management in Serbia [6], it has been recognized a need for establishment of the monitoring system on a local –urban planning- level that is struggling today to adjust its urban development and land management instruments and tools to the market-based economy mechanisms [22–24]. Also, after the years of post-socialist transition and delayed land reforms in Serbian cities, identified discrepancy between the current urban land management model and economic model has resulted in an inefficient land use management system, a poor local economic growth and, eventually, stalled urbanization process on national level [12, 22–24]. In order to overcome identified problems, Ministry of construction, transport and infrastructure (MCTI) [15] has adopted the first national Sustainable Urban Development Strategy 2030 (SUDS) [21], but it has also launched together with the Republic Geodetic Authority (RGA) [31] development of a national investment locations register and local level monitoring system for the efficient and effective investment locations and, thus, sustainable urban land use management in general [20]. Once built, this National Register of Investment Locations (NRIL) and related monitoring system, implemented as a part of the Serbian National Spatial Data Infrastructure (NSDI) framework and its geoportal Geosrbija [30], should provide advantages of an interactive visualization tool that would be able to support integrated urban development planning and management, which would stimulate sustainable local economic growth [33, 34].

On the European level, after the adoption of European Spatial Development Perspectives (ESDP) document and establishment of the European Observation Network for Territorial Development and Cohesion (ESPON) program, a number of monitoring systems for various policies and strategic goals implementation has increased, prevailingly on the national and regional levels [3, 8, 9]. However, despite this increase in number, the research and literature about monitoring systems are still somewhat limited [1, 5]. At the same time, a need for these systems adjusted by their contents and designs to the particular territorial development issue(s) is becoming critical, especially on the sub-regional or local level where the decreasing public budgets demand always innovative concepts and approaches for reaching a good quality of life and protection of public interest in general [1, 2, 4, 5]. Finally, since this local level is the one where a corrective role of urban plans and urban planning in general would be directly reflected in the sustainability extent of a market-driven urban development, it is expected that number and research on the urban monitoring systems would increase in the near future [4, 9].

Therefore, the aim of this paper is to present the first results on development of the NRIL register and related monitoring system for the investment locations and sustainable urban land use management in Serbia, as well as to analyze their potential direct and indirect benefits and impacts on the investment level and other areas within the urban planning and development domain in Serbia, both from technological and stakeholder perspectives. Also, this Project is implementing in the cooperation between MCTI, RGA and the Swedish counterpart Lantmäteriet [36], supported by the Swedish

International Development Cooperation Agency (SIDA) [35], within the 2-year Project "Improvement of Investment Environment in Serbia" [29].

After the Introduction section, the paper structure continues with general overview of a recent literature on monitoring systems and land use planning and management in European context. Afterwards, current status of the Serbian urban development and land management system in general are described, followed by the main information about the Project and its methodological approach. Further, the first results from an initial Project phase are described, and then Project results' benefits and potentials are briefly discussed. Paper is closing with the concluding section that, besides general concluding remarks, includes possible future directions of the development.

2 Monitoring Territorial Development in Europe

Regardless of the governance level, monitoring process is an integral part of a public policy management, related decision-making and its implementation management, and it influences thus directly the public policies efficiency and effectiveness in protection of the public interest [1, 3]. Therefore, according to Kleibrink et al. [1], the first and logical step in the public policy management for protecting the particular public interest is to establish the relevant monitoring information platform, which should enable efficient and meaningful decision-making in a continuous way. In order for the needed monitoring continuity to be accomplished, some authors claim the necessity of a monitoring process institutionalization [1, 2], as well as establishment of an appropriate monitoring system design [2, 5, 17, 19]. Regardless of the public policy domain, this monitoring system design should be able to perform the next functions [1–3, 5, 6]:

- Gather information and make them available to the decision-makers, in order to learn about transformation and provide responses accordingly;
- Clarify the purpose and functioning of the particular public policy and public interest, and make these comprehensible to all stakeholders and broader public, in order to build and reinforce mutual trust and cooperation; and
- Support the constructive involvement and participation of all stakeholders through transparent channels, in order to keep them accountable.

