INTERNATIONAL URBAN DEVELOPMENT WORKSHOP

WEDNESDAY 9 APRIL and THURSDAY 10 APRIL 2008
Pretoria, South Africa

"International Comparisons: Spatial Development and Poverty.“

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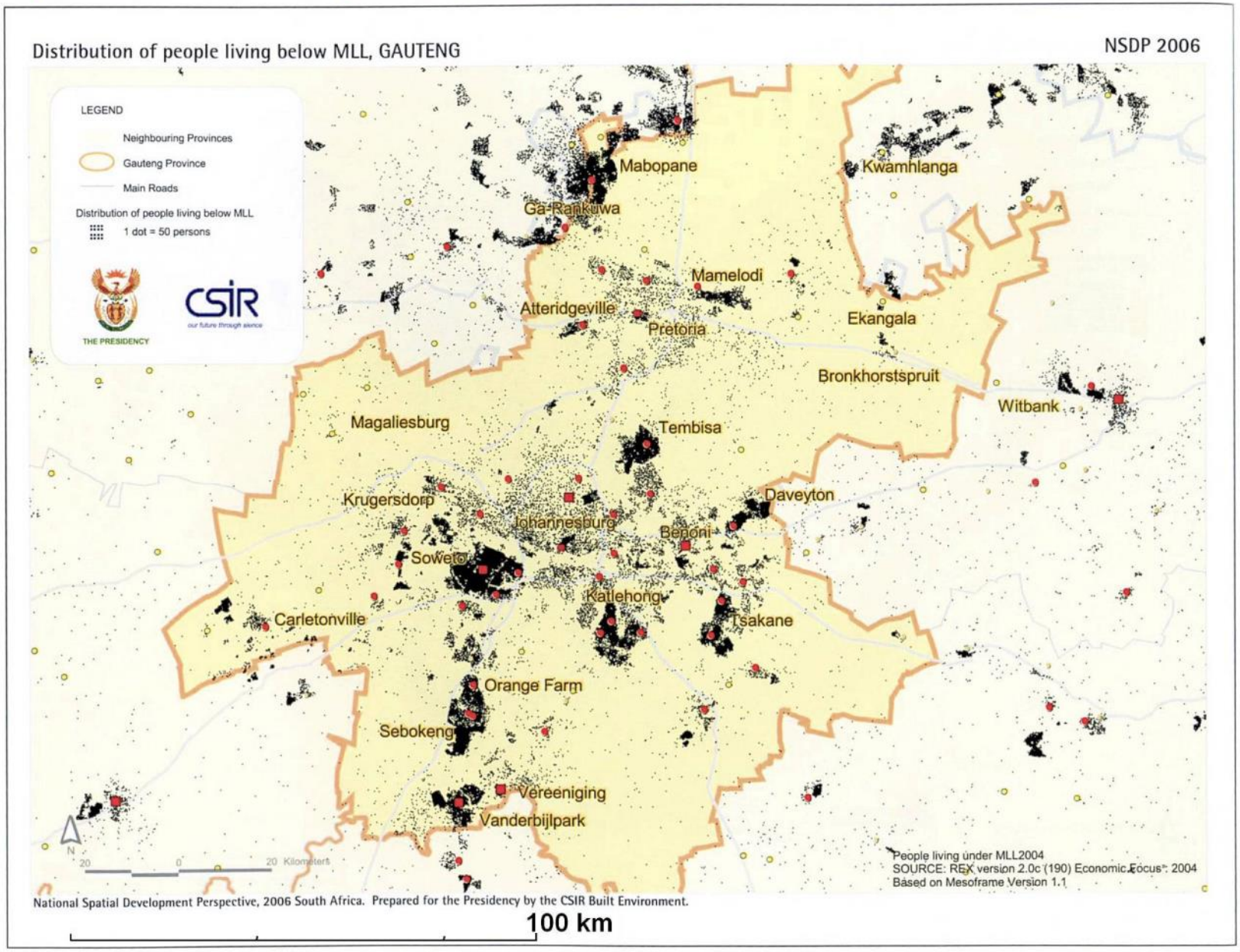
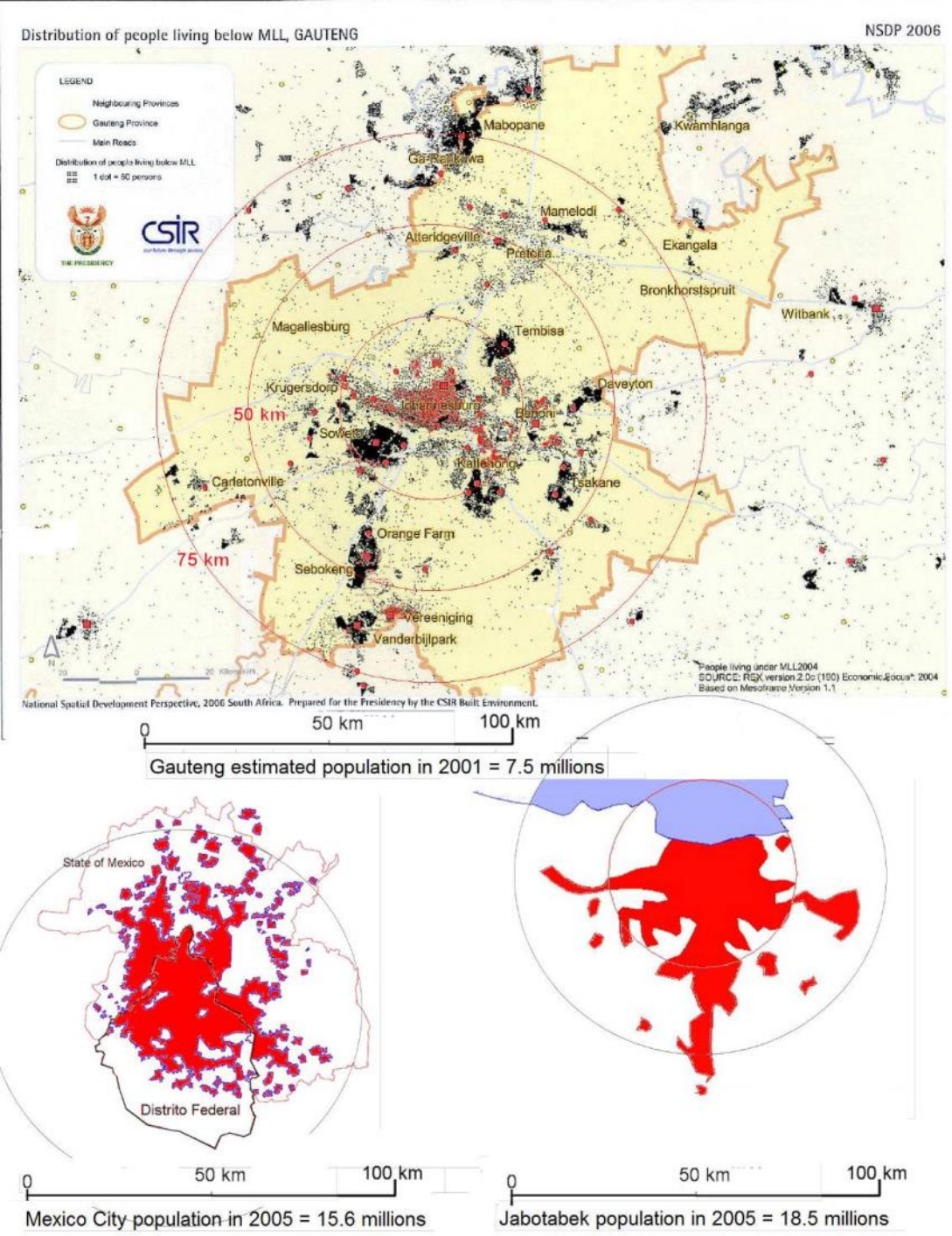
Additional papers can be downloaded from:
http://alain-bertaud.com

The spatial distribution of households living below the poverty level in Gauteng

Map iv: Distribution of economic growth and poverty in the Gauteng province





The extreme spatial dispersion of the poor in Gauteng: Gauteng (7.5 million people in 2001) compared to the built-up area of Mexico city (15.6 million) and Jakarta (18.5 million) represented at the same scale.

