



CRISALIDE - City Replicable and Integrated Smart Actions Leading Innovation to Develop Urban Economies

Digitalization of urban planning and management

Rostov on Don, 04.12.2018



Linking Russia to the European Research Area
Coordination of MS/AC S&T programmes towards and with Russia



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**The National Institute for Research and Development in
Constructions, Urban Planning and Sustainable Spatial Development**

URBAN-INCERC

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- NIRD URBAN-INCERC is the Romanian Project Partner 3 in CRISALIDE Project -



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Short presentation of NIRD URBAN-INCERC

URBAN-INCERC was founded in 2009 by merging three research institutes with a tradition of over 50 years, specialized in:

- constructions and economy of buildings,
- urban and territorial planning,
- habitat and sustainable development.

The activity of URBAN-INCERC is co-ordinated by the Ministry of Research and Innovation.

It is the only body habilitated to substantiate national public policies in its field, from the Strategic Territorial Development Concept and sections of the National Spatial Plan to technical regulations in constructions.

Being the only national R&D institute of its kind in Romania, it serves as the national voice of Romania's urban planning and constructions community.

URBAN-INCERC has branches in Bucharest, Iasi, Cluj-Napoca and Timisoara.



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URBANPROIECT branch, Bucharest: Research and Development in Urban Planning, Sustainable Territorial Development and Building Design

It has more than 50 years experience in urban planning and spatial development.

Its activities:

- Developing national development strategies and spatial planning policies, as well as the instruments for their implementation
- Developing research substantiating the legal framework in urban and spatial planning
- Proposing actions for national, regional, county and local development
- Ensuring the compliance of national spatial development with the European objectives related to territorial cohesion.



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International projects within INTERREG, ESPON Programs:

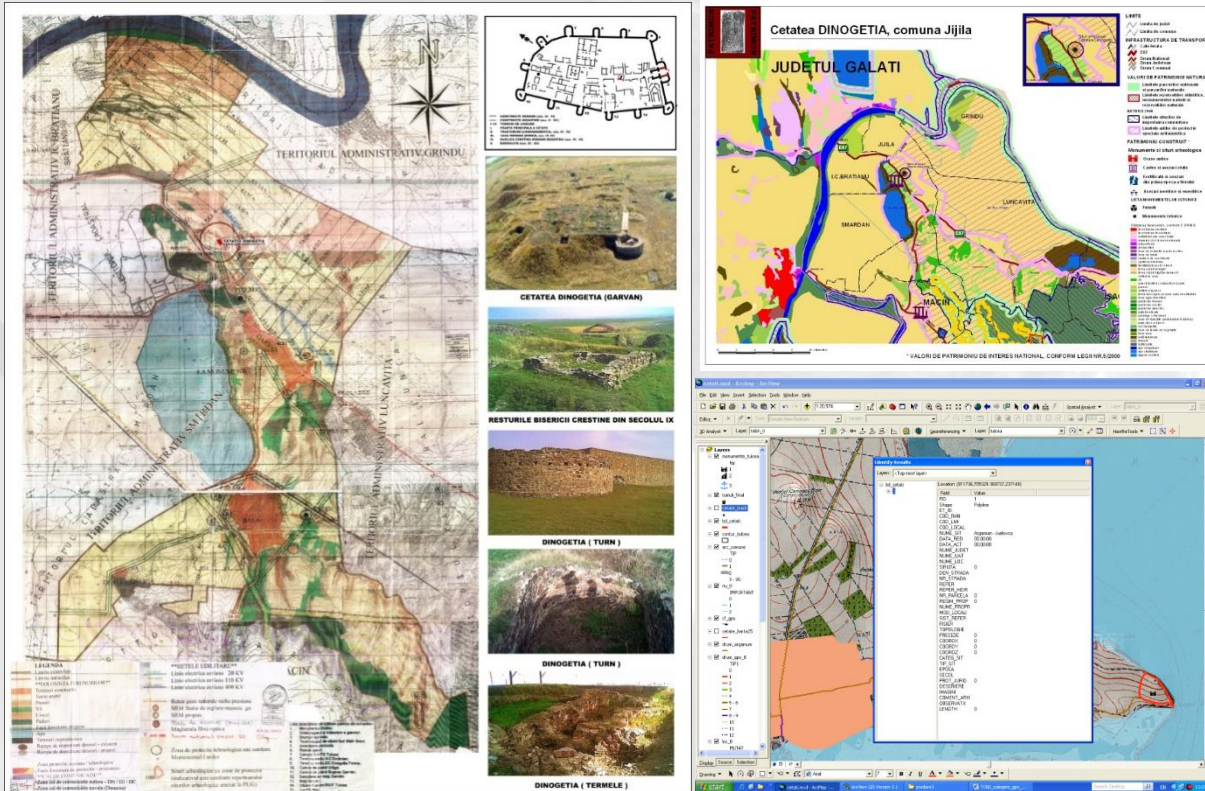
- The spatial development and unterregional cooperation in the Danube space – DONAUREGIONEN and DONAUREGIONEN+
 - Transnational strategy for the sustainable territorial development of the Danube area with special regard to tourism – DATOURWAY
 - Protection and sustainable development of the Carpathians in a transnational framework - CARPATHIAN
 - Tisa catchment area development – TICAD
 - Climate Change and Territorial effects on regions and local economies in Europe
- NIRD URBAN-INCERC was the National Dissemination Point of the URBACT II Program between 2011 and 2014



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Experience in using Geographical Information Systems – GIS - in:

- modelling the territorial dynamics
- developing spatial databases
- making inventories and assessments of the natural and built heritage
- generating decision-making support tools based on geographic information
- developing tools for monitoring the impact of spatial planning policies

Example : Geographic system to locate and protect the archaeological sites. Pilot area: Tulcea county (PATRIMON)



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The following presentation will show an innovative methodology to assess the index of territorial development at the level of the smallest administrative unit in Romania (LAU2) in order to define the Functional Urban Areas in our country, by using the GIS as a support system for spatial decision.