2.1 Territorial Development Monitoring Systems: From European to Local Level

Over the past decades, a large number of the territorial development monitoring systems or territorial observatories [5, 9] have emerged in Europe due to the many factors, including: increasing complexity of urban systems and territorial development dynamics in general; development of GIScience; and continually evolving European Union territorial policies [2, 3].

Since the adoption of common policy options for all tiers of administration in Europe with a spatial planning responsibility by the ESDP document in 1999, which has been followed by the ESPON program since 2002, growing number of the different territorial monitoring systems have been covering a range of diversifying development

topics and related monitoring activities [3, 8, 9]. These activities include different tasks, like: diagnosing of the territorial trends; development of the new indicators for monitoring urban systems; creation of the relevant monitoring databases; etc. [3].

According to Lindberg and Dubois [2], development of each territory is strongly influenced by its geographical characteristics. Since the territorial development and its management processes are strongly influenced by the types and unique combination of geographical features (cities, sparsely populated areas, mountainous regions, etc.), it is difficult to design an appropriate monitoring system, regardless of a public governance level [3]. Thus, in domain of the spatial and urban planning in Europe, territorial development monitoring systems vary depending on the geographic features and other related statistics and their scale, where the level of details for identified development trends are moving from the general and indicative in macro-regional monitoring systems, to the detailed information in urban monitoring systems (Fig. 1).

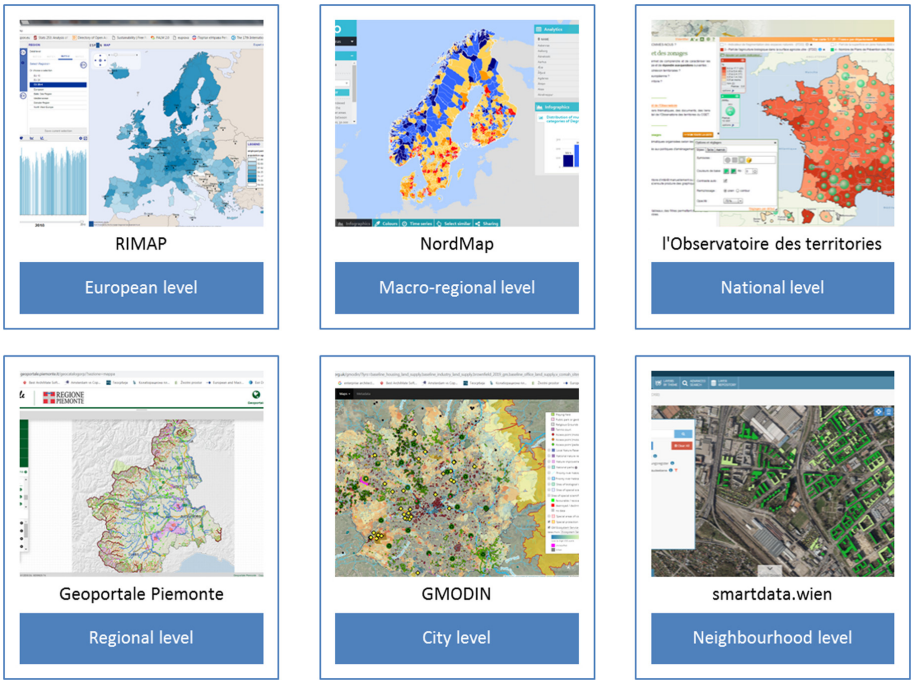

Fig. 1. Examples of geovisualization for territorial monitoring systems in Europe on different levels: RIMAP (http://rimap.espon.eu/) (top left), NordMap (http://nordmap.org/) (top middle), l'Observatoire des territories (http://www.observatoire-des-territoires.gouv.fr/observatoire-des-territoires/en/node) (top right), Geoportale Piemonte (http://www.geoportale.piemonte.it/cms/) (bottom left), GMODIN (https://mappinggm.org.uk/gmodin/) (bottom middle) and Smart City Wien geoportal (https://smartdata.wien/) (bottom right)

