Espace et transport : développement d'un SIG pour le calcul d'indicateurs d'accessibilité au niveau européen programme de recherche EUNET

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The aim of the EUNET project is to purpose an operational tool to assess new Trans-European-Network infrastructure projects. The assessment is made of a Multi-Criteria Analysis (MCA) in order to help the decision-making. This multi-criteria analysis is divided in two principal parts : a Cost-Benefits Analysis (CBA) to assess the competitiveness of a new transportation infrastructure project and a set of Accessibility Indicators to evaluate the cohesion and the equity aspects which can not be incorporated in monetary normative valuation (such as in the CBA analysis). An Accessibility Indicators tool try to full the lack of socio-political aims, socio-cultural value structure and social impacts in the decision process.
The aim of Work Package 5 is to build a tool focusing on accessibility which will be one of the pillar of this multi-criteria approach developed by EUNET. In Draft 02 (Chatelus, 1997), theory is focused, the description of the main elements which should be part of an accessibility indicator is largely described, a precise typology or the trips and actors is listed. This Draft consists in operational computations. It fills the choice of the reduced set of indicators mentioned in Draft 09-07-97, and purpose an original tool base on a raster-grid.

The Deliverable D3 proposed a set of 3 indicators needed by Work Package 1 :

1 - The Pointer Indicator :
POINTERi(Tj,Tt) = Sum(POPj*(Tj-2*Tij)) for Tij<=Tt/2
Tj = journey time limit
Tt = travel time limit
i = origin
j = destination
POPj = population reached at destination
Tj-2*Tij = time the businessman dispose of to deal at destination
Tij<(Tj-Tt))2 = duration of the one-way trip (or the back-way trip) under the travel time limit Tt
The Pointer Indicator refers to passenger transport, to time of travelling. It gives also the interest of the destination depending on the population reached and the remaining time.

2 The Equity Indicator :

EQUITYi(Tt) = SUM(POPj*exp(Tij))/SUM(POPj) for Tij<=Tt

Tt = travel time limit

i = origin

j = destination

POPj = population reached at destination

Tij<=Tt = duration of the leisure trip (only the one-way trip) under the travel time limit Tt

The Equity Indicator is weighted with the ICCR index of regional undevelopment (Liana Giorgi, Social Cohesion Weights, August 1998). The for an area Ai, the equity indicator will be :

Ai = SUM(Wi*EQUITYi)

The equity measures the endowment of accessibility of a zone, weighted by its level of underdevelopment.

3 - The Cohesion Indicator :

COHESIONi = POPi*SUM(POPj) for Tij<=Tt

Tt = travel time limit

i = origin

j = destination

POPi = population at origin

POPj = population reached at destination

Tij<=Tt = duration of the leisure trip (only the one-way trip) under the travel time limit Tt

The people cohesion measure the improvement of the potential for interaction between the people.

This set of accessibility indicators refers only to passengers transport. It neglects the good transportation aspects. It mainly deals with long-distance accessibility, and not with local and daily accessibility.

The concept of accessibility developed in the Draft 03 mentioned above refers only to the possibility for one user (Pointer Indicator and Equity Indicator) or for all the users of an area (Cohesion Indicator) to have access to opportunities of trips, allowed by the Trans-European Network. Aggregated indicators will compute the total gain of accessibility brought by a network improvement to the community. As such, the benefits for all users will be aggregated, and this will be part of the CBA approach. These indicators avoid double counting with the results of other Work Packages.

The present paper which represent the second part of Work Package 5 will focus on the tool developed. This tool is a Geographic Information System (GIS). It means the job is a continuous feedback from results to data and programs. We will precise on which way the tool could be improved with other data, the further possibilities and developments to increase preciseness for such a software and how much intermediate graphical results we obtained. The feasibility of indicator computation is very important because of the different cases studies we should achieve.