The research was carried out within the Romanian NUCLEUS Program and was focused on the *analysis of the attractiveness of the network of urban and rural localities as competitive, dynamic and innovative entities in view of connecting them to the European network of poles and development corridors.*





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Establishment of the territorial development index to define functional urban areas in Romania

The Green Paper on Territorial Cohesion (2008) underlines 3 aspects of territorial cohesion:

- concentration and specialization of urban and rural areas – peripheral regions consolidate regional functional connections;
- connecting through different infrastructures: equipments, information and communications technology, networks in the knowledge and research economy;
- cooperation: at different levels, horizontal and vertical multi-level governance.





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EUROPEAN VISION on territorial development

The first priority of the European Union Territorial Agenda 2020 (adopted in 2011), as key document in guiding the European Union's regional development efforts is to promote polycentric and balanced territorial development.

From functional and governance point of view, Functional Urban Areas (FUAs) are considered basic units for a polycentric development, the engines of development of the European economy

The development of the actual economic European territory can be characterized by a process of metropolisation of economic development potentials and of the innovation capacities. In this regard, smart specialization represents an important tool in achieving alternative strategies for sustainable development based on research and development.





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NATIONAL VISION on territorial development

The Government Decision no. 998/2008 on the poles of growth policy in Romania has designated :

- **7 growth poles** (one for each development region, except for the region Bucharest-Ilfov);
- **13 centers of urban development of regional importance.**

The designation of growth poles has taken into account interregional effects generated by them, on the following criteria :

- A balanced territorial spatial distribution in the territory, based upon existent urban centers, covering thus an extended functional territory.
- Location on national and international transport networks providing networking with other European urban poles.
- A high level of economic and social development and potential for attracting investors;
- An important research-development and innovation capacity;
- Historical experience as regional centers and traditional relations with neighboring cities.





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METHODOLOGY TO ASSESS THE TERRITORIAL DEVELOPMENT INDEX AT LAU 2 LEVEL (AT THE LEVEL OF THE ADMINISTRATIVE-TERRITORIAL UNIT)

The methodology consisted of:

- Creating a spatial database containing statistical indicators from various areas specific to spatial planning
- Using multi-criteria decision-making methods
- Using the ARCGIS computer solution 10.2.

In this respect, statistical indicators were analyzed in the following domains:

- Population / Transport / Economy / Technical infrastructure / Social / Natural Conditions / Culture.

For each domain, an index for each LAU was calculated and finally, a territorial development index was similarly calculated at LAU level, using the PROMETHEE multi-criteria decision method - the Visual PROMETHEE 1.4 software.





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Chapters and indicators at LAU 2 level

1. The POPULATION chapter

Indicators used for the analyse:

- Number of population (2015);
- Natural growth of the population (2015);
- Migratory growth (2015);
- Evolution of population 2015/2011;
- Evolution of population 2011/2008.

2. The ECONOMY chapter

Indicators used for the analyse:

- Number of employees (2015);
- Evolution of the number of employees 2015/2011;
- The ratio between the number of employees and the population (2015);
- Number of touristic overnights in each LAU (2015)

3. The TRANSPORT chapter

Indicators used for the analyse:

- Accessibility to main national and European roads;
- Railroad accessibility;
- Airports accessibility;
- Ports accessibility.

4. The TECHNICAL INFRASTRUCTURE chapter

Indicators used for the analyse:

- The length of modernized streets reported at the length of the total streets (2015);
- Quantity of household distributed water (2015);
- Quantity of household distributed gas (2015);
- Length of the sewage network (2015);
- Number of new dwellings reported to the total number of dwellings (2015).





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5. The NATURAL CONDITION chapter

Indicators used for the analyse :

- The LAU area (2015);
- The forests area (2015);
- Existence of national or natural parks (2015);
- Existence of biospheres at UAT level (2015);
- Existence of RAMSAR sites at LAU level (2015);
- Existence of SCI or SPA at LAU level (2015).

7. The CULTURE chapter

Indicators used for the analyse :

- Number of spectators (2015);
- Number of spectators in 2015 reported to the number of spectators in 2008;
- Number of spectators reported to the number of population in 2015;
- Number of visitors at museums (2015);
- Number of visitors at museums in 2015 reported to the the number of visitors in 2008;
- Number of visitors at museums reported to the number of population in 2015.

