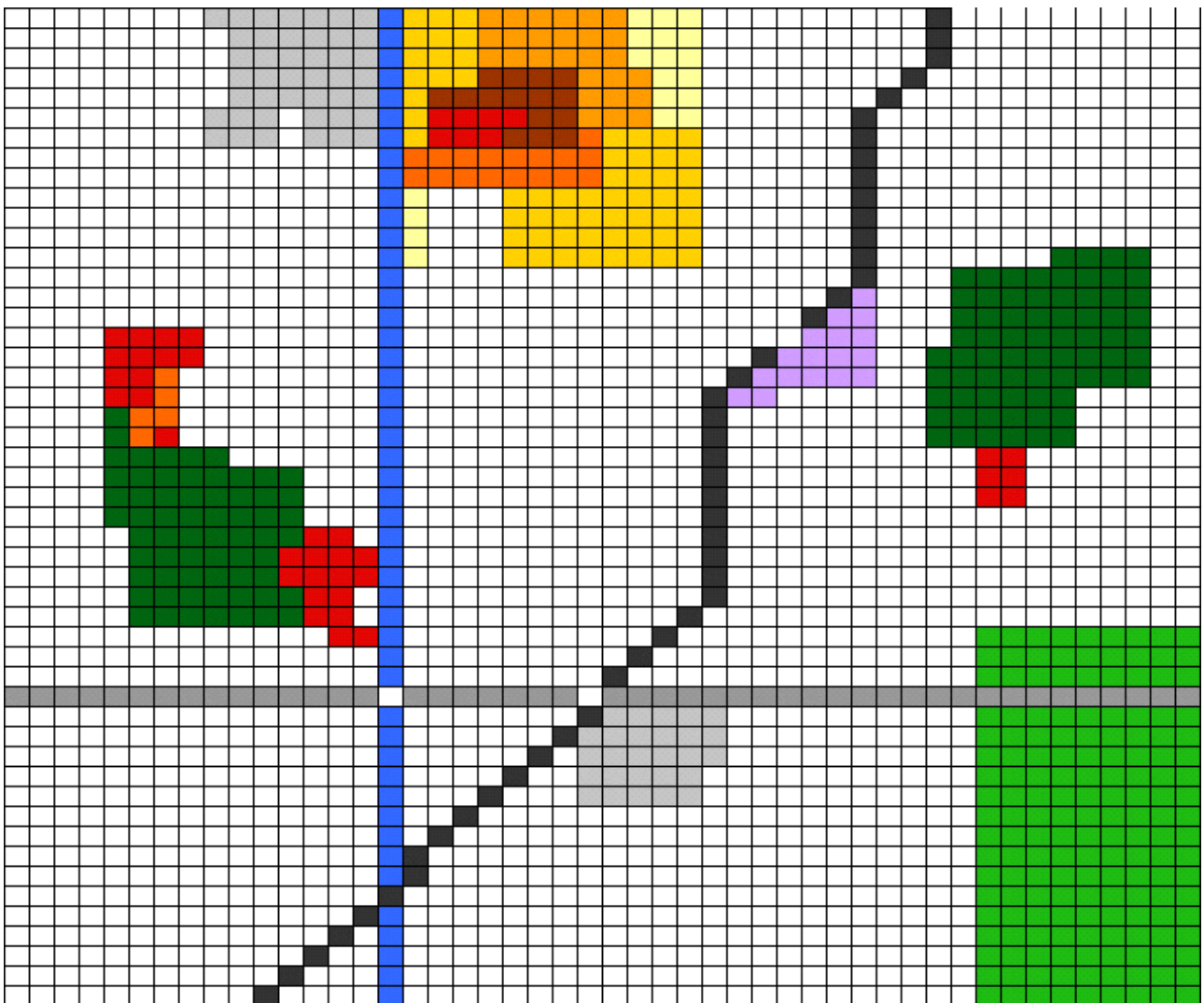


Description of the urban system used for computer simulations

D. Andrey, P. Giordano, A. Vancheri

We considered a small urban system of about 10 km x 10 km. It contains a small main city, some residential zones, two industrial zones, a commercial zone, two agriculture zones, a river, a wood, a motorway and a railway. A more precise description of each zone will follow. Every one of this zones is constructed with data like volume and/or surface of different land uses, urban planning indexes, data about the transport network and so on. Each cell corresponds to a square of 200m x 200m.

Situation map:



For each cell we have a state-vector with the following indications:

- V^R total of built volume for residences
- V^{C1} total of built volume for commerce 1: small commercial surfaces in residential zones
- V^{C2} total of built volume for commerce 2: big surfaces
- V^O total of built volume for offices
- S^A total used surface for agriculture
- S^I total used surface for industry

- vacant residence (in %)
- vacant commerce 1 (in %)
- vacant offices (in%)

- S surface covered by buildings
- Δ surface relating to buildings
- Δ^R surface relating to residential buildings

- S^U total surface used for public purpose as parking, schools, theater, green parks, ...
- S^F total surface of fix land uses as railway, river, motorway, ...