Also, if the territorial monitoring system is to be successful and durable, they should include the strategic issues important for the current political ambitions, besides the statistical evidence on past and current territorial dynamics and trends [2]. In this way, monitoring system would enable all relevant stakeholders to ground their decisions and action plans on the same politics-related information on this knowledge-creating platform. For this very reason, an early involvement and a participatory approach to the establishment of territorial development monitoring system are important [1, 2, 5, 6].

Supported by the modern computers and GIS-based applications, geovisualization capabilities of the monitoring systems are becoming critical for their success and usability as well. By definition, geovisualization is more than a cartographic presentation, or communication of the visual thinking results by the static user-customized maps, since it assumes functionalities of an online mapping application with interactive user interfaces, needed for adding and removing data layers during the visual exploration, facilitated by the Web services, digital databases and new functionalities necessary for a dashboard type of presentation [9, 13, 16, 17].

Finally, as sustainable territorial development is a generally accepted objective and principle in spatial and urban planning, as Ostojić and Glažar [7] confirmed, a land use management on the local level is its main instrument for achieving sustainability objectives within the urban development domain [20]. And, while the comprehensive monitoring system for achieving sustainability objectives in the urban development domain is still challenging, these authors claim that optimal approach assumes the stakeholders participation during the urban land use determination and implementation through "simulation of local well-being and economic prosperity, [where defined land uses should] accelerate mutual positive effects, diminish negative effects and increase the economic value of land" [3]. This approach is further supported by Korthals Altes [7] who finds that planning agencies, besides continuing their work on the improvement of urban places quality, must at the same time facilitate investments in the property development, and thus increase the land economic value, because "planning is not only driven by the realization of public works such as streets, parks and arterial access roads, but also by its effect on private investment in housing, industry, retail, etc." This leads to the conclusion that, in situation of the cutting public funds and aiming to do-more-with-less [2], the public interest can be protected today as well through the private investments, where the investment processes should strictly conform to the provisions of plans or planning documents promoting sustainable development and contributing to the preservation of spatial order in general [7, 23].

3 Urban Development and Land Management System in Serbia

On one side, adoption of the ESDP document and Territorial Agenda of the European Union 2020 [8] has triggered general rethinking of the strategic territorial development goals on the European level [2, 3, 6, 13, 17]. On the other side, the recent Urban Agenda for the EU [28], based on the UN-Habitat New Urban Agenda [27] and underpinned by the International Guidelines on Urban and Territorial Planning [26],

has launched new generation of the urban visioning and strategic urban development planning cycles for the foreseen challenges of the future cities and urbanization process in general up to 2030.

Correspondingly, on the national level in Serbia, the adopted Spatial Development Strategy (SDS) 2009-2013-2020 [25] and Spatial Plan of the Republic of Serbia 2010–2020 [14] have introduced for the first time some new instruments and tools on the national level, like the monitoring system for continual sustainable territorial development goals management, which are in line with the EUROPE 2020 strategy [18].

Also, pursuing sustainability as a general development principle [7], mentioned national SDS has provided directions for the compatible strategic urban development in Serbia, emphasizing the need for transition to either neoliberal or Scandinavian or some hybrid land management system, as well as to new urban land use and urban planning and development model, which would increase a role of the local authority and the use of urban plans and urban planning in general as main development corrective. Also, this new urban development model should include the new approaches and methods, and contribute to the establishment of a more streamlined and efficient system of urban land management, overcoming existing insufficiencies[1] of the same (system) by including -among other things- market-based instruments and tools within the strategic urban management domain in Serbia, like the private investments for public interest protection [22, 24].