6. The SOCIAL chapter

Indicators used for the analyse :

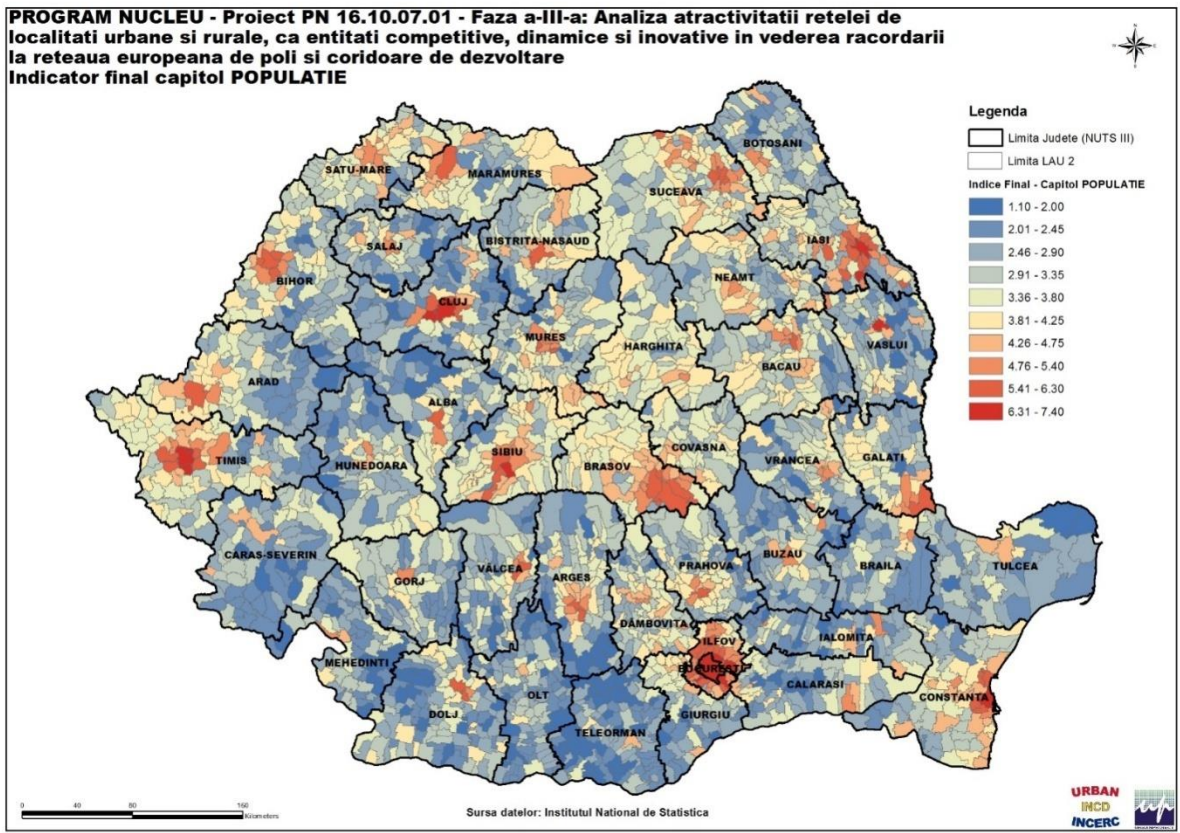
- Number of kindergardens (2015);
- Number of schools (2015);
- Number of high schools (2015);
- Number of universities (2015);
- Number of students (2015);
- Number of students reported to the number of population in 2015;
- Number oh hospital beds (2015);
- Number of hospital beds reported to the number of population in 2015;
- Number of dispensaries (2015);
- Number of doctors (2015);
- Number of doctors reported to the number of population in 2015;
- Number of medical staff (2015);
- Number of medical staff reported to the number of population in 2015.



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Defining the final index for the POPULATION chapter

PROGRAM NUCLEU - Proiect PN 16.10.07.01 - Faza a-III-a: Analiza atractivitatii retelei de localitati urbane si rurale, ca entitati competitive, dinamice si inovative in vederea racordarii la reseaua europeana de poli si coridoare de dezvoltare
Indicator final capitol POPULATIE



For the analysis of the POPULATION chapter, sociology specialists chosed the following weights for the mentioned indicators:

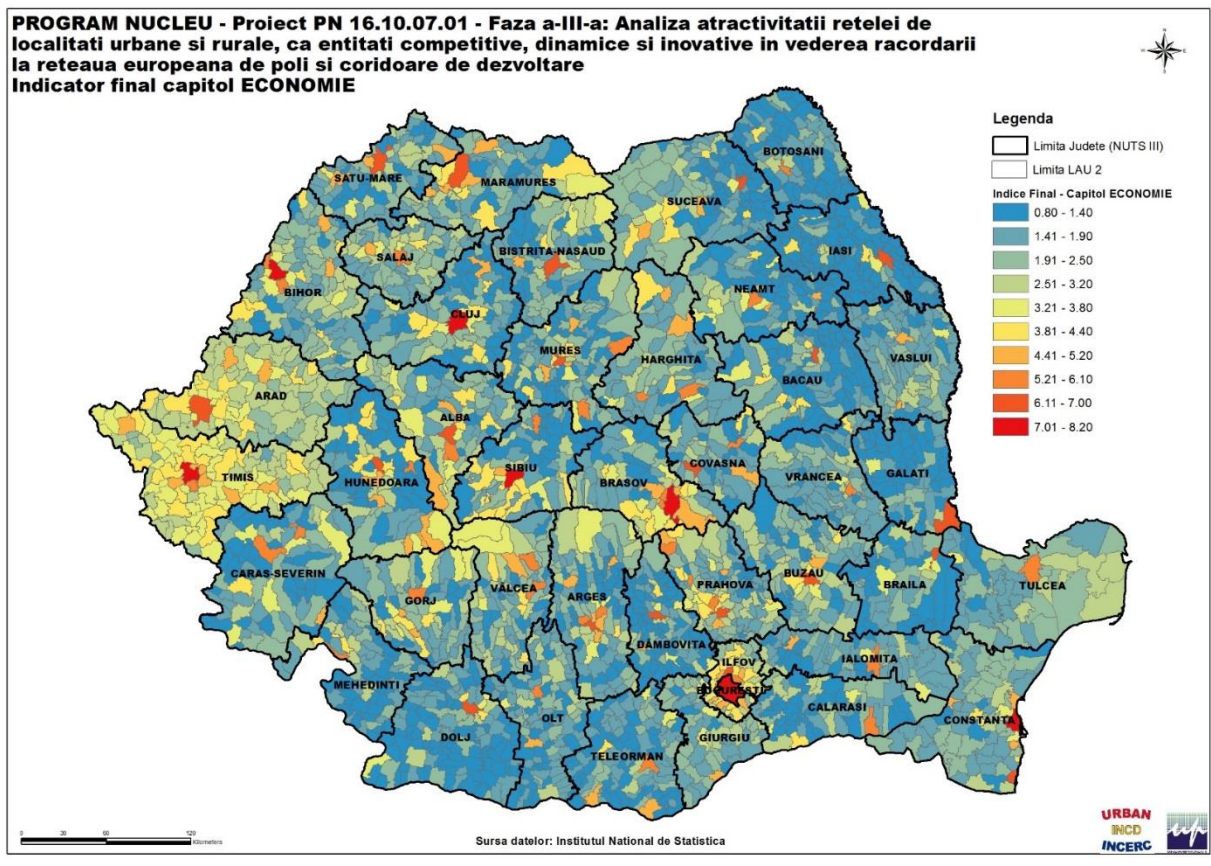
- Population (2015): 40%,
- Natural growth (2015): 15%,
- Migratory growth (2015), \
- Population evolution 2015/2011: 20%,
- Population evolution 2011/2008: 10%.

The analyse revealed the localities and areas with significant demographic decline (coloured in blue), as well as those having demographic potential (the brown color)

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Defining the final index for the ECONOMY chapter

PROGRAM NUCLEU - Proiect PN 16.10.07.01 - Faza a-III-a: Analiza atractivitatii retelei de localitati urbane si rurale, ca entitati competitive, dinamice si inovative in vederea racordarii la reseaua europeana de poli si coridoare de dezvoltare
Indicator final capitol ECONOMIE



For the analysis of the ECONOMY chapter, specialists in economy chosed the following weights for the mentioned indicators:

- Number of employees (2014): 35%,
- The ratio between the number of employees in 2014 and in 2011: 20%,
- The ratio between the number of employees in 2014 and the number of population in the same year: 25%
- Overnights stays: 20%

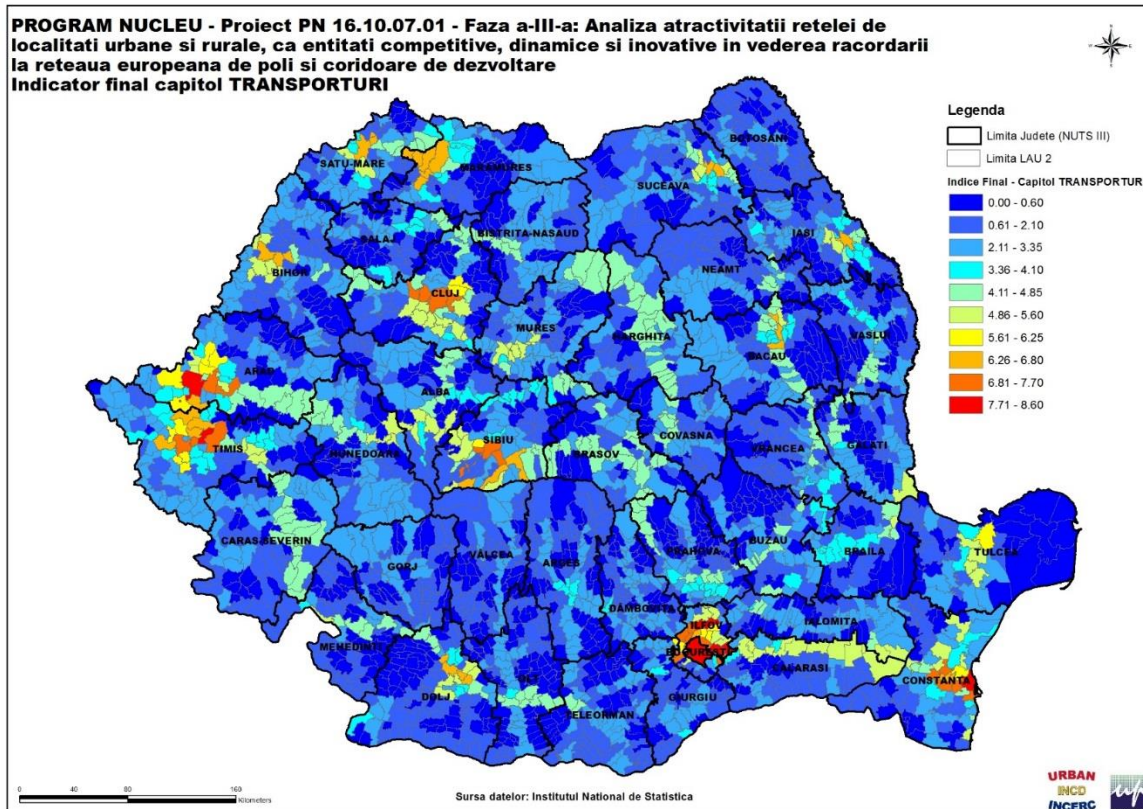
The analyse revealed the 2 compact areas with a high value of the Economy index: the Bucharest municipality as well as Timisoara-Arad areas (the brown and yellow colours). The LAUs located in the proximity of Romanian big cities have also a high value of the index.