Does a city spatial structure matters for the poor?

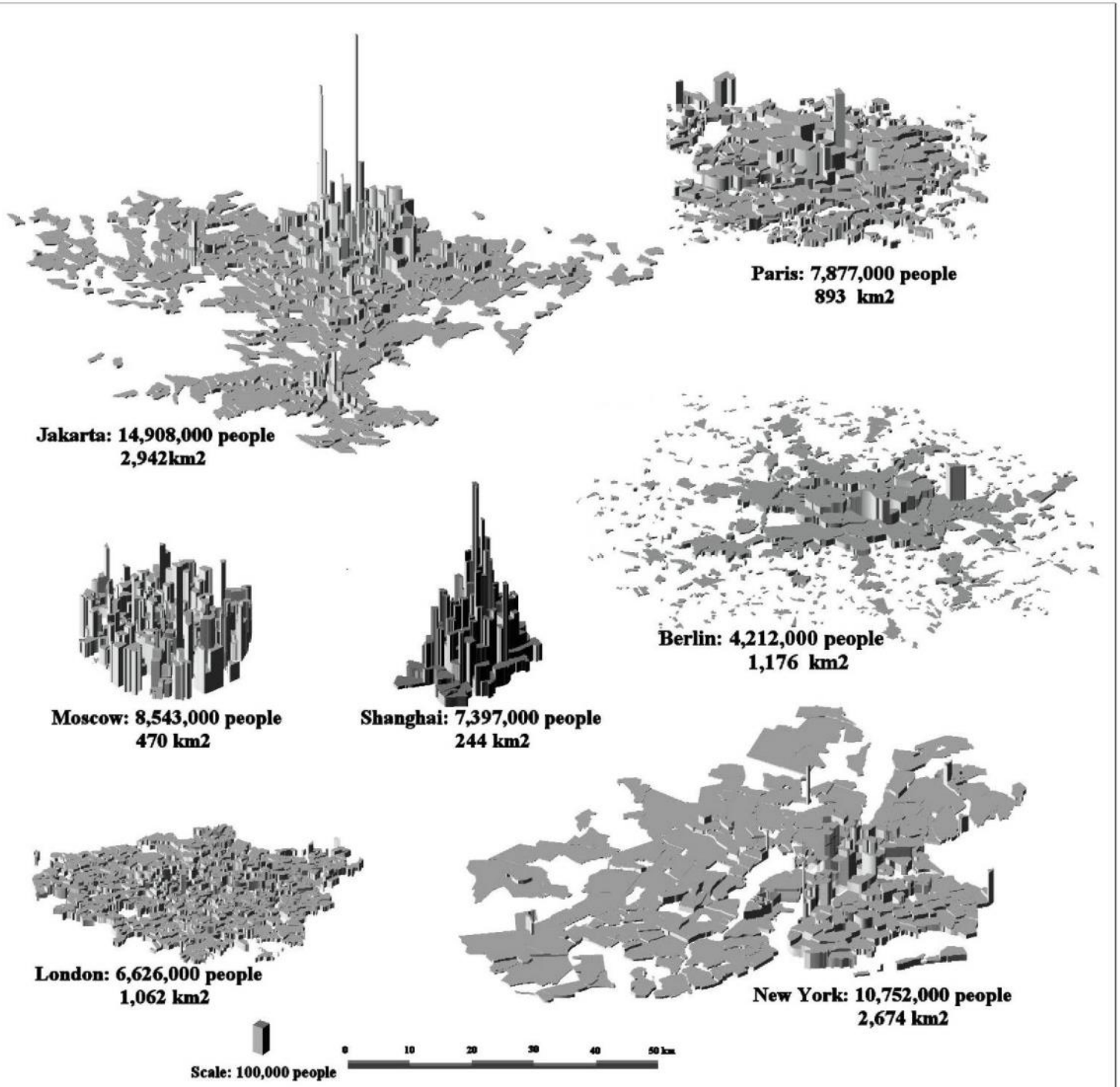
- Large labor markets are the raison d'être of large cities
- Large labor markets provide economic opportunities for both employees and employers
- This is why the poor migrate toward very large cities in spite of their higher cost of living and their poor environmental conditions
- When the poor are spatially dispersed they cannot fully participate in the labor market;
- Spatial dispersion decreases the economic opportunity of the poor and reduces the economic efficiency of the entire city.

The functioning of labor markets is dependent on a city spatial structure

- A labor market is efficient when it is integrated, when it is fragmented it looses its efficiency.
- Integration of labor markets requires that all jobs be potentially physically accessible to all adults within a reasonable commuting time (say, 1 hour one way) and at a reasonable cost (say, below 8% of income)
- A deficient city spatial structure fragments labor markets, and contributes to a high unemployment rate for the poor.

How do we define a city spatial structure and how do we know when it is deficient?

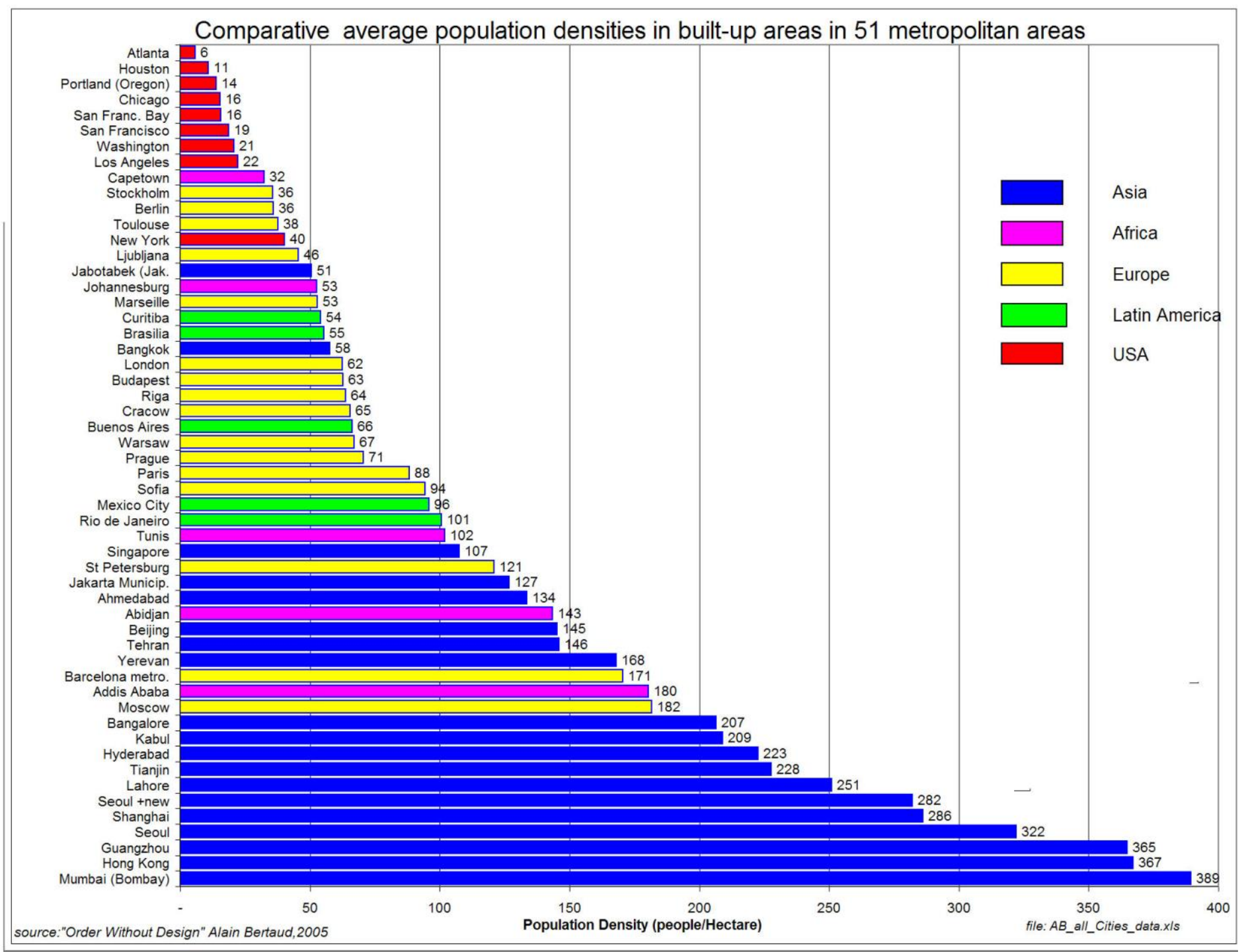
- A city structure is defined by:
  - The average density (consumption of land per person)
  - the spatial distribution of densities and population
  - The pattern of daily trips
- It is deficient when:
  - Commuting distances for a significant part of the population are too long to be travelled within a reasonable travel time or/and at a reasonable cost
  - The spatial distribution of population and the pattern of trips are incompatible with the main mode of transport affordable to the poor



