# Regional Strategy for Sustainable Urban Mobility and Smart Cities of the North-West Region 2021-2027 - Summary

In 2007, the smart city was defined as "a city well performing in terms of economy, citizens, governance, mobility, environment and living, built on the smart combination of endowments and activities of self-decisive, independent and aware citizens" (Giffinger et al., 2007). Through this definition, the 6 pillars underlying the smart city were presented for the first time. Another approach to smart cities is the "smart city wheel", which in turn identifies **the 6 smart city pillars: smart mobility, smart living, smart economy, smart citizens, smart governance and smart environment**. For each of these components, specific sub-domains and indicators have been developed that allow comparisons between different smart cities. **The approach and pillars of the smart city wheel are the base of the Regional Strategy for Sustainable Urban Mobility and Smart Cities of the North-West Region 2021-2027.**

At the same time, the planning approach for the Regional Strategy for Sustainable Urban Mobility and Smart Cities of the North-West Region 2021-2027 took into account the existing strategic context at European level, where attention to carbon emissions reduction targets occupies an increasingly important place within the concerns of European institutions. One way to achieve these environmental goals is, among other things, to use digital technologies. Similarly, the strategy aims to support competitiveness and innovation at regional level, in this sense referring to European indices in the field (Regional Competitiveness Index and Regional Innovation Scoreboard).

The Regional Strategy for Sustainable Urban Mobility and Smart Cities of the North-West Region 2021-2027 is based on an innovative tool for the comparative analysis of cities and municipalities and their smart development planning, namely **the smart city maturity matrix**. The maturity matrix of smart cities starts from the British standard for smart cities - PAS 181: 20014 which was then developed for cities in Scotland (Smart Cities Maturity Model and Self-Assessment Tool - Guidance Note for completion of Self - Assessment Tool October 2014) and in the end adapted for the Romanian context in order to elaborate the present strategy.

The maturity matrix highlights the level at which the municipalities and cities in the region are located in terms of smart urban development, using 5 maturity levels, classified on the 6 "Smart city" verticals. The matrix is built around realization indicators (e.g. the existence of a GIS database, digital public services, etc.) and around result indicators (e.g. the share of non-motorized travel from total, the share of recycled waste, etc.). For the most part, the scaling of similar elements on the 5 levels was attempted. Therefore, the same indicators/results are often found in the 5 levels of the maturity matrix, scaled according to value (e.g. % of the public transport fleet monitored in real time) or complexity (eg digital public services simplified version, complex version, the integration of public services at regional / national level, etc.). At each level, the matrix includes targets related to the technological component (e.g. data collection devices) but also targets that are rather oriented towards sustainable development (e.g. % of energy from renewable sources, etc.). The smart city maturity matrix has been completed for each city / municipality in the region, both for the current situation, including projects under implementation with expected results, and for the projected situation for 2030, assuming that this strategy and the projects from the proposed project portfolio will be implemented and will take effect by 2030.

In the present, most municipalities and cities in the North-West Development Region are classified between level 1 and 2 in terms of smart city maturity, while the county residences are situated on level 3 or 4 on certain tiers, Cluj-Napoca being the only case that partially meets the criteria of level 5 (e.g. - the city interacts directly with its citizens for public services - the virtual office clerk). Oradea can be considered the most developed municipality in the region in terms of smart living, as it meets several criteria of the 3$^{rd}$ level of maturity (e.g. urban database and PUG in GIS, open data in the metropolitan area, etc.). There are also municipalities and small cities that are progressing rapidly ("leapfrogging") through projects such as "the establishment of electric public transport service, monitored in real time" managing in only one step to reach the 3-4 level of maturity. The fact that small towns have a smaller number of public buildings, means of public transport, etc. gives them the advantage of being able, in some cases, to meet certain criteria much more easily than in the case of large cities. On the other hand, the investment budget, the population and economic volume of small cities are lower, and the thresholds for innovation, economy and community spirit are easier to meet for large cities, which are much more effervescent from a socio-economic point of view.