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Defining the final index for the TRANSPORT chapter

PROGRAM NUCLEU - Proiect PN 16.10.07.01 - Faza a-III-a: Analiza atractivitatii retelei de localitati urbane si rurale, ca entitati competitive, dinamice si inovative in vederea racordarii la reseaua europeana de poli si coridoare de dezvoltare
Indicator final capitol TRANSPORTURI



For the analysis of the TRANSPORT chapter, specialists in mobility chosed the following weights for the mentioned indicators:

- Airport access: 35%,
- Port access: 15%,
- Access to the main roads (national, European, highway): 25%
- Railway access: 25%

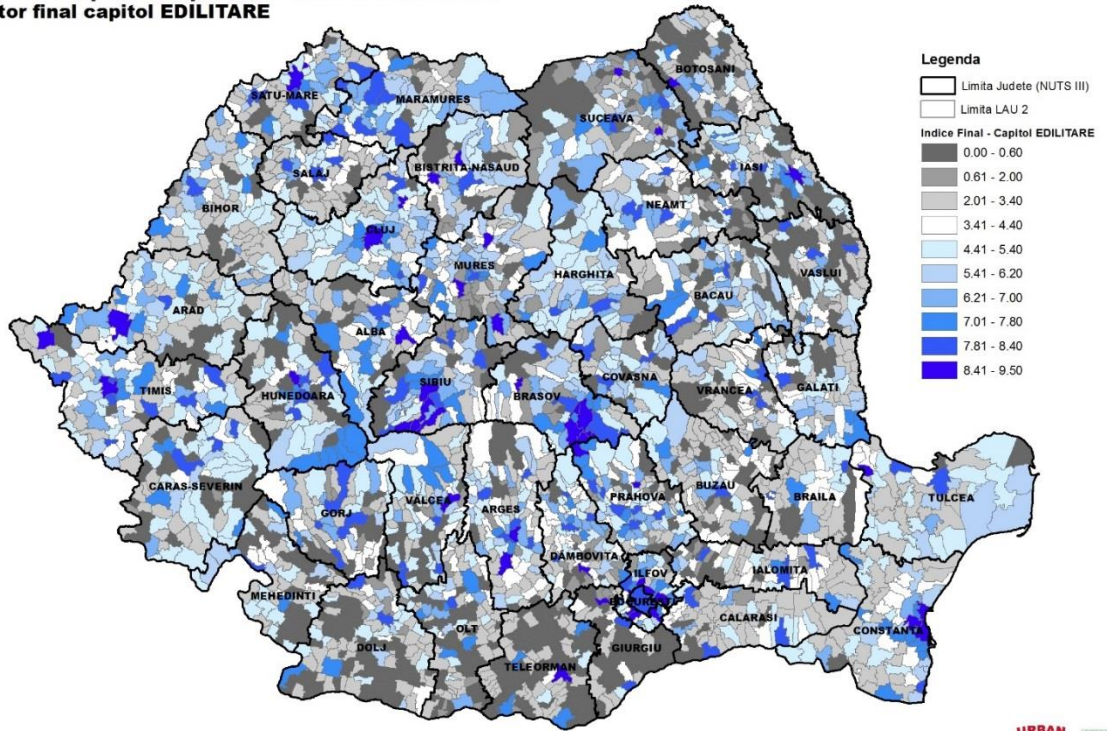
The analyse revealed the areas having high and very high accessibility due to the airports, facilitating the transit of a big number of passengers (the brown and yellow colors). According to the vale of the final transport index, a good accessibility is observed also on other road corridors, such as Bucharest-Constanta, a medium accesibility having the railway corridors.