3D representation of the spatial distribution of population in 7 metropolis represented at the same scale

Defining a city spatial structure: Average population density in the built-up area

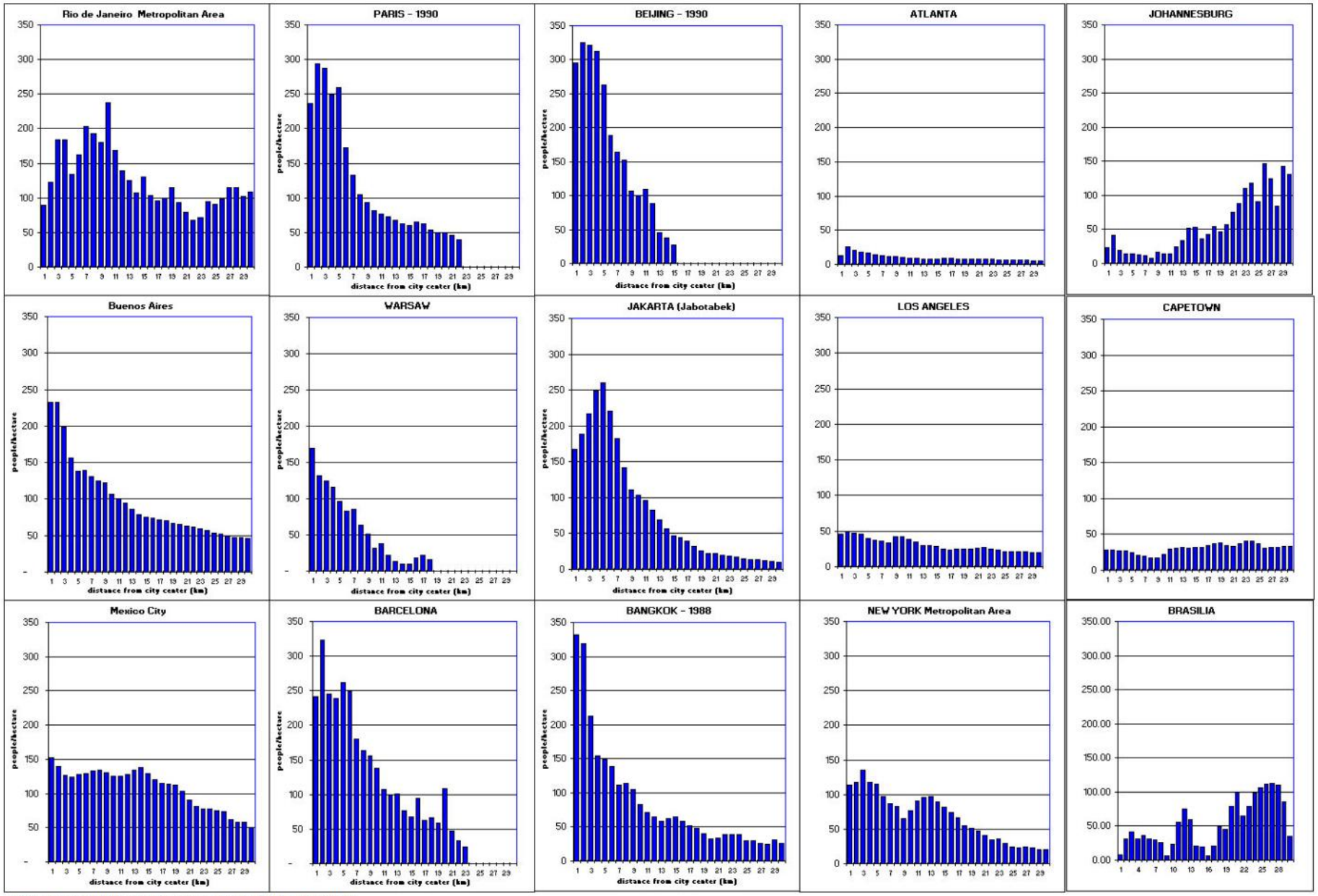
- The population density of a city is an indicator of land consumption. The lower the density, the larger is the city built-up area, the longer is the commuting distance;
- There are no “optimum” densities, but low densities are incompatible with transit, and high densities are incompatible with private cars as a main mean of transport.


Comparative average population densities in built-up areas in 51 metropolitan areas
Atlanta 6
Houston 11
Portland (Oregon) 14
Chicago 16
San Franc. Bay 16
San Francisco 19
Washington 21
Los Angeles 22
Capetown 32
Stockholm 36
Berlin 36
Toulouse 38
New York 40
Ljubljana 46
Jabotabek (Jak. 51
Johannesburg 53
Marseille 53
Curitiba 54
Brasilia 55
Bangkok 58
London 62
Budapest 63
Riga 64
Cracow 65
Buenos Aires 66
Warsaw 67
Prague 71
Paris 88
Sofia 94
Mexico City 96
Rio de Janeiro 101
Tunis 102
Singapore 107
St Petersburg 121
Jakarta Municip. 127
Ahmedabad 134
Abidjan 143
Beijing 145
Tehran 146
Yerevan 168
Barcelona metro. 171
Addis Ababa 180
Moscow 182
Bangalore 207
Kabul 209
Hyderabad 223
Tianjin 228
Lahore 251
Seoul +new 282
Shanghai 286
Seoul 322
Guangzhou 365
Hong Kong 367
Mumbai (Bombay) 389
Asia
Africa
Europe
Latin America
USA
- 50 100 150 200 250 300 350 400
Population Density (people/Hectare)
source:"Order Without Design" Alain Bertaud,2005
file: AB_all_Cities_data.xls