Based on the maturity matrix, cities and municipalities in the region may consider accreditation for ISO 317120 - Sustainable cities and communities - Indicators for city services and quality of life and ISO 317122 - Sustainable cities and communities - Indicators for smart cities. After reaching level 2 of maturity on most "smart city" verticals, the municipality / city can move towards ISO 317120 accreditation. This first step refers to the quality of public services and relies on the fact that a city must first ensure a minimum of infrastructure and services to be able to then focus on the technology component. ISO 31720 accreditation can also provide access to the World Council of City Data's international benchmarking platform (https://www.dataforcities.org/). During the elaboration of the Strategy, a large part of the component indicators ISO 31720 were collected (depending on availability), and these are found in the file of each city / municipality and are relative to the regional average. After obtaining ISO 317120 it can also be applied for ISO 317122, which is more applied in the field of smart cities and targets specific indicators. The indicators for the two ISOs, the data sources, the degree of difficulty in collection and the thresholds can be found in Annex 6.1 of the Strategy, *INDICATORI PENTRU ACREDITAREA „SMART CITY" (INDICATORS FOR "SMART CITY" ACCREDITATION).*

**The strategic approach starts from the premise that the North West Development Region is the most competitive region in Romania after the Capital** and that it competes at European level with regions such as Malopolskie (Poland - Krakow), Jihozapad (Czech Republic - Plzen) or Eszak-Alfold (Hungary - Debrecen), ahead of regions such as West (Romania - Timisoara) or Center (Romania - Brasov). The development of the region relies on the capitalization of the innovation processes of the regional centers Cluj-Napoca and Oradea, and their extension to the rest of the municipalities and cities, pursuing cohesion and cooperation in terms of innovation and development of smart cities.

The strategy takes into consideration the development of a network of smart cities that support sustainable urban mobility. **The proposed approach for the North-West region is a competitive-aggressive strategy**, which focuses primarily on the region's strengths and distinctive competencies and capitalizes on existing opportunities (especially the availability of European funds accessible through operational programs or EC programs). This approach aims at the same time to transfer good practices and successful models between cities.

**The proposed vision envisages the North-West Development Region in 2030** as a smart territory supported by a network of interconnected and innovative cities that use technology to facilitate sustainable development. Thus, innovation, the relationship between the administration and the citizens and the care for the efficient use of resources are the key to the progress of the region.

The North-West smart region relies on a digital network of localities consisting of regional, county, micro-regional and local innovation centers and cities that are developing on smart city levels depending on their potential: tourism, energy - environment, quality of housing, education, etc.

At the local level, municipalities and cities have data collection infrastructure, sensor networks and other devices that form IoT (internet of things) networks, generate complex data sets available to the general public and used to ensure better management of the city, the services, but also of the production process.

To achieve the vision, a set of 8 specific objectives is proposed, which respond to 2 strategic objectives, structured on the two main dimensions of the Strategy: smart cities and mobility, as follows:

**Strategic Objective 1 SMART REGION, SUPPORTED BY A NETWORK OF CITIES USING ICT TO ENSURE SUSTAINABLE DEVELOPMENT AND TO RESPOND TO CURRENT CHALLENGES AND TRENDS**

**OS1. Citizens involved in the development of cities and prepared for the future** - This goal is the basis of the development of smart cities. It aims to ensure the conditions for preparing the population for the digital society, but also to strengthen civic involvement. Therefore, the interventions through which this objective is implemented include the shaping of community centers dedicated to community formation, especially in terms of attaining digital skills and sustainable development. Thus, each city / municipality in the region that develops smart city solutions, especially digital public services, will have to ensure, in addition to the training of public administration staff, the familiarization of citizens with new services and projects. Starting from the desideratum that an intelligent community is an involved community, the objective also aims to strengthen the civic spirit, in the form of empowering citizens to get involved in solving the city's problems and in the form of respect for the city and the environment.