However, despite the strategic urban development directions provided in the national SDS in 2009, only in 2019 the first national urban strategy -SUDS- has been adopted, which relies on the principles and solutions stipulated in the relevant international documents and initiatives [26–28], and includes the vision, goals and measures for steering sustainable development within the Serbian cities up to 2030. Also, in order to create strong commitment to the implementation of identified long-term measures and goals within SUDS, through the local Integrated Urban Development Strategies (IUDS) development, national SDS strategy proposes the general urban planning shift from 'command-and-control' to 'learn-and-adapt' model, as well as building of the monitoring system for the urban development evidence-based decision-making and status reporting [21, 24].

3.1 Monitoring Urban Development and Sustainable Land Use Management

Finally, although the national urban development strategy document –SUDS- has been adopted, it still needs to be translated into the concrete action plans and directives. In the meantime, majority of the current urban land use planning and development issues are regulated by the valid Law on Construction and Planning (LCP) [11]. Besides those basic urban land management-related issues, LCP prescribes also establishment of the

[1] Like, for example: inefficient urban land consumption; lack of synergy between the urban land market and urban development planning; an enormous increase of illegal and/or informal construction; poor administrative arrangements for land use management including the transparency of the system; unresolved issue of urban land leasehold rights conversion into urban land property rights; uncontrolled suburban expansion - sprawling, etc.

local information systems in accordance with the INSPIRE principles, which would once built provide comprehensive data platform required for the urban development and land use monitoring, decision-making and steering [10, 11, 22]. And, while development status of these local monitoring systems varies between the local self-governments in Serbia, mostly due to the absence of relevant standards, resources and bylaws, some components –like digital registers- are already in building phase on the national level as part of the NSDI initiative [11, 30], which is becoming major pillar for the e-Government development in Serbia as well [19, 33]. Among those digital registers, NRIL establishment would be also prioritized due to the recognised 1) importance of an efficient urban land use management for an effective urban renewal process in Serbian cities, which are implementing the urban regeneration, revitalization and reconstruction projects, on one side; as well as 2) importance of the private investments attraction, either brownfield, greyfield or greenfield, for protecting the public interest in domain of sustainable urban development when public funds are decreasing.

Therefore, the aim of this article is to present up-to-date status in establishment of the NRIL register and related framework within the 11 local self-governments in Serbia, as well as development of the interactive urban development monitoring system for the investment locations and sustainable urban land use management using the NSDI platform advantages.

4 Project "Improvement of Investment Environment in Serbia"

4.1 Aim and Objectives

In order to create possibilities for improvement of the local economic development and launching of the urban renewal process in Serbia in a systematic way, through the targeted investments into the local strategic projects from the urban revitalization, regeneration and reconstruction domain, MCTI together with RGA has started Project "Improvement of Investment Environment in Serbia" [29] with the Swedish counterpart Lantmäteriet, supported by the Swedish International Development Cooperation Agency (SIDA).

Due to the previously described urban land system inefficiency in Serbia, and its negative effects for the local economic development, urbanization process and quality of life, the **purpose** of this Project is to contribute to a better climate for investments that would improve local socio-economic, environmental and other conditions necessary for a sustainable smart and inclusive urban development in future [32].

Therefore, the **aim** of the Project is to support sustainable local economic development in Serbia by establishing a digital national register of investment locations – NRIL-, and related on-line and interactive monitoring system for the transparent and efficient investment decision-making, locations management and their status monitoring, as well as for a direct communication between the local self-governments and potential domestic and foreign investors. Additionally, combined with the other relevant NSDI registers and datasets, the aim of this monitoring system is to support

sustainable urban land use planning and management, as well as integrated urban development monitoring in Serbia.

Based on the defined aim, the **objectives** of the Project include:

- To develop a model, database and digital platform for storing, processing, searching/retrieving, analyzing, geovisualizing and monitoring status and effects of the selected investment locations within the 11 local self-governments in Serbia;
- To collect, visualize and communicate investment locations data to the potential investors and other end-user communities; and
- To build capacities of the Project stakeholders –RGA and pilot local self-governments- on a market-based urban land use principles and tools for the investments attracting and management.

