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Future Orientations for CIties

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Interim Report

EUROPEAN UNION
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INVESTING IN YOUR FUTURE

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Introduction

This report presents a snapshot of work in progress on the analysis of European cities in terms of state, trends and perspectives. Cities are increasingly seen as major motors of economic growth and societal development in general. The Green Paper on Territorial Cohesion highlights the need for supporting cities as sources of agglomeration economies, while at the same time avoiding diseconomies by maintaining Europe's particularly well distributed urban system.

The approach in this study is resolutely policy- and thus future-oriented. While we invest heavily in the analysis of past trends and the mechanisms explaining them, we do so in view of learning lessons for informing policy making and developing an educated guess on what might lie ahead in the future of European cities.

This project was supposed to be based on a unique and fairly new data collection, the Urban Audit, which promises to become a privileged source of information and data on large cities in Europe. However, in its current state, and even more so for the recent 2004 round than for the previous one, holes in the data abound and often with a very strong national boundary effect, making the use of the data difficult, or even impossible. Adding to that the fact that another research team is currently busy updating the State of European Cities report, using almost exclusively the Urban Audit, we decided to not "compete" in this very small territory of analyses possible with the available data, but rather to propose complementary approaches and sources of information. Most of our analysis will thus combine NUTS approximations, original city-based data and case studies to analyse in depth what make cities tick, sometimes sacrificing exhaustive coverage for better understanding.

The main body of this report provides glimpses of the current state of the work, detailed much more in the annexes. We decided to leave out any literature references in this main body to improve readability. They can be found in the annex. Throughout the report we present as grey boxes the original requests form the project specifications in order to make it clear to which questions we attempt to find answers in each of the different sections.

In the first part we provide a literature review on the current state of knowledge concerning trends, driving forces and perspectives in the fields of demography, economy, accessibility, social cohesion, environment, city-hinterland relationships and polycentricity. After a more detailed explanation of the above-mentioned data issues, we go on to explain the methodologies and data chosen to contribute to the response to some of the open questions through our own empirical work, as well as some first, very preliminary, results which should be seen for the most part as examples of things to come, more than as actual definite results. In the annexes we have not used this same division into three parts, but rather assembled all of the information for each theme into separate annexes to allow a thematic view of our research results so far.

We end this introduction with an important request to the ESPON Monitoring Committee and Coordination Unit: in order to be able to begin work as soon as possible on the different case studies, it is very important for us to have a definite answer on the proposed case study areas as soon as possible, but the very latest for the end of May. Obviously, feedback on the rest of the analyses is just as important, but the latter can more easily be adjusted on the way, whereas case studies are definitive, once work has started.

Chapter 1. State and perspectives of European Cities – a literature review

As in all research, this project will not create vast amounts of new information, but mainly stand on the shoulder of giants and use existing knowledge, interpreting it to answer the policy makers' questions and adding small bits here and there through our own empirical work. This is especially true because of the future-oriented approach, which means that we have to take into account a very broad set of driving forces if the scenarios are to be relevant, and it would be impossible to analyse all these driving forces empirically ourselves. The project, therefore, started by reviewing the current, state-of-the art literature to identify the main trends and driving forces relevant for cities today, guided by the three fields of questions raised in the specifications for this project.

As a caveat, we immediately have to highlight that the current economic crisis is obviously not taken into account in the available literature. Such profound economic upheaval is bound to have a significant effect on the spatial configuration of lives and activities, but this impact will only be clearly visible in a number of years. At this stage, most of what we can say about it is speculation, based on more general ideas of the levers this crisis might trigger. As you will see in the synthesis of the drivers, we attempted to identify those drivers particularly prone to change because of the crisis.