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Defining the final index for TECHNICAL INFRASTRUCTURE

PROGRAM NUCLEU - Proiect PN 16.10.07.01 - Faza a-III-a: Analiza atractivitatii retelei de localitati urbane si rurale, ca entitati competitive, dinamice si inovative in vederea racordarii la reseaua europeana de poli si coridoare de dezvoltare
Indicator final capitol EDILITARE



0 40 80 120 kilometers

Sursa datelor: Institutul National de Statistica



For the analysis of the TECHNICAL INFRASTRUCTURE chapter, specialists chosed the following weights for the mentioned indicators:

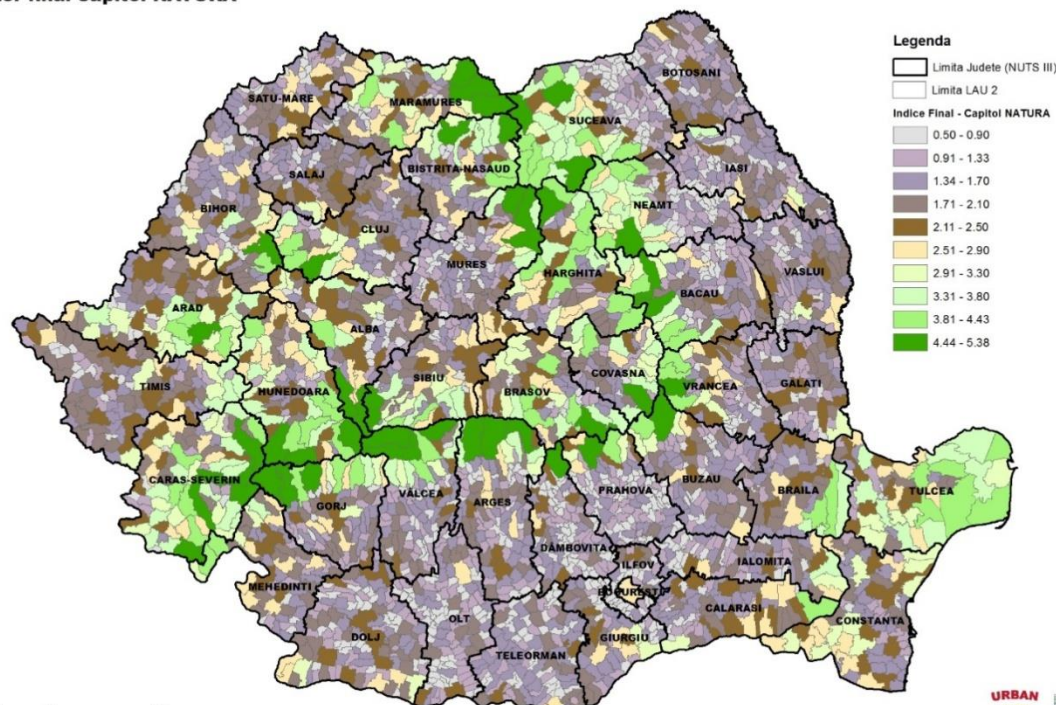
- The ratio between the length of modernized streets and the total length of the streets: 20%
- The quantity of household water: 30%
- The quantity of household gas: 10%
- The length of sewage network: 20%
- The ratio of the new dwellings to the total number of dwellings: 20%

This final index is very important when analysing the Romanian cities: it shows the lack of their technical infrastructure. A very low level of this indicator is found in localities belonging to the counties close to the Danube as well as in the Northern part of Romania (coloured in gray).

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The final index for NATURAL CONDITIONS and ENVIRONMENT

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Indicator final capitol NATURA



Sursa datelor: Institutul National de Statistica



- For the analysis of the NATURAL CONDITIONS chapter, specialists in geography chose the following weights for the mentioned indicators at the LAU level:
- The area of the LAU (2015): 30%
 - Existence of natural or national parks (2015): 15%
 - Existence of a biosphere (2015): 15%
 - Existence of a RAMSAR site (2015): 12%
 - Existence of a SCI or SPA (2015): 8%

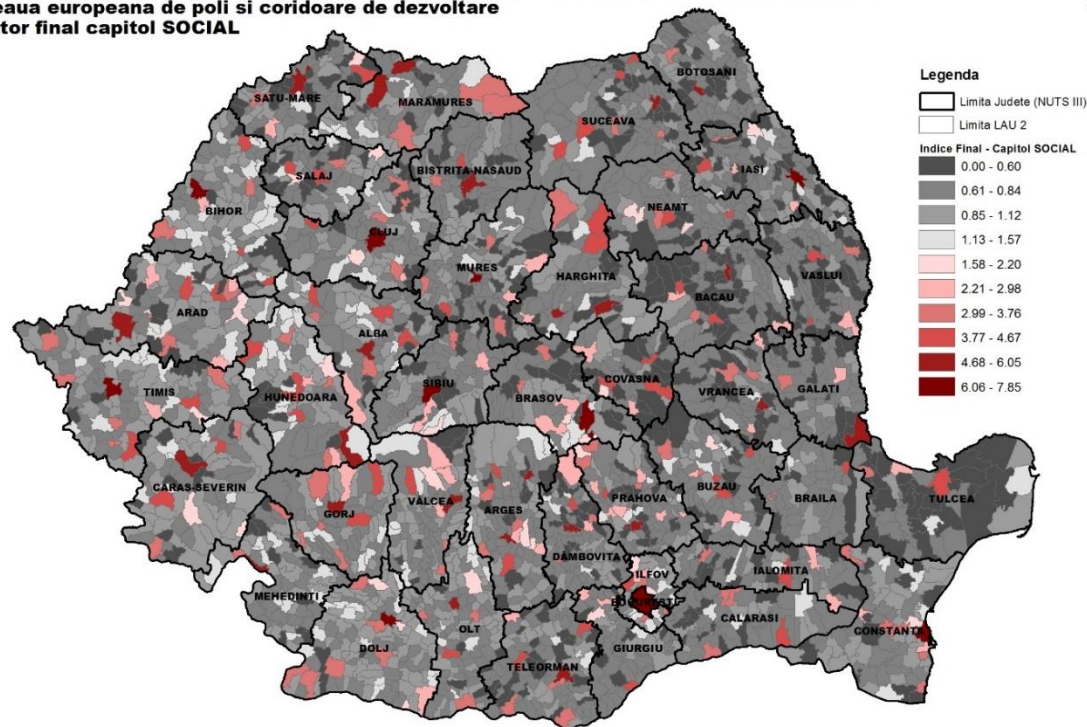
The final index has high values for the Carpathian Mountains, as well as in the Danube Delta (the green color). A low value of this indicator have counties located in the Southern part of the country and also the Eastern counties (the grayscale).