**OS2 Competitive economy, based on innovation, digitalization and creativity** - This objective supports a balanced development of the economy, focusing on the transition to industry 4.0 and aims primarily at digitizing economic activities, whether it is about internal flows and day-to-day operations or it is about interaction with public authorities and the community. The objective also promotes the strengthening of the innovation capacity of the cities and municipalities in the region by territorial extension of the services offered by the main actors involved in the innovation process (clusters, academia, innovative companies, etc.). This approach is supported by the formation of a network of local / community micro innovation centers that serve the territory in a balanced way.

**OS3 Climate change resilient region with low energy consumption** - This objective targets the sustainable development of cities by reducing energy and resource consumption, harnessing renewable energy sources and increasing the quality of environmental factors. In this approach, the ICT infrastructure and "smart city" projects are firstly oriented towards a better understanding of consumption and the state of environmental factors in order to be able to later orient investments to the directly affected areas, but also to educate the population in order to adopt an appropriate behavior towards the natural environment. However, to achieve this goal, a suite of traditional measures will be

needed that are not based on IT solutions such as: revitalization and expansion of green spaces, energy efficiency of the built fund, etc. However, these projects also include ICT components to ensure more efficient management (e.g. automated irrigation systems, lighting sensors or devices for measuring and optimizing air quality).

**OS4. Attractive cities for residents and visitors** - This objective aims to increase the capacity of urban planning for sustainable urban development through the development of urban databases, being closely correlated with the objective of streamlining administrative processes. All data collected are integrated into the urban database (including GIS) of the city / municipality that communicates (can be queried) with the databases from the county and regional levels. At the same time, this objective uses ICT infrastructure to optimize a wide variety of traditional projects meant to improve the quality of housing and the attractiveness of cities / municipalities. Thus, the objective aims to improve access to public services and the living environment through interventions oriented towards: health (telemedicine), culture (digital reconstruction of heritage, digitization of museums, etc.) or safety (expansion and modernization of video monitoring systems). In the field of tourism, the emphasis is on the component of integrated promotion of touristic attractions and facilities. Achieving this goal also involves interventions in urban infrastructure, such as urban regeneration of the central areas and the neighborhoods of collective housing, revitalization and expansion of public spaces, restoration of monuments or revitalization and development of new recreational facilities, as smart city projects operate in this area mainly as a catalyst.

**OS5. Efficient and open administration, which makes decisions with the support of a complex and up-to-date database, updated in real time** - This goal relies on optimizing the administrative process and focuses on the development of urban databases along with the provision of digital public services. Urban databases will require a comprehensive process of digitization of existing urban planning documentation, data collection, as well as the development of real-time data collection and display systems. These databases (including GIS) will substantiate and encourage both urban planning processes appropriate to the situation and the dynamic in the territory, as well as strengthening and improving relations between the institutions involved in city management. For small towns, whose resources are limited and which cannot manage a GIS database, this service can be taken over at county councils level. In the case of cities and municipalities with more than 50,000 inhabitants, the development of real-time monitoring centers of the city should be considered, to which the representatives of the main institutions that carry out daily interventions should have access. The entire process of digitization of public services also relies on equipping local governments with hardware and software, staff training and rethinking internal processes. This process is usually supported by a digitization or digital transformation strategy. In the case of county seat municipalities, teams will have to be developed to be directly involved in the development and the implementation of local "smart city" strategies and projects.

**Strategic Objective 2 - EASY ACCESS TO OPPORTUNITIES AND SERVICES SUPPORTED BY A PERFORMANT AND RESILIENT COMMUNICATION AND TRANSPORT INFRASTRUCTURE**

**OS6 Continuously optimized transport system that supports low-emission travel** - This objective is based on the priorities set out in the sustainable urban mobility plans. Thus, ICT is used primarily to optimize and increase the attractiveness of low-emission means of transport, but also to facilitate a

change in behavior among the citizens and the transition from personal car to public transport and cycling or walking. .

**OS7. High-performance transport infrastructure that ensures optimal conditions for efficient and low-impact means of transport** - This objective aims to improve connectivity at intraregional level, but also in relation to the rest of Europe. Thus, the completion of the network of highways and express roads included in the MPGT and the modernization of the railway system are taken into consideration. In order to increase the connectivity in the metropolitan / functional urban areas, the development of green-blue corridors along the watercourses, dedicated to active mobility, is also considered. Furthermore, in the case of conurbations, the development of public transport systems is envisaged to ensure connections not only within the cities, but also with the neighboring cities.