1. Competitiveness, social cohesion and environmental impacts of European cities

What is the present state of cities'/urban agglomerations' developments, their functional strengths and weaknesses based on the most appropriate economic, social, cultural and environmental indicators that can be collected European wide? (In this respect, the accessibility of cities/urban agglomerations should be included in the analysis.) How does the functionality of cities influence their competitiveness, their socio-economic and environmental situation, including their welfare What endogenous strengths of cities/urban agglomerations could be better exploited, thereby achieving improved competitiveness? What additional functionality could be considered in individual cities in order to improve their competitiveness?

Competitiveness has become the major goal of the European Union, or at least of the European Commission, especially since the Agenda for Growth and Jobs of 2005. This focus on competitiveness is epitomized by the statement made by Commissioner Hübner that "cohesion policy is first and foremost an economic development policy aimed at raising aggregate growth in the Union."[1]
More generally, the current, new paradigm developing in the Commission seems to be that "by mobilising under-utilised resources and exploiting comparative advantages, cohesion policy aims to ensure that all European regions, be they lagging behind or not, contribute to

1 Hübner, D. "Equity and Efficiency: two missions and one policy" – Speech given at the International conference "Regional policy around the world" - Porto, 29 September 2008 – written version accessed at http://europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/08/469&format=HTML&aged=0&language=EN&guiLanguage=en

overall economic growth and change and to the creation of sustainable jobs, and that all citizens can benefit from the internal market."[2]

In this context, and even more so in the light of the economic crisis, the issue of competitiveness of cities, and policies enhancing this competitiveness, tend to gain in importance, crowding out other issues such as social cohesion and environmentally sustainable development. However, as discussed, for example, at the Bordeaux ESPON seminar, not all members of the European territorial development community seem to share the opinion that this concentration on competitiveness is desirable. We have, therefore, decided to continue working on all sides of the sustainability triangle. However, instead of only looking at the three parts separately, we try to identify the interlinkage between them, e.g. the impact of specific competitiveness strategies on social cohesion and the environmental footprint and vice versa.

1.1 Urban demographics

Gilles Van Hamme

The specificities of urban demographic dynamics

Cities demographic dynamics – especially when not considering the biggest ones – are very much in accordance with the regional and national trends in which they are embedded. See annex 1 for a more detailed analysis of those. However, cities in general – at least from beyond a certain level of the urban hierarchy – have a specific place in the migratory process. Generally, they attract young populations and expulse the older.

Depending on the level of the cities in the urban hierarchy and contextual factors, this process occurs at different scales: major cities such as London or Paris and many other capital cities play this role at the national and growingly at the international level (migration of wealthy pensioners to Spain for example); at a lower level, cities could play this role at the regional level; for the small cities, this process could be reduced to the suburbanization process which is of course also taking place in the bigger cities.

As a result of these processes, metropolitan areas are younger than average and have a higher natural growth rate.

The demographic results of the intra-urban migratory movements can be synthesized as follows:

- Generally, a younger population in (the centre of) the cities, notably through gentrification
- A higher share of active households with children in the suburban areas through suburbanization
- Poor immigrants concentrated in some specific areas of the cities, either near to the centres or in specific parts of the suburbs

Demography as an important driving force

From the literature, we can conclude that demographic trends have an impact on different fields of the urban evolutions we are dealing with. Several hypotheses can be explored

2 Hubner, D., Debate in the European Parliament - Plenary session - "Future reform of the cohesion policy" - Strasbourg, 24 March 2009 – written version accessed at http://ec.europa.eu/commission_barroso/hubner/speeches/pdf/2009/24032009_stra.pdf

concerning theses impacts:

- By simple mass effects, "competitiveness" (as measured through GDP growth) is for a part dependent on dependency ratio and activity rates
- Social cohesion depends among others on three interrelated major demographic evolutions: the concentration of poor immigrants in the big cities, the evolution of the household composition and gentrification processes
- Population growth, the household (de)composition and the suburbanization process are factors producing urban sprawl.