Project duration is 2 years in period 2019–2021, while the total budget of 2 million euros is allocated among the 5 main components that are necessary for the establishment of investment locations database and mentioned monitoring system, as a tool for informed and efficient sustainable urban land use management in Serbia.

4.2 NRIL and Its Monitoring System Concept

The concept of the investment locations database and its communication-oriented monitoring system needs to be designed in such a way to satisfy identified user requirements related to the NRIL data model and technical solution, which main features are listed in Fig. 2.

Data model requirements	Technical solution requirements
To enable a unique identification of each investment location, To include a spatial position of the investment locations, To establish a uniform national classification of the investment locations, To be user-friendly, To provide potential investors a relevant information on the investment locations, To be reliable platform for the investment decision-making by providing quality data, To secure transparency for the investment locations management to citizens, public authorities and third parties, To provide possibilities for connecting to the other relevant registers and monitoring systems on national level, To ensure compliance with the ISO19100 standards and INSPIRE principles and rules, and To secure for all data modifications to be traceable, and change of data values would be recorded.	Applications to be platform independent, System to be modular and scalable with independent components integrated by the services, Applications to be built as centralized systems with Web-based interfaces, To use Internet and HTTP/HTTPS protocols for enterprise application integration, Technological diversity to be controlled to minimize the cost of maintaining expertise, Data to be protected from unauthorized use and disclosure, Data integrity to be maintained in multiuse environment, Data modifications to be traceable, and change of data values would be recorded, Data are accessed through services, All data to be centrally stored and online available in a central data repository, and Software and hardware to conform to defined standards that promote interoperability for data, applications, and technology.

Fig. 2. NRIL and its monitoring system requirements

5 Methodology

The recent World Bank study [12] has revealed an uneven spatial distribution of the lagging and leading regions in Serbia, as well as generally stalled urbanization process that has been an obstacle to Serbia's economic growth. Thus, recognizing the importance of achieving sustainable, inclusive and balanced regional development on the national level through stable local economic development, couple of initiatives[2] for the establishment of investment locations register has been launched lately in Serbia. These initiatives failed due to the lack of national standards for the investment locations data collection, spatial presentation and unified management. Also, being identified as one of the registers with strategic importance for the sustainable urban development and urbanization in general in Serbia, it has been decided that planned NRIL database would be part of the already established NSDI database and its geoportal Geosrbija [30]. In this way, it is expected that this new database and planned monitoring system would benefit from the existing technological capabilities as well as combination with the other NSDI datasets, securing thus directly conditions needed for creating the interactive cartographic tool for the informed and efficient investment decision-making and urban development monitoring.

Therefore, the Project methodology for establishment of this tool has been organized around the 5 main Project components and related activities for creation of the outputs needed for the identified aim and objectives achievement (Table 1) [32].

Table 1. Project methodological approach

Component	Activity	Output
National investment location model	Development of a registry model for the investment locations, including database implementation	Data model and database "National Register of Investment Locations"
Data collection tool	Development of tool for collecting data on the investment locations on a local level	Web-based application for data collection
Capacity building of local self-governments	Building capacities of local self-governments in the domains of market-based urban land management and attracting investments by presenting available resources to potential investors	Improved knowledge and skills capacities of 11 Serbian local self-governments
Location pool tool	Establishment of direct and transparent channel of communication between investors and a local self-governments	Web-based user interface for communication "Location pool"
Public monitoring and visibility tool	Development of a tool for public monitoring and promotion of the Project and its results	Web-based user interface for the Project visibility

[2] For example, https://ras.gov.rs/podrska-investitorima/baza-investicionih-lokacija.

And, although the Project methodology includes above listed 5 components, final component in a technical sense is the fourth one.