Defining a city spatial structure: the distribution of densities

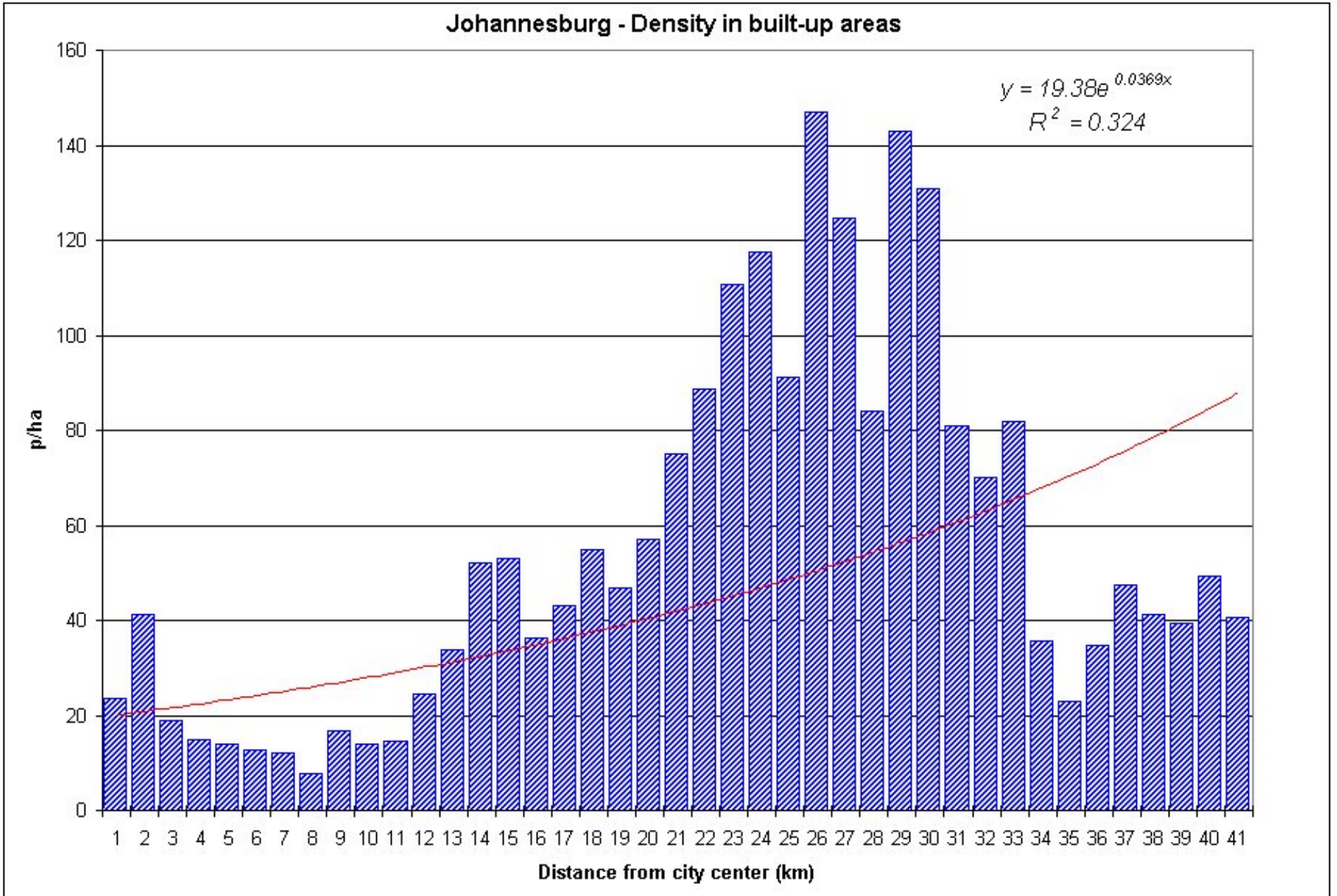
- The way densities are distributed within a metropolitan area is an important factor in determining trip length, and therefore the efficiency of the transport system
- In the great majority of cities densities decrease sharply form the center toward the periphery
- The pattern of densities in most cities is self generated by market forces
- In a few cities of the world (Johannesburg, Brasilia and Moscow, for instance) the density pattern is reversed, it increases with distance from the center.
- The pattern of densities in Johannesburg, Brasilia and Moscow increases the travel distance compared to cities with the same average densities but with a “classical” density gradient decreasing from the center to th periphery

COMPARATIVE POPULATION DENSITIES IN THE BUILT-UP AREAS OF SELECTED METROPOLITAN AREAS (1990)