1.2 Urban competitiveness

Competitiveness as such is a very slippery concept, but even more so when dealing with regional or urban competitiveness. It is clear that the economic performance of regions is highly dependent on the national economic system. In this context, macro-economic policies play a decisive role in regional development, notably by influencing significant variables such as demand, availability of financial resources, exchange rates, etc. An extensive analysis of these macro-economic effects is presented in the annex. We concentrate here on the regional/urban specificities of "competitiveness".

Urban competitiveness as regional competitiveness

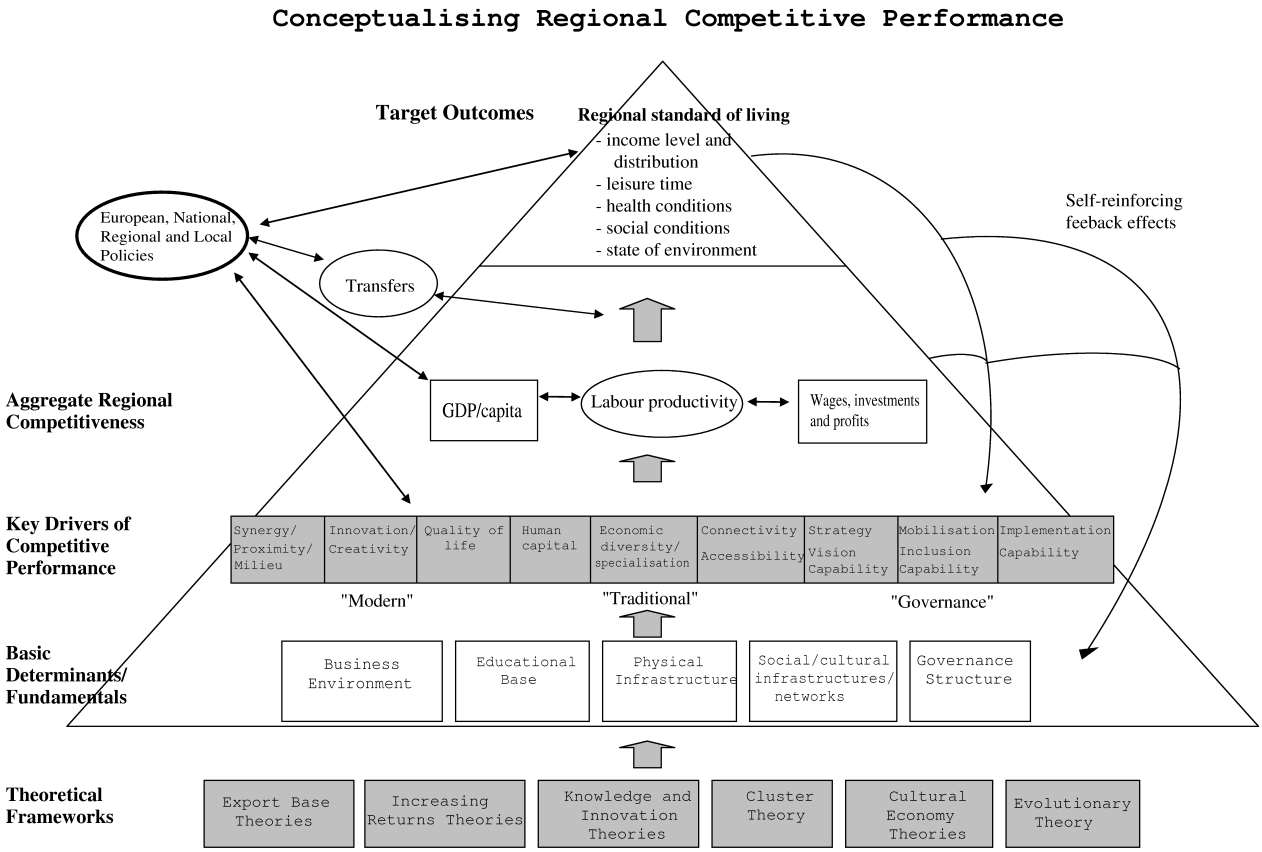
In terms of competitiveness, urban competitiveness can be equalled to regional competitiveness and much has already been written on the subject. So we will not provide here an n-th review of the literature on the factors of regional competitiveness[3], but rather refer to the results of the ESPON 2006 project 3.4.2, and notably the pyramid of competitiveness it presented (see figure 1). We focus our own work mainly on the network approach to urban competitiveness.