- $I^E = V^{Max} / \Delta$ edification index
- $I^C = S^{Max} / \Delta$ covering index

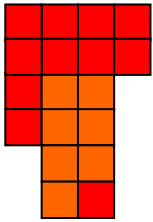
- integration of the cell (an indicator describing the relation of a cell to the transport network)

- distance of a cell from the motorway
- distance of a cell from the motorway junction
- distance of a cell from the railway
- distance of a cell from the river

DETAILED DESCRIPTION OF THE INITIAL CONFIGURATION OF THE URBAN SYSTEM

Residential Zones

Zone 1



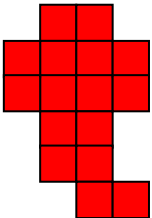
- scattered residential zone (one-family houses)
- some small commerce (small general store, handicraft shop, a garage, ...; 1 shop = 300 m²)
- no offices
- different colors indicate different values of the indexes:

■ Ic = 0,3 Ie = 2,0

■ Ic = 0,4 Ie = 2,45

- the vacant rate of the built volume is 0,5% for the residences and 1% for the commerce

Zone 2

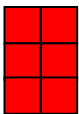


- scattered residential zone (one-family houses)
- some small commerce and handicraft
- some small offices (bank office, post office, ...; 1 office = 100 m²)

• Ic = 0,4 Is = 3,0

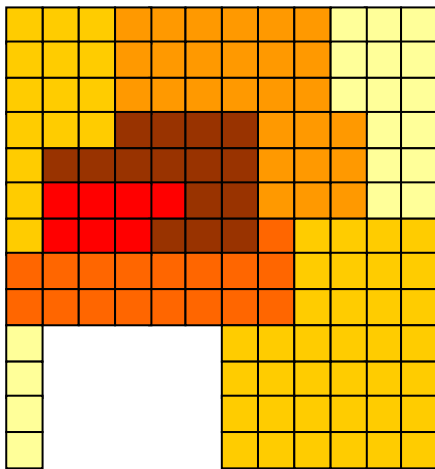
- the vacant rate of the built volume is 0,5% for the residences and 1% for the commerce

Zone 5



- residential zone (houses for peasants family)
- no offices and no commerce
- Ic = 0,3 Ie = 1,5
- the vacant rate of the built resident volume is 0,5%

Zone 6: Small city



- Second extensive residential zone
 - $I_c = 0,3$ $I_e = 6,0$
 - the vacant rate of the built resident volume is 1%, for the built office volume 12%

- First extensive residential zone
 - $I_c = 0,4$ $I_e = 19,2$
 - the vacant rate of the built resident volume is 1%, for the built office volume 12%

- Second intensive residential zone
 - $I_c = 0,45$ $I_e = 8,9$
 - the vacant rate of the built resident volume is 1%, for the built office volume 10%

- First intensive residential zone
 - $I_c = 0,4$ $I_e = 9,7$
 - the vacant rate of the built resident volume is 1%, for the built office volume 10%

- Centre 2 (outer belt)
 - $I_c = 0,6$ $I_e = 8,7$
 - the vacant rate of the built resident volume is 1%, for the built volume 8%

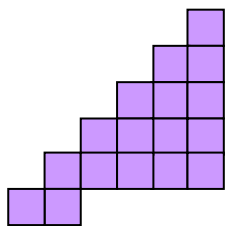
- Centre 1
 - $I_c = 0,8$ $I_e = 11,0$
 - the vacant rate of the built resident volume is 1%, for the built office volume 8%

Further in this small city we have the following land uses which are considered fix:

- 5 parks, each of 500 m²
- 1 park of 10'000 m²
- 6 schools, each of 5'500 m²
- an opera house 6'400 m²
- a theatre 6'400 m²
- 2 sport areas, each of 5'000 m²
- a big sport area 111'000 m²
- a hospital with parking 21'600 m²
- a town hall with a square 4'000 m²

In this small city there are no churches and no cemetery.

Commercial Zone



In this zone we settle the big commercial surfaces.

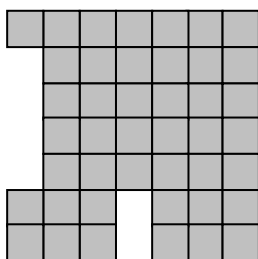
The building indexes considered are

Ic = from 0,55 to 0,7

Ie = from 5,5 to 10,5

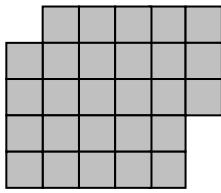
Industrial Zones

Zone 3



Older industrial zone: This industrial zone is situated opposite to the small city (outside), it touches the river which is enough wide to be used for industrial purposes.

Zone 4



Noisy industrial zone: this zone is situated far away from every residential zone, but near to the railway and to one of the motorway junctions.

In both cases there is enough land around the zone which can be used for development.

The indexes for both industrial zone varies

I_c = from 0,4 to 0,8

I_e = from 2 to 4

Agriculture



We consider a cluster of cells used for agriculture. The used surface pro cell varies from 10'000 m² to 40'000 m²

Other Zones (fix land uses)



• **river:** the river has a width of 150m near the industrial zone (the river is navigable), otherwise it is 120 m wide. The residual surface of the cells crossed by the river is considered as equipped-green park and is therefore to be considered fixed.



• **wood:** every cell in this zone contains 40'000 m² of wood.



• **motorway:** a motorway (4 lanes = ca. 18 m of width) crosses from right to left the urban system. The motorway passes near the bigger residential zone (small city) and one of its junctions is near the commercial zone.



• **railway:** the railway crosses horizontally the urban system far away (about 3 km) from the centre of the bigger residential zone (there is no direct connection between the smaller city and the railway), it touches one side of the „noisy“ industrial zone.

• **roads:** we indicated a system of roads (the main roads) only by their course (1) and their crossings (0) as shown in the figure below.