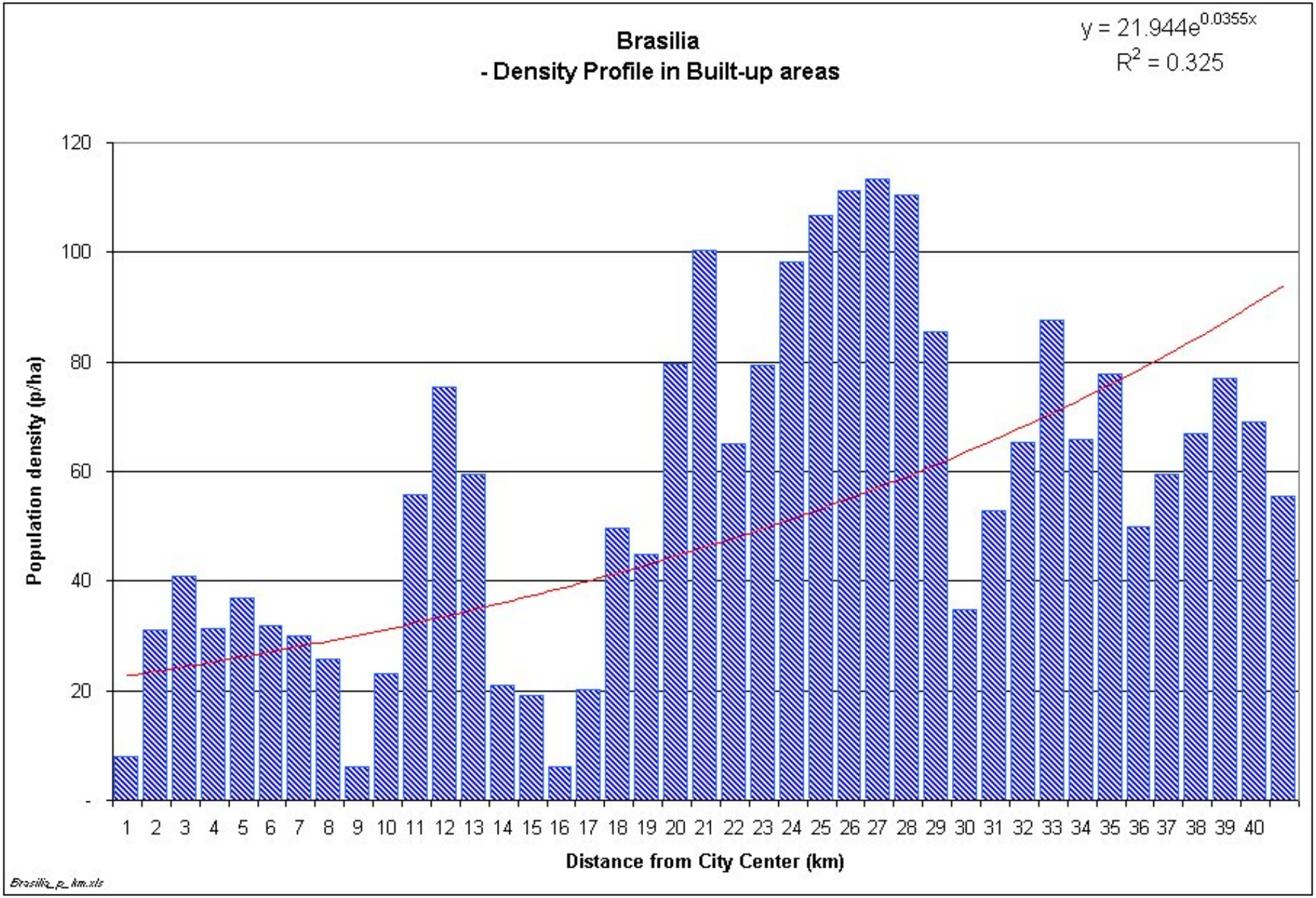


from "Order Without Design", Alain Bertaud, 2002

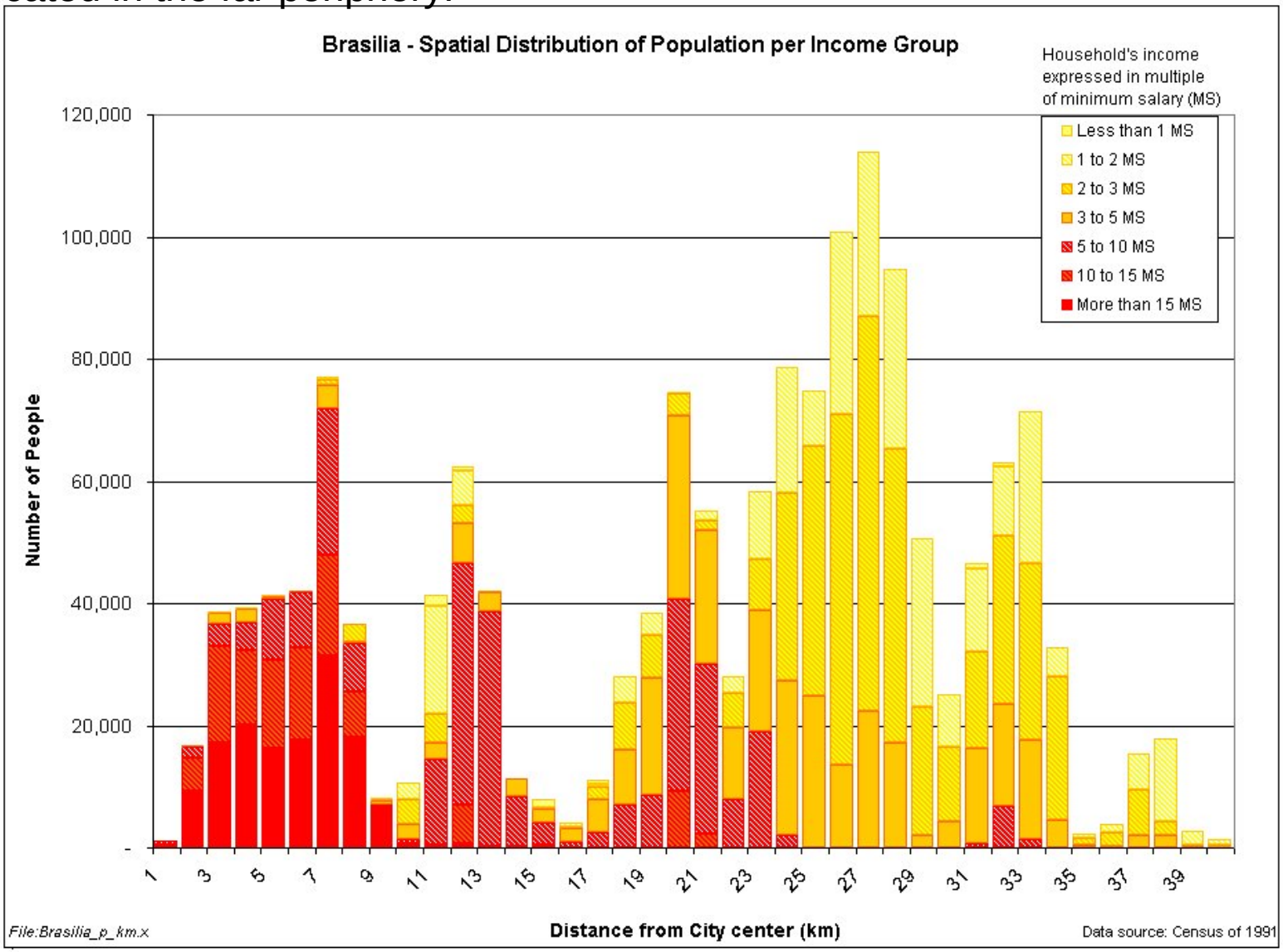
Johannesburg density profile as measured in 1993;
The current population density profile might be even worse in 2008.



Brasilia density distribution is similar to Johannesburg

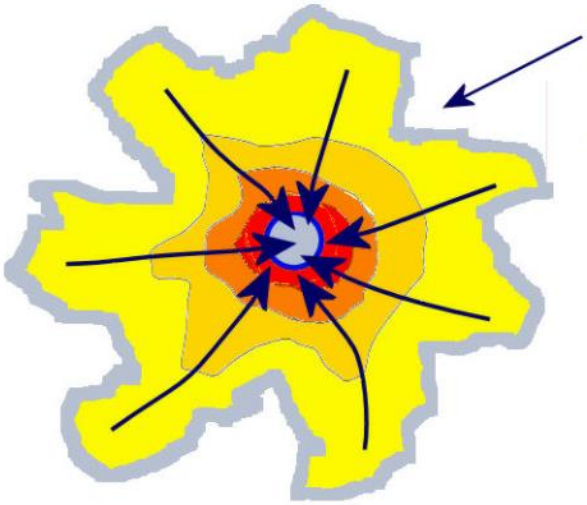


The geographical isolation of the poor, shown on this graph, is a cause of high unemployment. This deficient spatial structure was entirely created by Government's low income housing programs that removed slums located close to the center and moved their population into formal subsidized housing projects located in the far periphery.



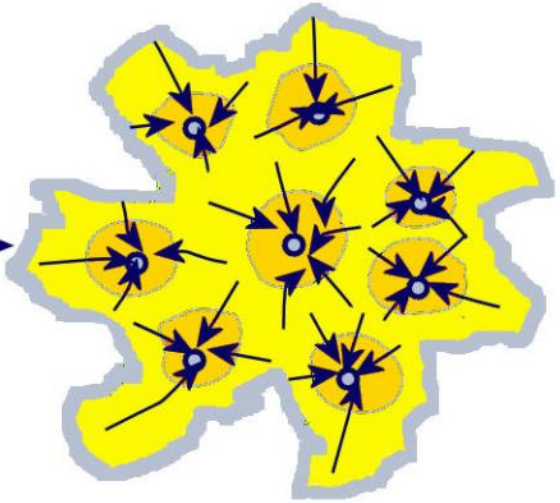
Defining spatial structure: the pattern of trips

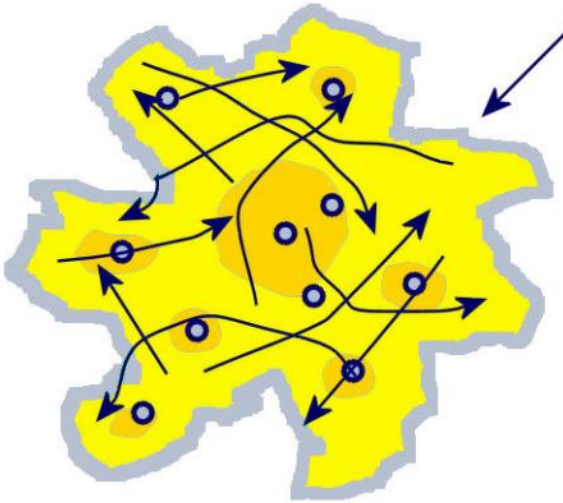
THE MOST COMMON URBAN SPATIAL STRUCTURES



The Classical Monocentric Model,
- strong high density center with high concentration of jobs and amenities
- radial movements of people from periphery toward center

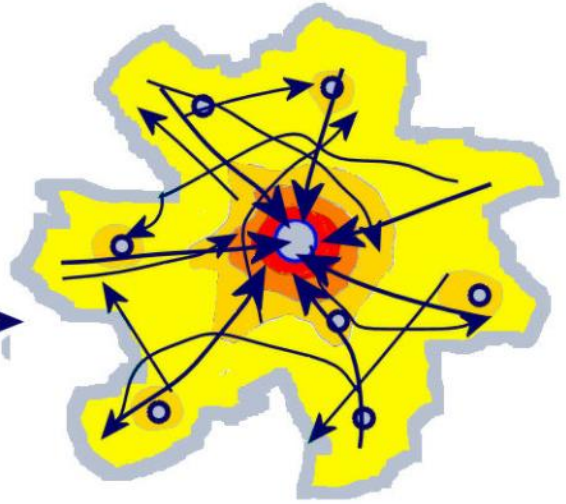
The "Urban Village" Model
- people live next to their place of employment
- people can walk or bicycle to work
- this model exists only in the mind of planners, it is never encountered in real life





The Polycentric Model
- No dominant center , some subcenters
- Jobs and amenities distributed in a near uniform manner across the buil-up area
- Random movement of people across the urban area

The Composite Model
- A dominant center , some subcenters
- Simulateneous radial and random movement of people across the urban area