**OS8. High digital connectivity** - This objective promoted the provision of support infrastructure for the entire smart city ecosystem. Thus, the primary aim is to facilitate the population's access to broadband / high speed internet. To support the full variety of digital public services, data collection systems, urban databases but also to support innovation (e.g. autonomous vehicles), the gradual development of 5G networks is required.

To implement the proposed vision and objectives, the Regional Strategy for Sustainable Urban Mobility and Smart Cities of the North-West Region 2021-2027 includes two project portfolios, based on the territorial level of implementation, as follows:

**Regional projects portfolio** - The strategy includes two types of regional projects: regional mobility projects and regional "smart city" projects.

1. Regional sustainable urban mobility projects are either large infrastructure projects included in strategic documents of national interest (MPGT, Railway Infrastructure Development Strategy 2021-2025, etc.) or projects that transcend the local level and thus include several cities and settlements (green-blue corridors or micro-regional public transport). In this category of projects the bypass variants of various municipalities and cities were also included, as their existence has an essential impact on the local level but also on the regional transport system.

2. "Smart city" regional projects are projects whose implementation would be much more efficient at the regional level. Based on regional projects, disparate investments with high costs can be avoided.

**Local projects portfolio** - was conceived in the form of "smart city" projects that could a) respond to local needs and problems, b) could capitalize on certain strengths of the city / municipality or c) could ensure a better understanding of local issues. Local projects are smart city projects that have a general character, which will be subsequently dimensioned and detailed by local authorities. The structure of the set of local "smart city" projects is adapted to the size of the cities and their degree of development, especially their digitalization. For example, complex projects such as traffic management systems are not justified at small cities level, but here small projects that may have already been developed at the level of municipalities such as digitization and equipping the schools, are essential. Thus, the local project portfolio includes sets of projects oriented toward small cities (less than 20,000 inhabitants), cities / municipalities with 20,000-60,000 inhabitants and municipalities with over 60,000 inhabitants.

For both local and regional projects, potential sources of funding were identified, taking into account the information available at the time of drafting the Strategy on available funding for the 2021-2027

programming period. Given the types of proposed projects, the main source of funding will be the Regional Operational Program, which will have an axis dedicated to smart city interventions and will continue to fund investments in sustainable urban mobility. In addition, some of the proposed projects - mainly regional ones, are eligible for funding through territorial cooperation programs (Interreg). Funding from the Horizon Europe program could be accessed for projects with an innovation or research component, while funding from European Urban Initiatives can be accessed for innovation projects of cities / municipalities. Other sources of funding to be considered are: EIT, POEO - Education and Employment Operational Program, national / governmental programs, loans and financial instruments, local budgets.

In terms of **governance, implementation and monitoring**, the Strategy is not the responsibility of a single person or institution, but requires the involvement of the whole local / regional community - public institutions, civil society organizations, academia and business, through a participatory and citizen / user focused approach. The involvement of such partners is necessary in the design of initiatives / projects / services, in the mobilization of resources, in implementation, and in the monitoring and evaluation of the overall implementation of the strategy. For this purpose, during the elaboration period of the strategy, thematic working groups were carried out with representatives of the local public administration, representatives of academia, business, professional and non-profit environment, covering the six smart components. Being involved from the initial phase of needs analysis, the participants in the working groups will be a valuable advisory group in implementing the Strategy, thus ensuring the dialogue with all the categories of relevant actors at regional level, based on the quadruple helix model.