6 Project Results

Since this Project is currently under implementation, only its first results are subject of this article and analysis, and they would be presented and described in the next lines in a following order:

- Proposal for a common data model for the investment locations database (Subsect. 6.1),
- Collection of the initial –pilot- data for investment locations and their publication on the NSDI geoportal Geosrbija (geosrbija.rs) (Subsect. 6.2), and
- Implementation of the first capacity building event for the selected Project stakeholders, i.e. 11 pilot local self-governments[3] (Subsect. 6.3).

6.1 National Investment Location Data Model

According to the above presented requirements from the NRIL data model and solution (Subsect. 4.2), and following the lessons-learnt from the previous similar initiatives in Serbia, as well as results of the first consultations with the selected pilot local self-governments, initial data model for the investment locations management and monitoring in Serbia has been proposed (Fig. 3).

This national investment location data model, in line with the collected user requirements analysis, should include approximately 21 attributes divided into the 7 categories of information that are find to describe each investment location within Serbian cities into the sufficient level of details for the informed investment decision-making. These categories and their attributes with the specified value domains present a good starting point and, in fact, a first national standard for the investment locations data collection and database design, and eventually full digitalization of the NRIL register.

Also, from the technology perspective, digitalization of the NRIL register would open up possibilities for the usage of modern GIS-based and related technologies' advantages for the investment locations data analyses, their (geo)visualization, as well as efficient monitoring of the investments realization and impacts on the neighboring land uses and urban functions, quality of life and urban development in general, as presented in the next section (Subsect. 6.2).

Further, since the digital NRIL register is planned to be implemented as part of the already established NSDI database and its digital platform Geosrbija, which stores and publishes today over 220 various datasets, it would be possible to easily combine and analyze together investment locations data with the other relevant NSDI datasets. This would support integrated decision-making and management of each investment location's value, feasibility and future potential separately.

[3] Arilje, Bor, Valjevo, Ćurpija, Knjaževac, Sombor, Vranje, Zrenjanin, Pirot, Požarevac, Čačak.

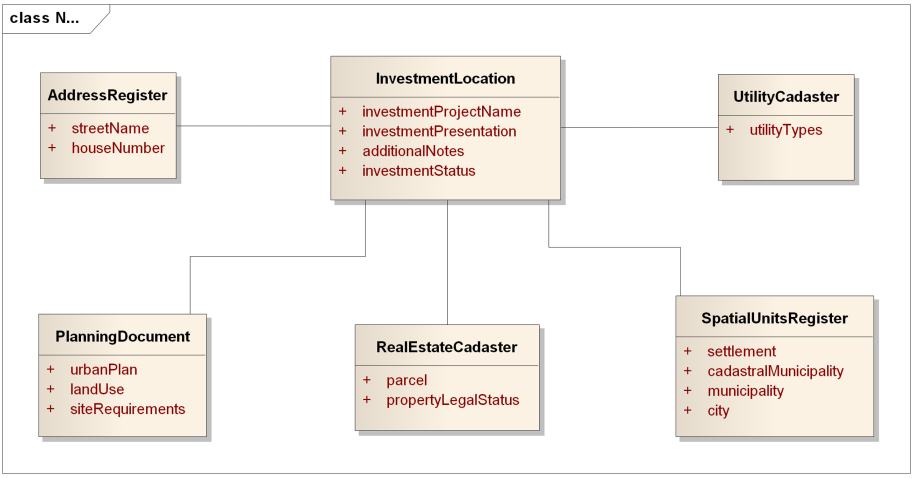

Fig. 3. Conceptual model for the investment location management and monitoring domain (indicative)

Finally, based on the previously stated user requirements and expectations, above presented is a proposed conceptual model for the investment location management and monitoring domain (Fig. 3), which consists of the existing NSDI datasets, like utility, real estate cadaster, spatial units and address registers, as well as the new datasets that still need to be created, like investment locations and planning documents datasets.

6.2 NRIL Applications and Pilot Investment Locations Visualization

Following the predefined technological requirements for the NRIL monitoring system (Subsect. 4.2), and relying on the advantages of above proposed investment location data model (Subsect. 6.1), RGA supported by the Swedish partners has started the initial phase of Project by developing the test versions of NRIL components and monitoring environment. Thus, the results of this initial phase have included development of a temporary Web form for collecting data on a selected set of pilot investment locations, as well as collected data visualization on the NSDI geoportal Geosrbija.