The major points we can draw from this definition of competitiveness for FOCI are the following:

1. The measure of revealed competitiveness is multi-variate and contains GDP/capita, Labour productivity and some notion of the distribution of GDP as a proxy to the efficiency with which a region is able to meet the needs of its inhabitants.
2. However, this revealed competitiveness is a step below the question of regional standards of living and, thus, does not necessarily give a clear idea about the latter.
3. In a policy-oriented reflection, the key drivers seem to be the most relevant to study, but the presence or absence as such of these drivers in a city does not automatically allow to measure competitiveness.
4. The distinction between traditional, modern and governance-oriented drivers contains no value judgement concerning their importance. They are more linked to different parts or phases of the academic discussion. In other words: it is obvious that the traditional drivers remain as important as before, even if recent academic work has also highlighted other factors.
5. Many of the key drivers identified are very difficult or impossible to measure, especially in a pan-European approach à la ESPON. Our analyses will thus focus on the "traditional" drivers, innovation and quality of life.

3 For some Europe-wide studies, see ESPON 3.4.2, Cambridge Econometrics, Ecorys-NEI and Martin R (2004), "A Study on the Factors of Regional Competitiveness", http://ec.europa.eu/regional_policy/sources/docgener/studies/pdf/3cr/competitiveness.pdf and the currently ongoing study for DG Regio: "Analysis of the main factors of regional growth: an in-depth study of the best and worst performing European regions"

One might add that one specificity of urban areas is the particular importance of agglomeration economies, notably of the Jacobsian type linked to the availability of a general labour force and supplier pool. However, as an ESPON priority 2 project deals



specifically with this aspect of urban development, we will not focus on that here.

Figure 1. Pyramid of regional competitiveness, source: ESPON 3.4.2.

Urban competitiveness in a network approach

Céline Rozenblat, Marie-Noëlle Comin, Denise Pumain

Another approach to urban competitiveness is to see cities as nodes in networks, somewhat detached from their regional and national context. In this logic, cities are embedded into systems of cities, which constrain a large part of their becoming. Their own resources interact with the whole system in several ways:

- through competition and complementarities allowing the development of self-organization processes
- through the strategic behaviour of major private actors like multinational firms
- through emergence and diffusion of innovation

Dynamics of Urban systems

The European urban system is integrating through a variety of processes that enhance the financial, economic, technological, political and cultural linkages between them. Two main general trends of urban development affect the European urban system since the 1990's and will continue during the next two decades at least: globalization and development of knowledge economy have already selected first locations for their investment. Cities are more selected in the competitive process, with a strengthening of the hierarchical structure of functions of command, control and information. There is evidence that innovations spread preferentially from the largest cities, already concentrating multiple networks, to the smallest ones. These trends lead to a strengthening of major cities, where opportunities are more likely to be diversified and where interactions are maximized, decreasing transaction costs. Scaling effects thus support a historical trend to the reinforcement of urban hierarchies and contribute to more concentration in the "urban pentagon" or European megalopolis.

Organization networks of multinational firms

Different geographical scales are emerging from networks (Continental, National, trans-boundaries etc.) offering opportunities to develop new networks, or at the opposite locking cities into some specialized networks. While the financial networks developed into a restricted group of "Global Cities", the whole productive economy must be taken into account in the globalization processes. In this context the diversity of a city's networks, both in term of economic specialization and geographical influence, becomes an important condition for its "resilience" in the global economy.