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The final index for SOCIAL chapter

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Indicator final capitol SOCIAL



Sursa datelor: Institutul National de Statistica



For the analysis of the SOCIAL chapter, specialists gave weights between 4% and 10% to all indicators previously mentioned at this chapter. They refer to EDUCATION and HEALTHCARE: the number of kindergartens, schools, lyceums, universities, students, hospital beds, hospitals, doctors.

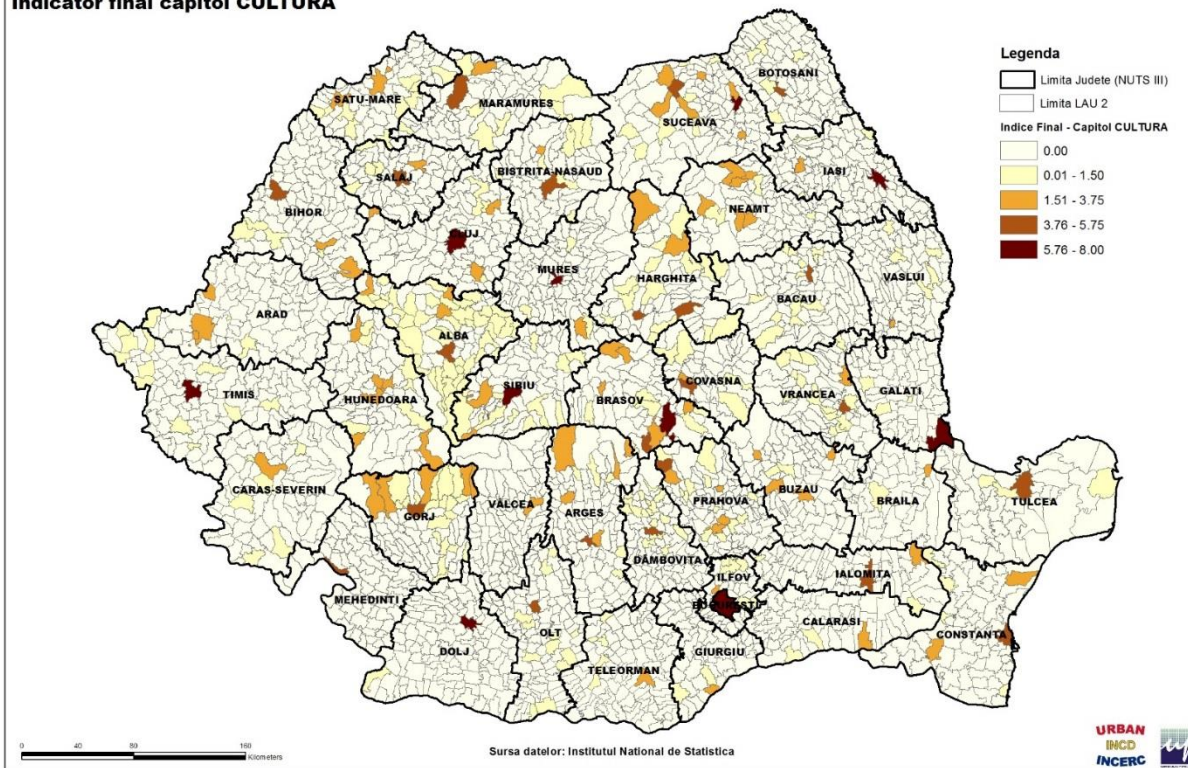
The final index has high and very high values in the big cities, as well as in average or small cities. The worst situation have localities situated in the Eastern part of the country, such as Tulcea, Bacau, Braila but also in the North-Eastern part (Bacau county) and the South-Eastern part (Mehedinti county). There are also 5 localities with a zero value of this indicator.



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The final index for CULTURE chapter

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Indicator final capitol CULTURA



For the analysis of the CULTURE chapter, specialists chose 6 indicators (year 2015), receiving the following weights:

- Number of spectators: 25%
- Number of spectators compared with the number of population: 15%
- The number of museum visitors: 25%
- The number of museum visitor in 2015 compared with their number in 2008: 10%, and
- The number of museum visitors compared with the number of population; 15%.