This means that, using this temporary Web form based on the proposed investment location standard data model, those 11 local self-governments have collected and combined geometry data with the attribute data for each pilot investment location (Fig. 4). Collected investment locations data has been stored directly within the NSDI database, while testing of the resulting data and visualization quality, including available geovisualization capabilities, have been performed using the geoportal Geosrbija functionalities (Fig. 5), which is based on the module-oriented map application Adaptive [16].

Following the already identified main Project outputs in the methodology Section (Sect. 5), the NRIL monitoring system would be provided also with the 3 Web-based applications, which should secure this strategic national register sustainability



Fig. 4. Visualization of the investment location data on the geoportal Geosrbija; example investment location in Kikinda

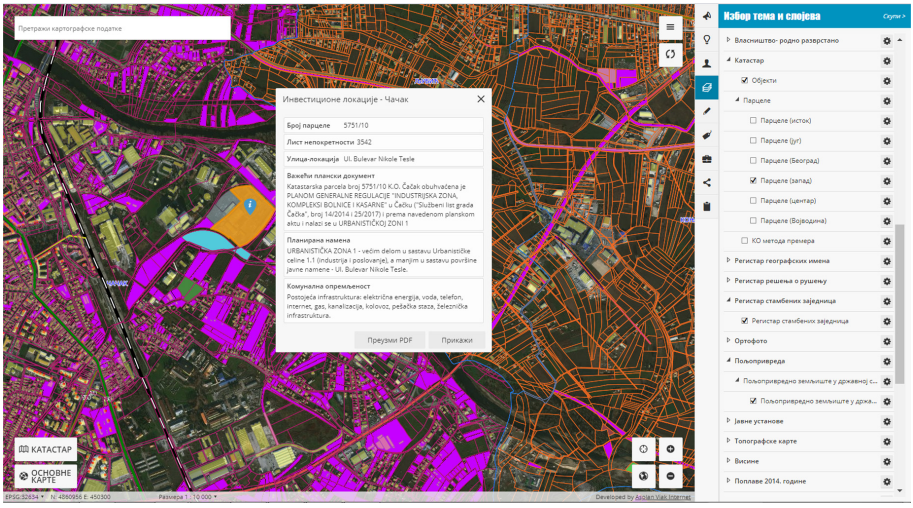

Fig. 5. Interactive cartographical visualization possibilities for the investment location data on the geoportal Geosrbija; example investment location in Čačak

also after the Project ending. Those proposed 3 Web-based applications are further elaborated during this initial Project phase, and it was defined that they would support the next NRIL monitoring system functions:

- **Web-based application for data collection** would support user-friendly and standardized collection and modification (editing, updating, etc.) of the investment

locations data directly in the NSDI database, structured according to the proposed standardized data model (Fig. 3);

- **Web-based user interface "Location pool"** would provide public –online- access and transparent selection of the stored investment locations data, based on the criteria set by investors; also, it would allow direct communication between the potential investors and local self-governments. Transparency quality of the solution would be secured by the planned reporting function on the potential investors' queries, as well as through the real-time investment locations status monitoring; and
- **Web-based user interface for the Project visibility** would provide simple and transparent interactive cartographic presentation of the Project results, including monitoring of the investments realization status in real-time.

6.3 Capacity Building of Local Self-government and RGA

Finally, following the first results of the Project in data and technology domains, also first capacity building event for pilot local self-governments was organized by the Swedish partners. Besides the general introduction to the Swedish local government administration level and investments attraction and management tools, provided trainings included presentation of the organizational, legal, financial and technology issues and framework for the similar investment-related initiative in Sweden. During the trainings it was also emphasized the Swedish model for municipal public financing options, as well as state system for the investment support.