Emergence and diffusion of innovation into cities and beyond cities

Knowledge and information, reflexivity and the capacity to learn and invent are driving the urban development. The role of cities as centres for the integration of human capital and as incubators of invention was rediscovered by the "new" economic growth theory, which posits that knowledge spillovers among individuals and firms are the necessary underpinnings of growth, leading to the recognition of the social and economic role of urban centres in furthering intellectual cross-fertilization. A process whereby knowledge produces growth and growth attracts knowledge, is the engine by which urban centres sustain their development through unfolding innovation, which in turn is an essential element of the explanation of their competitiveness. Urban growth is linked to innovation cycles, following a hierarchical diffusion process over time. In that logic, the major urban specialisations can be linked to the main innovation cycles. Within a city, innovation is a multi-scalar process which combines at a variable extent according to the city size, internal and external interactions of medium and large spatial range. Two main processes explain that transformation in production processes and services: an increasing share of intangible capital (R&D, education, human capital …) and the diffusion of new technologies of information and communication. It is thus essential to focus a prospective analysis of European cities on their situation within the next innovation cycle. This is known as the cycle of "converging technologies" (nano and bio technologies, as well as technologies of information and cognition).

Role of policies for orienting urban development

After a concentration of policies around the concept of clusters until 2000, combining in different variations the the classical model of pure agglomeration economies, the industrial-complex model and the network or club model, more recent regional development policies were elaborated at national, regional or urban levels in three ways:

- focused on actors embeddedness (at regional level with the implicit model of Silicon Valley and Italian Districts): ;
- National networking of innovative activities;
- Local networking of innovative activities;

1.3 Accessibility of cities

Sandra Bozzani-Franc, Alain L'Hostis, Laurent Terral

Accessibility, or the possibility to reach places, is widely recognised as a key issue in urban development. Accessibility and the development of transport systems is seen as a factor favouring or supporting or even causing urban development be it locally in the neighbourhood of entry points or globally concerning the entire urban entity.

ESPON has already provided extensive results on transport and accessibility, both in terms of state and trends and in terms of prospective analysis. Many of the results are still valid and we, therefore, base our development on the analysis provided in the ESPON report 3.2 for the building of territorial scenarios for Europe. On the basis of the recent literature we confirm or amend the trends identified by that project.

Six major trends concerning accessibility and transport can be identified in the literature (see annex for details):

- **The first trend considers the uneven nature of accessibility across Europe.** We can confirm the continued existence of large disparities of accessibility for road and rail across the ESPON space. Authors do not seem to agree, however, on whether the overall trend is concentration or dispersion, as this highly depends on the object and methods of measurements. One trend observed favours the reinforcement of a European "global city" associating a limited number of cities and threatening the medium and smaller cities, whereas others see a greater dispersion of traffic during the nineties, although a general spread of the development of air transport is not observed, in spite of the arrival of low-cost airlines. High-speed rail is also reshaping the geography of the continent, notably of the larger cities. At the same time, there is a lack of integration of the air transport network in Europe compared to the USA. For cities, it is important to note that the dynamism but also the fragility of the air transport system, highly subject to the energy crisis and to the consequences of the current global crisis, suggests that cities access to air transport could dramatically evolve in the near future, especially for airports too dependant on one single operator. At the same time, a valorisation of intermodality between high-speed rail and air transport systems can build an accessibility level equivalent to that produced by an international airport located nearby.
- **The second trend concerns the imbalances among transport modes.** Railways, mainly in freight transport, maritime and inland waterway transport are less performing than road and air which are favoured by the observed trends. A special mention is made of low cost airlines credited of a "revival of air transport".
- **The third trend recalls the predominance of national characteristics in the organisation of networks** with organisational shapes very specific to organisational and geographic realities in each country. The importance of hub-and-spokes network

organisation confirms this trend with nationally organised sub networks.