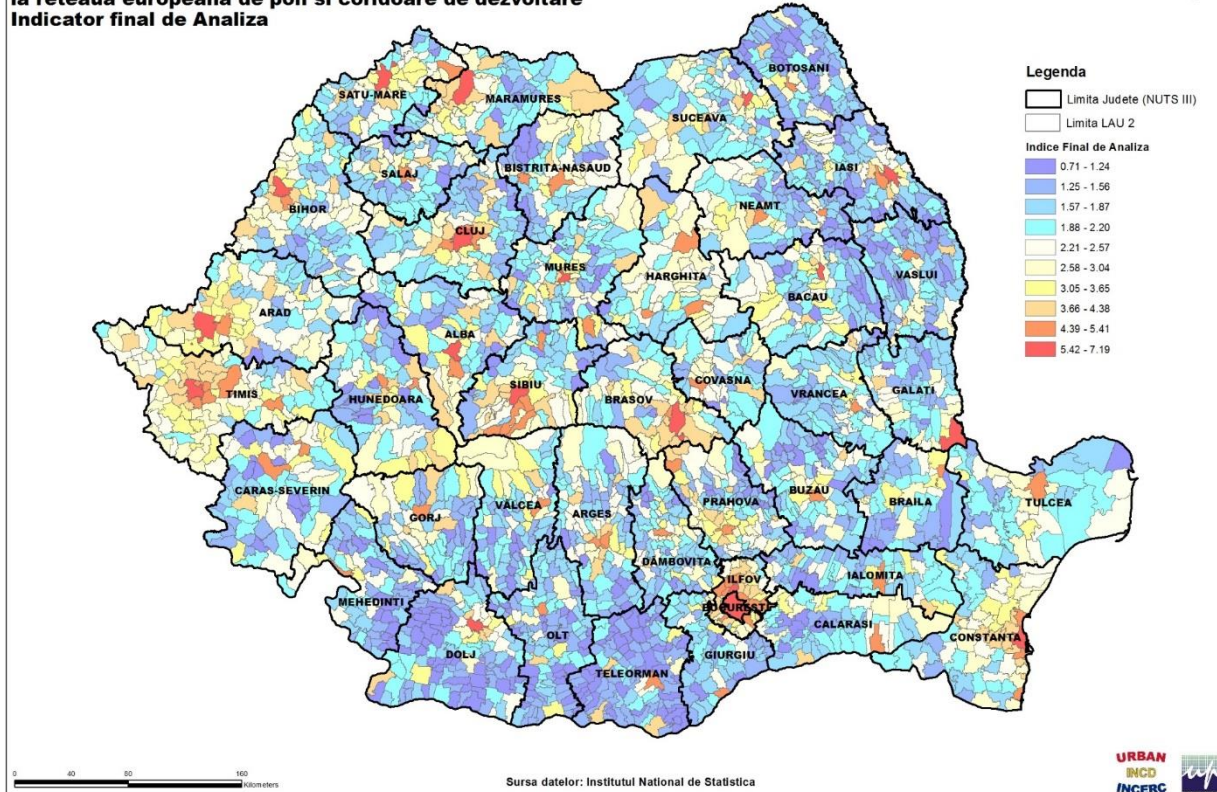
The final index has high and very high values in cities with important cultural traditions, as well as in localities having museums or historical monuments of national importance.



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The final index of territorial analysis, at LAU 2 level

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Indicator final de Analiza



The final index of the administrative-territorial units level was calculated by weighting all indexes previously calculated. The weights were:

- For the Population index: 17%
- For the TRANSPORT index: 17%
- For the ECONOMIC index: 28%
- For the TECHNICAL INFRASTRUCTURE index: 10%
- For the NATURAL CONDITIONS index: 10%
- For the SOCIAL index: 10%
- For the CULTURE index: 8%

The map of the final index at LAU 2 level was obtained using 10 groups, according to the JENCKS Natural breaks classification. (The most attractive and competitive localities are colored in brown and yellow on the map)



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CONCLUSIONS

The strong points of the final map of territorial analysis show the good situation of localities from Transilvania, as well as from the Bucharest-Ilfov region, positively influencing the localities in their vicinity.

- Positive results were obtained in metropolitan areas of Timisoara-Arad and Oradea.
- An attractiveness corridor can be observed in the area Alba Iulia – Sibiu.
- Are outlined the Sibiu and Brasov metropolitan areas, but also Cluj-Napoca and Constanta.
- Regions with low attractiveness were found in localities from the Southern and Eastern part of Romania

From the point of view of economic development, there is a growing gap between areas with development potential and the poorly developed areas. In this context, there is an increased development of the areas close to the big cities with development potential (Bucharest, Timișoara, Arad, Cluj, Oradea, Sibiu, Brașov) and partially the surrounding areas around Constanța, Târgu Mureș, Alba Iulia, Iași, Baia Mare, Satu Mare, Craiova. This gap, which has grown over the past 10 years, is due to foreign investments that have concentrated mainly in Transylvania and Bucharest, and also due to the European funds absorbed especially in these areas.

The use of GIS systems and other technologies in spatial planning is supporting the management of the territory by helping local authorities in their activities to have a clear vision of their locality development, to build new public-private partnerships and to propose new projects of development.

Thank you for your attention!