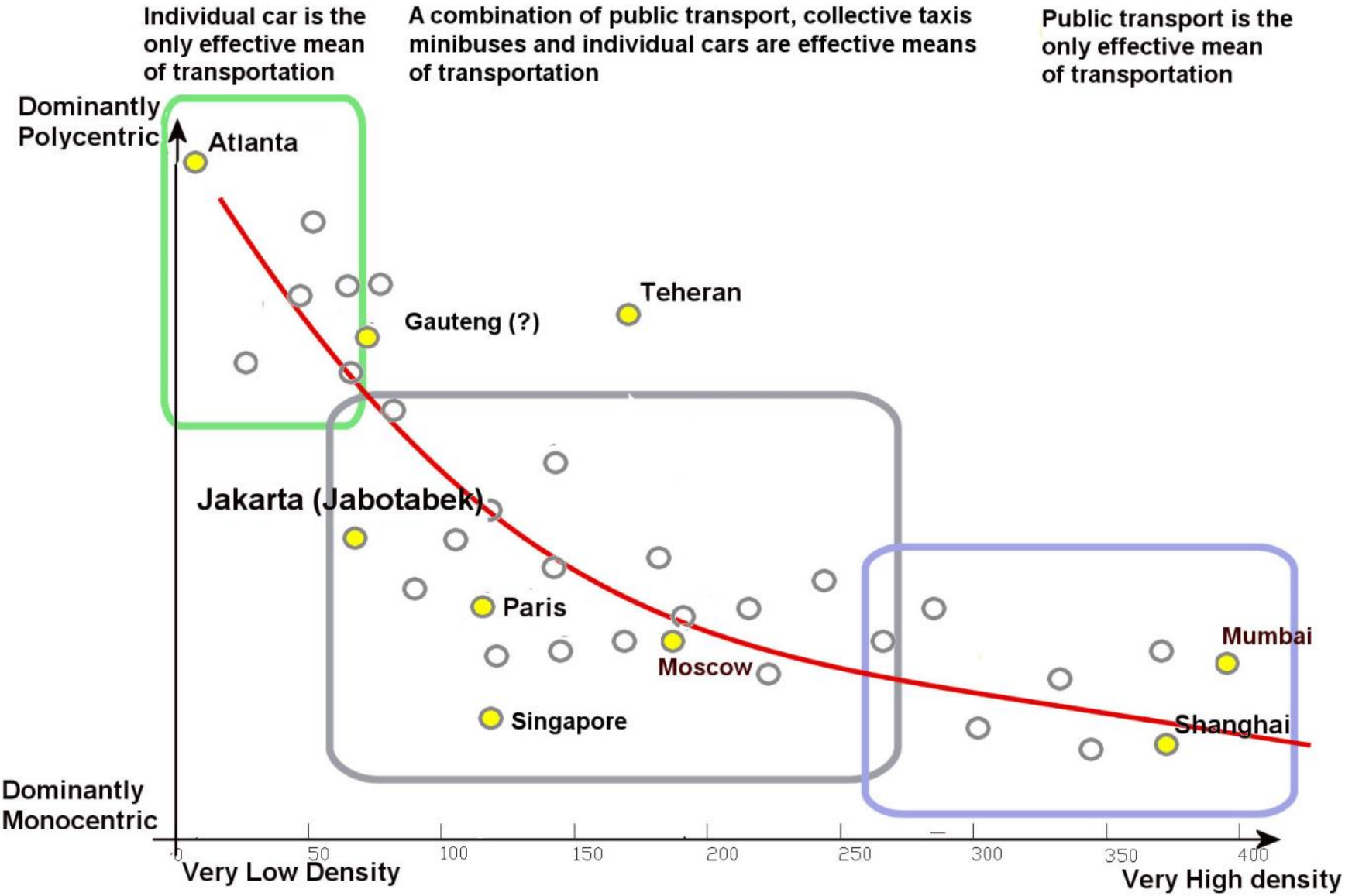


"Order Whithout Design" Bertaud 2006 (unpublished)

Transport efficiency and city shape

- The distribution of densities and the pattern of trips determine the viability of different forms of transport
- Mass transit is difficult to operate at low densities (below 30 p/ha)
- Dominantly polycentric cities with low densities are incompatible with mass transit;
- Gauteng has a relatively low density and is becoming increasingly polycentric; if this trend continue, mass transit (BRT and metro) will be difficult to operate efficiently.

Relationship Between Spatial Structure and the Effectiveness of Public Transport



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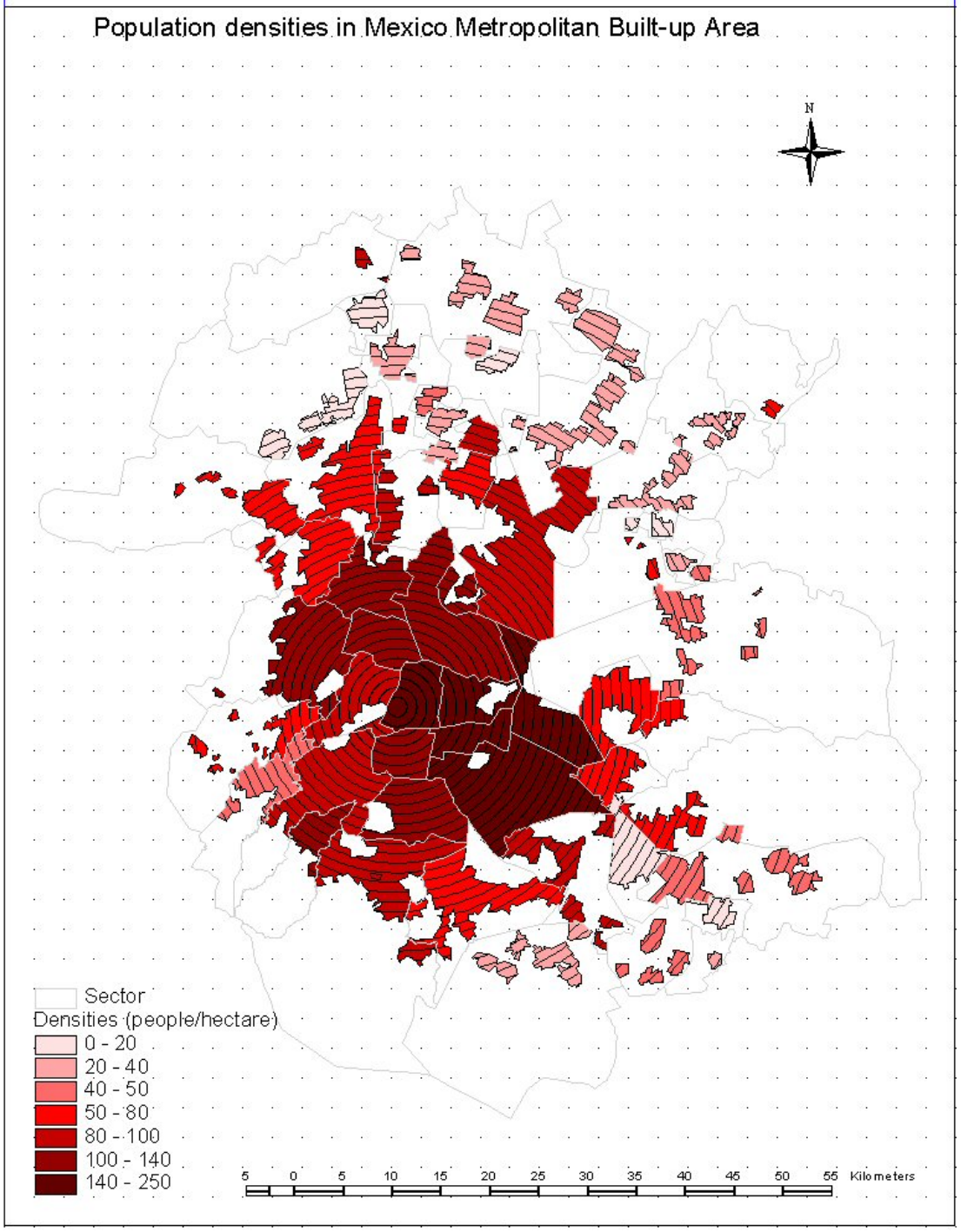
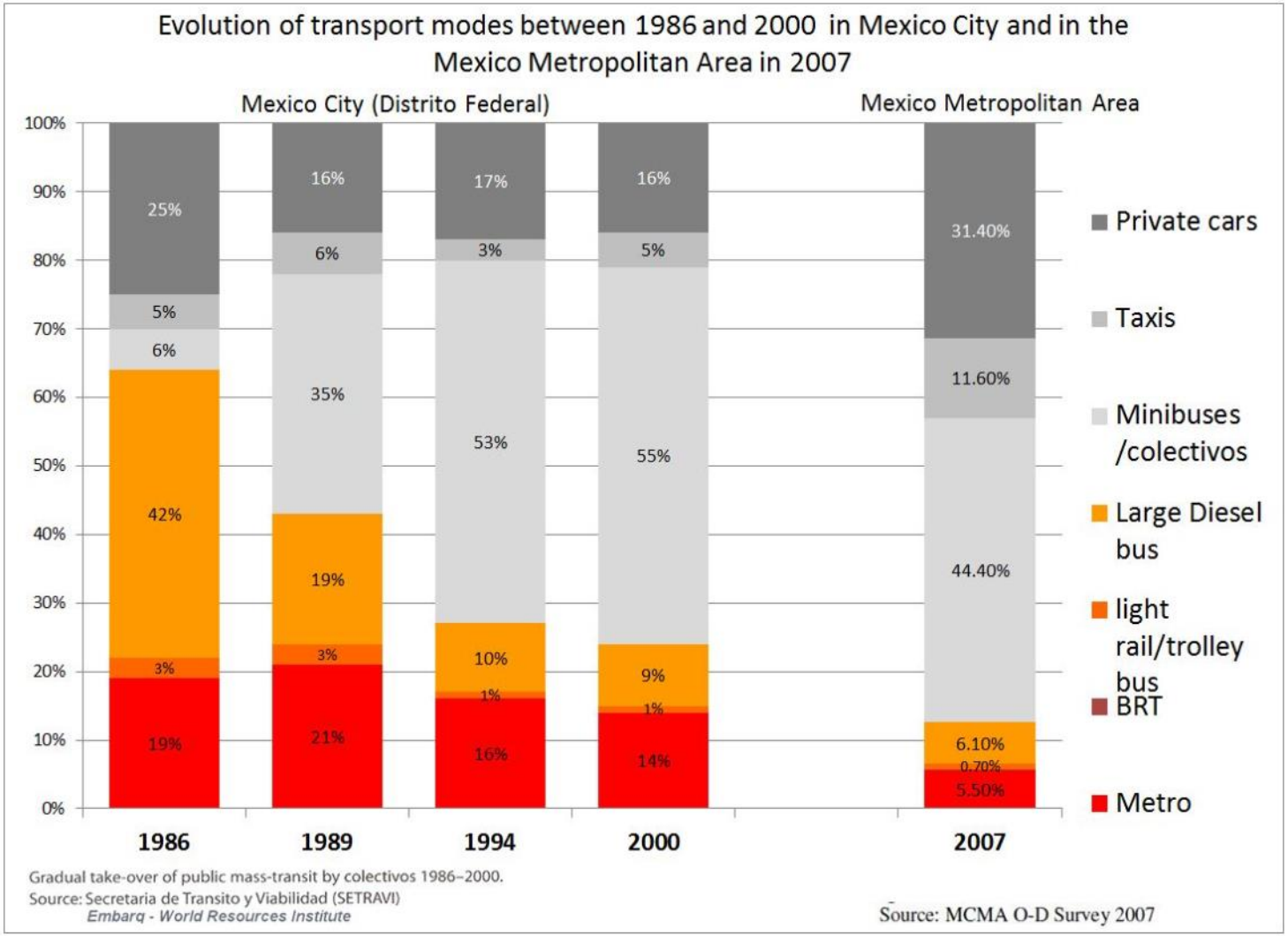