- **The fourth trend focuses on the importance of East-West flows** in relation with enlargement.
- **The fifth trend expresses the changing transport paradigm among new members states**, or the "regions of cohesion" in the new territorial jargon, that saw a sharp decline in freight transport and that favours road on rail.
- **The final identified trend assumes growing congestion of major networks**.

1.4 Social cohesion

Gilles Van Hamme

Introduction

In general, European studies seem to confuse two very different aspects in the way to evaluate social cohesion inside the European space: social cohesion to sustain competitiveness versus social cohesion as alternative non economic evaluations of well-being.

In this project, we intend to clearly separate these two main aspects and only focus on the second one in this chapter, the first being integrated in the chapter on competitiveness. The two main aspects we will concentrate the literature review on are social polarisation and exclusion and social-spatial polarisation.

Past evolutions of social polarization in cities

In the last decades, social polarization has increased in nearly all rich countries, including the new member states after the collapse of communism. The level of social polarization of a city seems to depend first on the national context and second on its level of insertion in the global economy and the new forms of economic growth related to the knowledge-based economy. Social-spatial polarization in the cities seems also to have increased in the last decades with growing gaps in well-being between city districts.

Economic and labour market driving forces of social polarization in the city

In the last decades, the literature has emphasized the major restructuring of economic process occuring in many cities through the concept of metropolization, highlighting the new emphasis put on short-term profitability in knowledge-based sectors, leading to a growing demand for highly skilled labour. Other authors emphasise a more flexible reorganization of the work. In this perspective, social polarization is not the result of a new supply/demand equilibrium for qualified and unqualified workforce but a new political form of economic regulation to restore the profit rate. In conclusion, we can probably argue that the new forms of economic growth lead to growing social polarization through different mechanisms and can thus raise the hypothesis that the more global and the more engaged in the knowledge-based economy a city, the more socially polarized it will be – all other things being equal.

Socio-demographic driving forces and real estate

Three major driving forces are at play in the socio-demographic field:

- Household composition, with a general tendency of household size to decrease and the share of single-person households to increase
- International immigration which concentrates in the cities and particularly the biggest ones
- Intra-urban migrations which play a major role in the socio-spatial polarization process, notably through suburbanization and gentrification

These evolutions cannot be understood without taking into account house prices. First, the rise of prices in the housing market has a clear impact on the living standards and the level of poverty of the households, especially the most deprived. Second, suburbanization is pushed by high prices in the central areas. Third, renovation processes (often linked to gentrification) raise housing prices and lead to the expulsion of the most fragile populations.

Political driving forces

One of the major determinants of social inequalities and social exclusion in the cities is related to public policies at two different scales: the state and the city levels. The state level is the main scale through which welfare state functions operate and, as a consequence, welfare policies explain a part of the level of social inequalities and social exclusion.

Public policies at the city level are decisive in three different perspectives:

- as part of the welfare state notably through social housing,
- in accompanying economic development, with a shift from a 'managerial / redistributive' to an 'entrepreneurial / neo-liberal' framework,
- through social policies oriented toward place-based policies rather than households and individuals.

1.5 Environmental sustainability

Jaume Fons

Framing the concept

The concept of sustainable cities appears everywhere, but in many cases the conceptual or empirical basis is missed. Consequently it is very difficult to set targets and to get the right information to assess the evolution and trends. Three different approaches have been identified:

- **Ecological footprint** as a measure of the resources necessary to produce the goods that an individual or population consumes
- **Urban metabolism** conceptualizing the relationship between societies and their natural environment as a physical input–output process
- **Environmental vectors or domains**. Analysing different compartments of the urban environmental system considering their trends over time

The problem of the first two approaches is the high data requirements reflected in that most of the studies focus on few, if not only one, cities or areas. Will will thus focus on the environmental vectors approach which also allows us to emphasize the land use dimension,

beyond the city limits, which is a central component of the hypothesis presented in our project.