The implementation of the Strategy will be done at different territorial levels - regional, county and local (including collaboration between several cities / municipalities or metropolitan approaches). Given the relatively early stage of implementing a regionally integrated approach to smart cities and sustainable urban mobility, it is most feasible to set up an internal unit, within the North-West RDA, for the implementation, monitoring and evaluation of the Strategy. The strategy implementation and monitoring unit has the role to coordinate the implementation and to monitor the Strategy. Given the wide coverage of the Strategy and the fact that it is mainly addressed to municipalities and cities in the region, the actual implementation of measures and projects (except the regional ones) would be done at the level of the latter, at the county level or at the level of partnerships between them and / or with local partners. Regarding the regional projects, they will be coordinated either by RDA NV, or by other actors with a regional role, who have expressed their interest in coordinating and / or implementing certain initiatives: county councils, clusters, etc. In order to ensure the regional coverage of the projects, it is recommended to establish partnerships (e.g. between county councils).

**The strategy creates the framework for monitoring the development of the region, its cities and municipalities**. Three main tools have been proposed for monitoring the strategy:

1. **"Smart city" maturity matrix** - by implementing the projects and meeting the criteria from the maturity matrix, it is estimated that smaller municipalities and cities can reach level 2 or 3 out of 5 in terms of "smart city" maturity. Also, a smaller number of municipalities / cities can reach the level 4/5 of maturity, while 2-3 could partially reach the highest level (level 5). The evaluation on the maturity matrix can be performed either at regional level, taking into account the targets proposed in the Strategy, or at the local level, by consulting the file of each city / municipality and the proposed targets for 2030.

2. Key result and realization indicators (partially correlated with ROP indicators) - key indicators measure the performance of the region, being correlated with indices at European level to allow comparability (Regional Competitiveness Index, Regional Innovation Scoreboard, Social Progress Index, etc.), as well as the alignment with the objectives of the 2030 Agenda (Sustainable Development Goals - SDG). Smart city projects are a catalyst and can help meet set targets. Thus, complementary, traditional projects will still be needed to ensure that these targets are met. The proposed key indicators are mostly collected by the NIS and Eurostat or the OECD, so there should be no major difficulties in collecting them.

3. Benchmarking analyzes, especially Regional Competitiveness Index and Regional Innovation Scoreboard - Taking into account the key indicators and proposed targets, the region will also have to assess its competitiveness in a national and European context. Regarding the Regional Competitiveness Index, the target for 2030 is for the Development Region to be able to compete in the same category with more developed regions in countries such as the Czech Republic - Jihozapad, Poland - Malopolskie or Wielkopolskie or Ékszak-Alföld - Hungary. In terms of the Regional Innovation Scoreboard, the North-West Development Region should reach at least a Modest + score (currently ranked at Modest -), or even at Moderate -. The Regional Innovation Scoreboard is updated every 2 years so it can be constantly monitored.

In conclusion, the Regional Strategy for Sustainable Urban Mobility and Smart Cities of the North-West Region 2021-2027 creates the framework for the smart development of the territory and the support of sustainable urban mobility in the next programming period, setting clear targets and directions to follow.

Last but not least, given the highly participatory approach, in close connection with local stakeholders and based on a good knowledge of the local context, **a number of results of the elaboration process will ensure the assumption and sustainability of the proposed approach**, while providing working tools during the implementation, monitoring and evaluation of the Strategy:

1. **Community of practice** - The participants in the working groups, involved throughout the elaboration of the Strategy, which can be constituted in the Advisory Committee for the implementation, monitoring and evaluation of the strategy. At the same time, they implement or will in turn implement smart city projects.

2. **Smart city maturity matrix** - Innovative tool for assessing and monitoring the maturity level on the 6 smart city pillars.

3. **Regional benchmarking platform** - Interactive map that allows comparisons between cities and regional database with 68 indicators / city.

4. **43 city files** – A file for each city / municipality, describing the smart city maturity level, the main indicators, SWOT, relevant projects (smart city and mobility). The file can be used for monitoring at local level, but also for planning / coordination with the local development strategy and the sustainable urban mobility plan, offering recommendations in this regard (where appropriate).

5. **Lists of projects** - Types of local and regional projects, with international examples - lists of local and regional projects (smart city, urban mobility, urban regeneration).

6. **Catalog of local / regional smart solutions** - Catalog of smart solutions produced by companies in the region and promoted through clusters.