The density pattern of Mexico City is compatible with mass transit, however the progressive decentralization of employment centers and the fragmentation of settlements in the Northern and Eastern parts of the city have decreased the share of transit trips and increased the role of minibuses and collective taxis.

Mexico city average built-up density (2000) = 96p/ha
population: 15.6 million

In Mexico city, the progressive decentralization of jobs and their dispersion in the suburbs have decreased the share of mass transit trips, in spite of a density much above the one required for an efficient transit operation. Minibuses, less rapid and more expensive than mass transit, has become the dominant form of transport, reflecting the progressive change in city structure



Settlements pattern, economic activities and mass transit

- Residential settlements in Gauteng are less dense, have higher standards of roads and open space and have less mixed land use than residential settlements in other cities of comparative income and size.
- Backyard shacks are demand driven and contribute to increase densities in a positive way
- The fragmentation of residential areas and the dispersion of employment centers, if it continues, will make the operation of mass transit and BRTs expensive to operate and not very convenient to the users

Informal settlements north of Mexico city in the process of consolidation

Mexico city, consolidated informal areas northern part of the city, mix of incomes and activities

Jakarta’s Kompongs: high density, mix of income and activities created by a buoyant informal real estate market. Road infrastructure is of a much lower standard than in Gauteng, but the mix of economic activities is more favorable to the poor

Alexandra: the very low standard housing filling the vacant space within the older formal housing is a typical example of demand driven informal housing.

An informal settlement in Johannesburg where households made a trade-off between low standards and location

Gauteng: Sebokeng

- Physical isolation and the pattern of streets make Sebokeng difficult to serve with a mass transit system that would be convenient to the user and financially viable for the transit operator.
- A BRT station in the middle of Sebokeng could generate a potential for economic activities and new jobs

Gauteng: Sebokeng

Sebokeng sample density

Total area	17.51	ha
formal stands and houses	431	units
people per formal house	5	people
Total population	2,155	people
Design density	**123**	**p/ha**

Back yard shacks	0.8	per stand
Total backyard shacks	345	units
People per backyard shack	3	people
people in backyard shacks	1,034	people
Total real density	**182**	**p/ha**

If the spatial structure of most South African cities is deficient, what can we do about it?

- Cities structure are very resilient, they can be changed only very slowly
- Land use regulations, infrastructure investments, subsidies and taxation are the main tool that planners could use to influence cities' structure in the long run
- Planners should insure the consistency of purpose between these four tools if they want to have an impact on South African cities' structures
- In South Africa current large low income housing programs may have a significant negative impact on the future structure of cities

Low cost housing and city structure

- In many countries where the government or NGOs are involved in providing subsidized low cost housing, poor households are often pushed at the city periphery at relatively high densities (Brasilia, for example)
- Low cost housing providers often seem to prefer to provide higher infrastructure standards and larger stands in distant location where land is cheap, rather than smaller lots and lower standards in smaller sites closer to the jobs' center of gravity.
- Poor households on their own seems to often prefer lower standards closer to employment centers.
- The only way to remedy to the distortion in city shape caused by large subsidized housing program is to make subsidies "portable" and to let low income households make the trade-off they want between land use standards, transport costs and location