It is expected that shared experiences of the Swedish local administration should encourage Serbian local self-governments to change or improve efficiency of the current municipal public financing model and options, as well as to build realistic expectations from the investment locations in Serbia, which are necessary for the local economic growth underpinning and successful implementation of the future local strategic goals identified by the IUDSs, and national –SUDS- ones in general.

7 Discussion

Selected methodological approach and the first results of the Project "Improvement of Investment Environment in Serbia", described in the previous Sections (Sects. 5 and 6), confirm that the investment locations and urban land use management and monitoring system under development would provide necessary technological advantages for the interactive geovisualization. This characteristic of the monitoring system is important not just for the usability and durability of this system, but it's also critical for a better visibility, analysis and understanding of the investment locations potential, including their impacts on the neighboring urban functions and urban land use patterns in general. This means that the outputs of this Project once built should lead to the optimally informed investment decision-making, as well as later efficient management of the investments realization on side of the investors in Serbia.

Also, on side of Serbian local self-governments, emerging investment locations monitoring system should lead to the better understanding of the investors' needs, including possibility for simulating potential effects of each investment decision-

making on public interest, besides strengthening the strategic role of local self-governments in urban development process in general. Further, digitalization of the standardized, modular and scalable NRIL register, and its reliance on the other NSDI registers, would support learning process needed for creation of the new model of urban land use planning and management, as well as designing of the new concept of land management system and land use policy in Serbia in general, which would be able to boost local economic growth in the cities.

Also, as part of the NRIL register digitalization, standardization of the land use dataset that is part of this register (following the INSPIRE implementation rules and local specific needs) would also support interactive visual thinking about the new land use model, as well as better adapted urban planning methods and approaches to Serbian city's needs. This would lead to a new urban development knowledge creation, needed for sustainability goals implementation along with the encouraged local economic development.

Once built, this national investment locations' register and urban land use monitoring system would be able also to tackle today stalled urbanization process in Serbia, and secure its sustainable evolving using the controlling mechanisms of the plans and urban planning in general. Additionally, this new urbanization process could in future be supported by the currently developing compatible paradigms and concepts in Serbia and Europe, like Smart City, Open Data, Big Data, EU Green Deal, etc.

Finally, digitalization of the land use dataset from the urban plans and other planning documents would directly support their already confirmed corrective role, while the assumed modularity and scalability of the monitoring system solution would encourage establishment of the spatial and urban planning documents database in Serbia in near future, as well as launching of so-called e-Space geoportal that would be a national gateway for the territorial planning and development related content.

8 Conclusions

In order for the urban planning community and local self-governments in Serbia to understand and respond appropriately to the poor local economic growth, lagging reforms in the land management domain, as well as increasing urban development challenges in general, they need the integrated urban planning and development monitoring system able to support evidence-based decision-making and relevant urban policy management. Relying on the various datasets and registers, this monitoring system should support interactive geovisualization capabilities, needed for the visual thinking and customized user-driven approach to the digital maps creation, proved to be useful tool for the territorial development stakeholders gathering, empowering and development options negotiation.

In order to underpin building of this type of the local monitoring and information system in Serbia, MCTI together with RGA and Swedish partners has launched the Project "Improvement of Investment Environment in Serbia" to establish the digital NRIL register that would support the investment locations decision-making and management, as well as the urban land use monitoring within 11 pilot Serbian cities. This register and related monitoring system would be part of the NSDI initiative and its

geoportal Geosrbija, securing thus direct access to the over 220 datasets for combining and analyzing together with the investment locations data. Besides technical components, the planned Project activities include also capacity building events for RGA and local self-governments, which would increase the strategic role of the latter and create the critical opportunities for learning, reinventing and adopting the new land management and urban development models and approaches in Serbia.

Finally, it is expected that the results of this Project would motivate and encourage digitalization of some new registers in Serbia, as well as launching of some new projects of strategic importance within the territorial development domain, including establishment of the spatial and urban planning documents database and e-Space geoportal.

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