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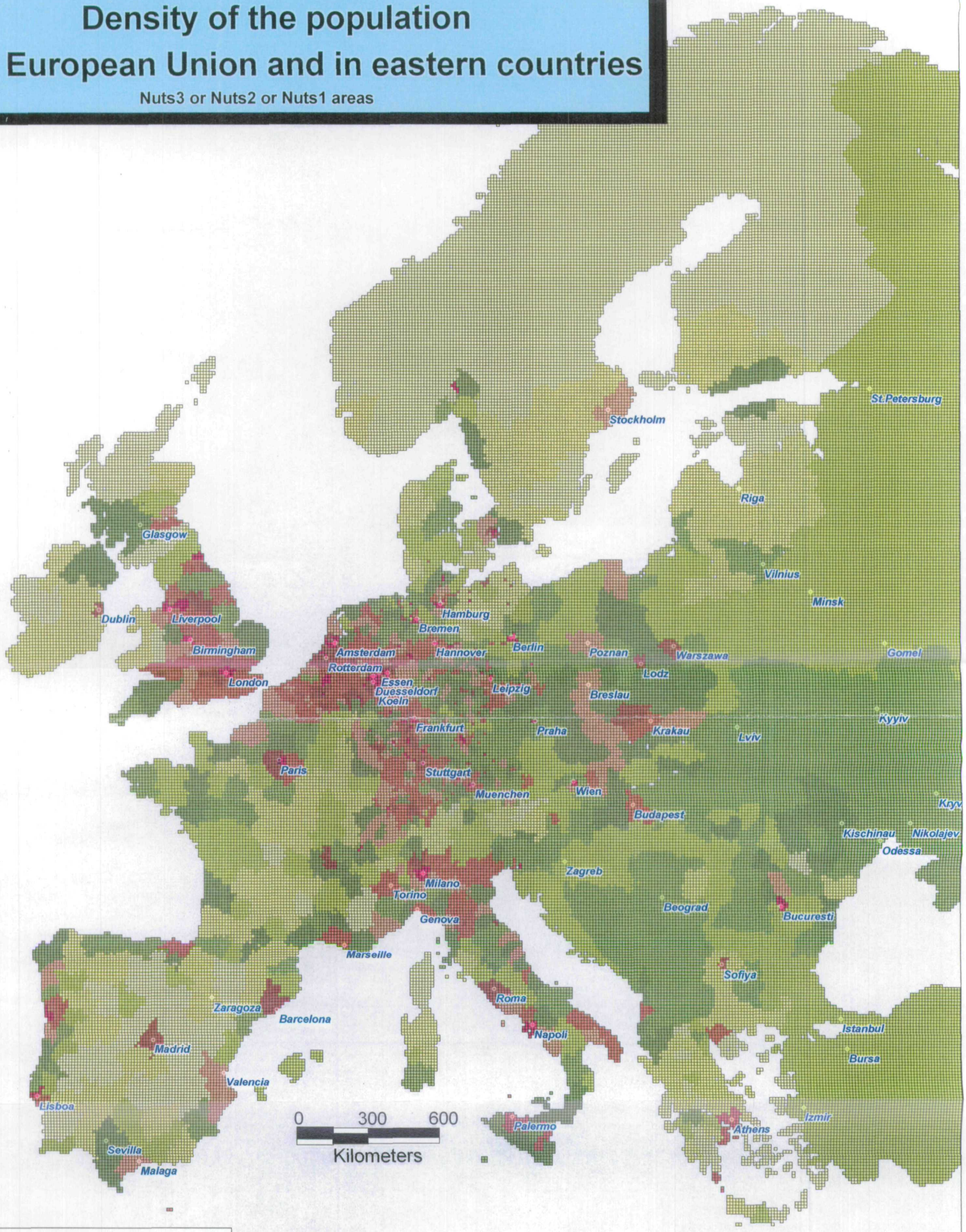
Workpackage 5 : Accessibility indicators

Density of the population in the European Union and in eastern countries

Nuts3 or Nuts2 or Nuts1 areas



Density (Nuts3)

habitants per km² (and number of cells)

10 000 -	22 000	(2)
5 000 -	10 000	(6)
1 000 -	5 000	(285)
500 -	1 000	(897)
200 -	500	(2974)
150 -	200	(2533)
100 -	150	(6557)
75 -	100	(13622)
50 -	75	(50317)
25 -	50	(9720)
0 -	25	(18504)

Sources : (1232 areas)
European Union population : REGIO-EUROSTAT (1993)
eastern countries population :
SCENARIO-IWW (1994), TENTEN-NEA (1995),
L'Etat du Monde 1997, La Découverte (1994)
rastercells : ~10kmx10km (~100km²)

Computed and drawn by :
Jérôme Carreau
INRETS/DEST

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Workpackage 5 : Accessibility indicators

Density of the population in the European Union and in eastern countries

Cities, towns and agglomerations

Density (cities+towns+agglomerations)

habitants per km² (and number of cells)

10 000 -	20 000	(16)
5 000 -	10 000	(51)
1 000 -	5 000	(546)
500 -	1 000	(677)
200 -	500	(608)
150 -	200	(147)
100 -	150	(184)
75 -	100	(112)
50 -	75	(109)
25 -	50	(85)
0 -	25	(244)

Sources : (1443 cities and towns and 537 agglomerations)
Cities and towns : GV100-IRPUD (1993)
Agglomerations : GeoPolis-Moriconi (1990)
rastercells : ~10kmx10km (~100km²)-INRETS/DEST

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