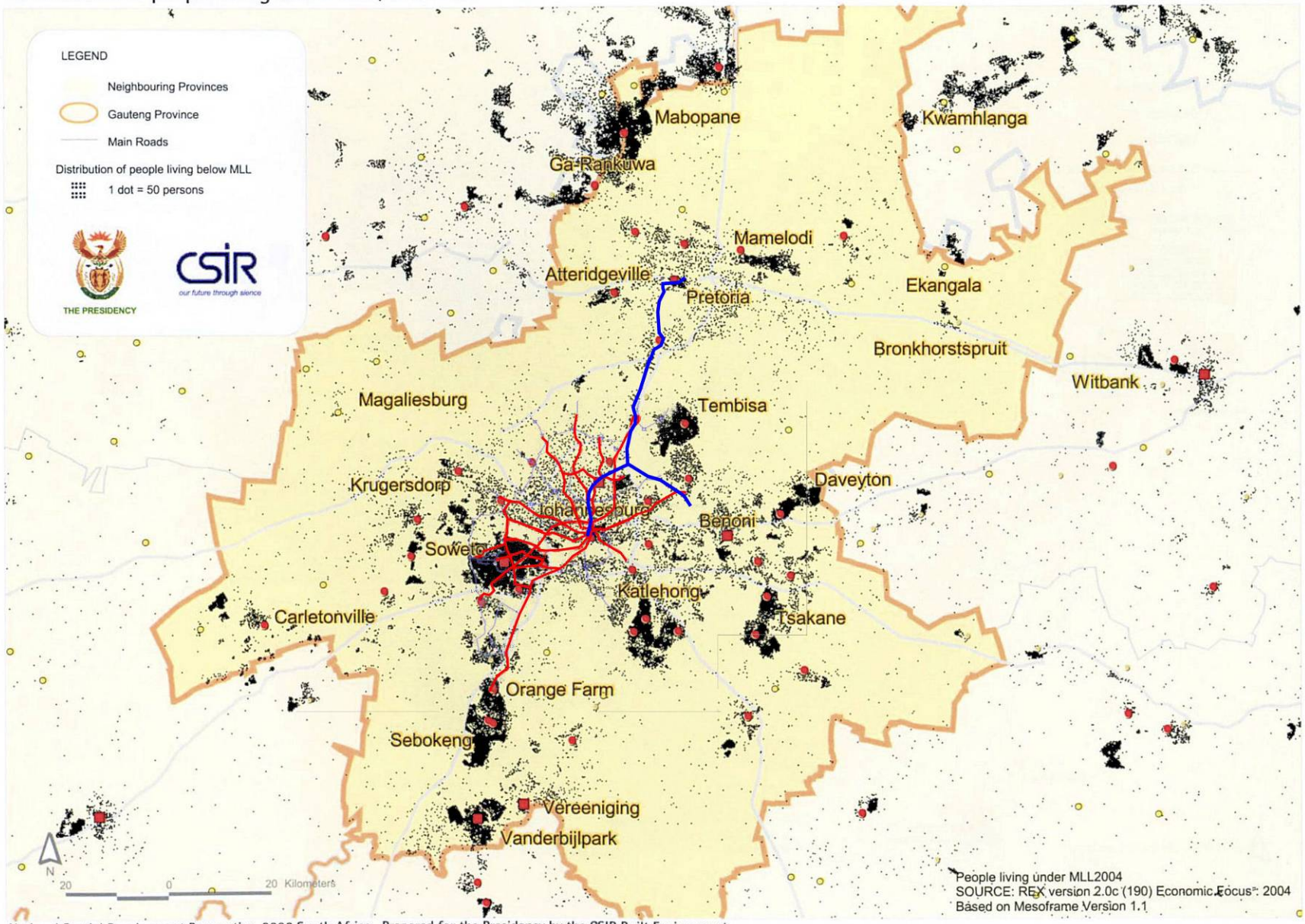
Attempt to optimize a city shape often produce utopian designs

- It is futile to try to optimize city shape using one objective alone (reducing distance to jobs, optimizing the operation of public transport, optimizing the design of water or sewer systems, etc)
- The most efficient city shape is the one that is purely demand driven while responding to supply constraints

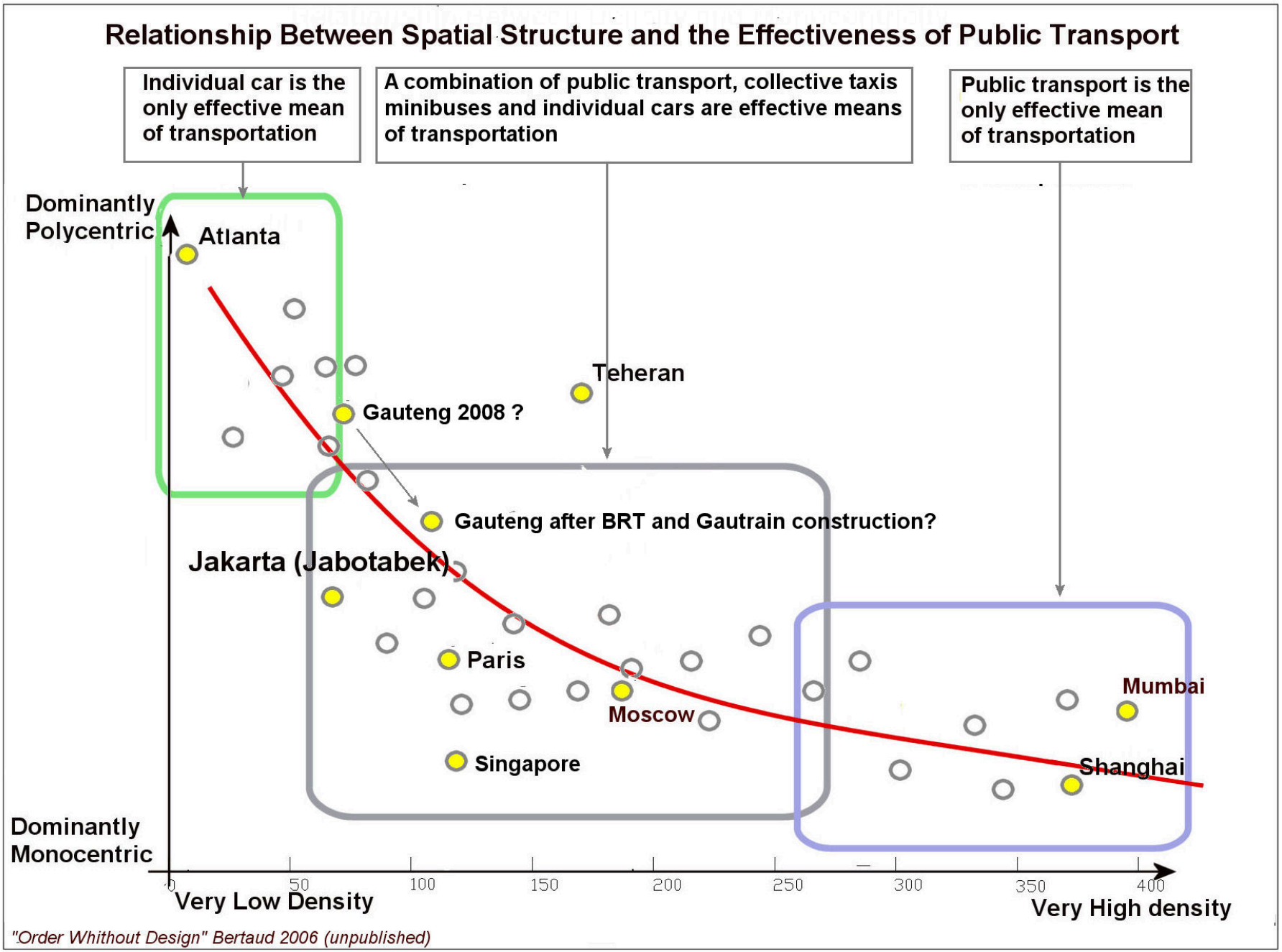
Is it possible to change a city's spatial structure in the long run?

- In the long run a city spatial structure can be modified by a consistent action involving a close coordination between:
  - Transport infrastructure investments
  - Modification of land use and planning regulations
  - Taxation and distribution of subsidies
- This is difficult to do, because the objective is spatial modification, not an increase in revenue or an optimization of transport efficiency from the point of view of the operator

Map iv: Distribution of economic growth and poverty in the Gauteng province with planned Johannesburg BRT and Gautrain rapid rail



The possible result of a long range coordinated action



Conclusions

- In South Africa more attention should be given to the spatial structure of cities and its impact on poverty.
- Recommendation for a plan of action:
  - Systematically audit land use regulations to allow demand driven more compact settlements closer to the centers of employment.
  - Invest in BRT and rapid transit to the extent that cities' structure allow it;
  - Reduce the potential tax or regulatory incentives to disperse employment centers
  - Review low cost housing standards and the impact of subsidized housing site selections on the structure of cities
  - A change in the way housing subsidies are provided to low income households will have more impact on future city shape than any master plan or land use policy
  - Portable housing subsidies would ensure that location and housing standards in residential areas correspond to households demand.
  - Transport subsidies may have a larger impact on reducing poverty than housing subsidies