Pollution

Despite the progress made in controlling local air pollution, urban areas show increasing signs of environmental stress and air quality is one of the major concerns, with varied, but continued exposure to PM10, ozone and NO2.

Noise

European cities have become increasingly "noisy"; the noisy places have not necessarily become louder, but there are less quiet places left. Detailed noise data across Europe is, however, hard to obtain. Road traffic is the dominant source of exposure in major urban areas.

Waste

The average amount of municipal waste generated per capita per year in many western European countries still exceeds 550kg, way above the 300kg target set in the 5th Environment Action Programme (EAP) for the year 2000.

However, generation of municipal waste per capita has stabilised in the EU since 2000 while GDP has increased by 13%. Generation of waste has thus apparently been decoupled from economic growth across the EU. As a result, it is likely that the environmental impacts associated with municipal waste generation have also been decoupled from GDP.

Urban sprawl, a key issue in land use

Land, and soil, can be considered limited resources at human scale. The Soil Thematic Strategy identifies soil sealing by impervious surface as one of the main threats to soil conservation in Europe. The creation of greenspace within urban areas did not match the speed of urban growth (EEA, 2002). Moreover, there is an impact that extends far beyond of the city limits by the destruction of biotopes and fragmentation of eco-systems. Sprawl also increases the pressure on protected areas by increased air pollution. All these environmental issues are clearly related to the type and form of city growth. Moreover, once urban areas have sprawled it is very difficult to counteract the impacts given the amount of energy needed to restore sealed urban areas.

Urban sprawl in the past 50 years

Long term trends in Europe

Long term data leads to the following major conclusions (see details and relevant table in annex 5):

- The largest urban land expansion in Europe started in the 1950s.
- Rapid changes during the last 50 years resulted from combined effects of increasing affluence, mass motorisation for the transport of persons and goods, the introduction of air transportation and the shift from manufacturing to services in urban economies.
- Central planning, dominance of public transport and no land market determined a specific form of compact city in former socialist countries, but this has changed since the 1990s.
- Urban change is incremental: most of the physical fabric of cities survives for many decades if not for centuries.

- There has been a process of convergence in most of the cities which accelerated by the end of 1990s.

Recent trends (1990s and 2000s)

During this period the growth of urban areas and associated urban infrastructure consumed more than 8 000 km2, about the size of Luxembourg. This increase has been at higher speed than population change.

Combining land cover and population changes (1990-2000) with population density and percentage of urban land (2000) we can conclude that in Europe urbanisation generally leads to less dense urban areas, because dedensification is the most dominant form of urbanisation. Urbanisation in regions with a low level of urbanity is relatively limited, in contrast with urbanisation in regions with higher levels of urbanity. As a result, the differences in urbanisation in the European Union are increasing.

Drivers of urban sprawl

The following figure summarises the main drivers of urban sprawl according to the existing literature (Figure 2 – see annex 5 for more detailed descriptions of these drivers):

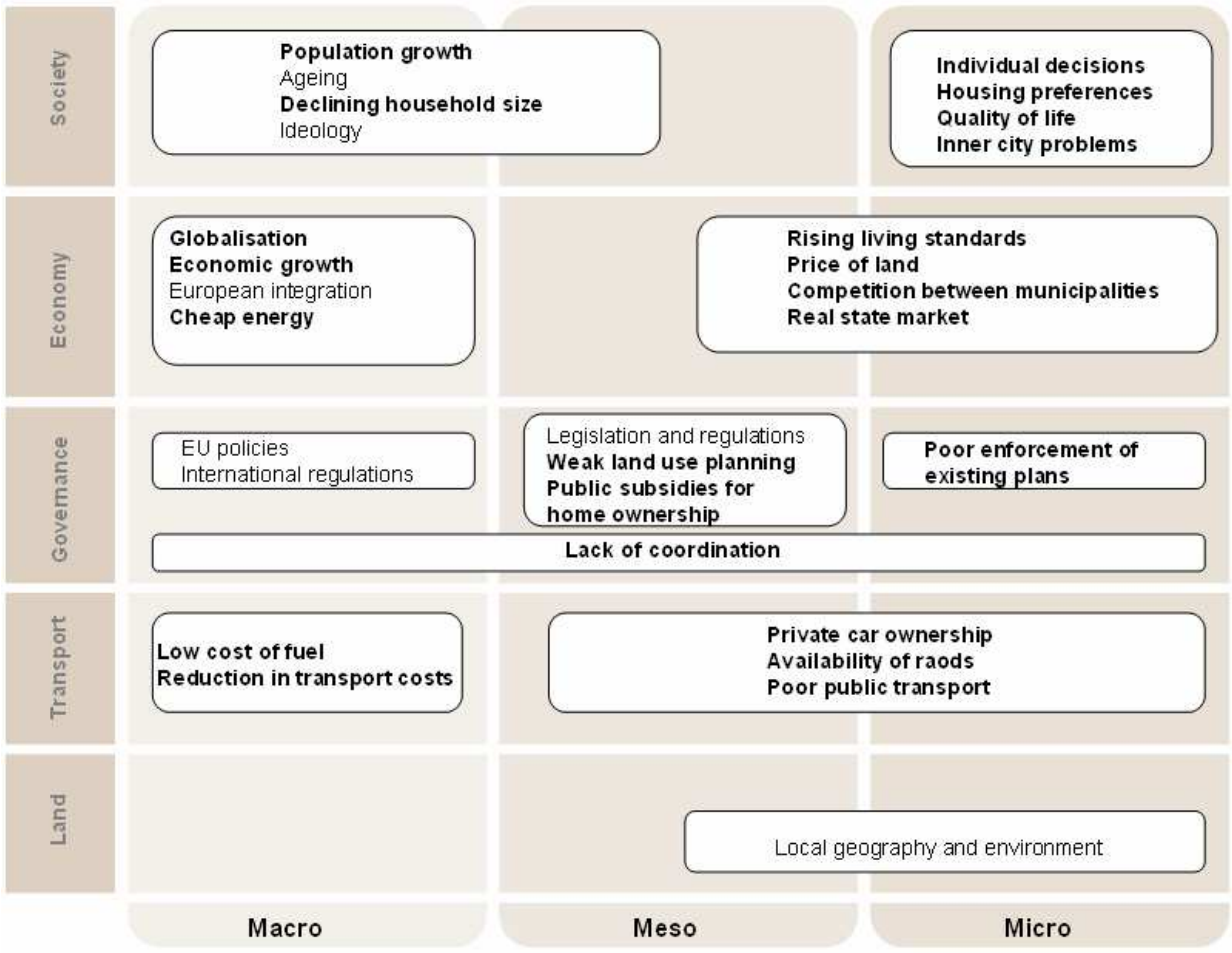


Figure 2. Main drivers of current urban sprawl in Europe. Drivers have been organised in two dimensions: domain (horizontal) and spatial scale (vertical).

Demand/supply has not been differentiated. In bold: factors that drive urban sprawl; the remaining factors may become drivers of urban sprawl under certain conditions. Adapted from EEA (2006), Couch et al. (2008) and Urban sprawl book and PBL (2008).

2. City-hinterland relations

Maciej Smętkowski, Adam Płoszaj

What does the relationship between cities and their hinterland look like and how do they influence one another? Which cities/types of cities are pulling their region, their country, and/or Europe forward? Which cities/types of cities are holding back development?

2.1 Territorial definitions

Obviously a city, especially a large one, cannot be viewed as an isolated point in geographical space. With the help of spatial, morphological or functional analysis, we can distinguish different zones relating to how the city influences its surroundings. On the basis of a review of relevant terminology, we will use two main zones of city impact: a zone of direct impacts in which the relationships are both fixed and strong (*Umland* in German; associated to FUA, also called Metropolitan area or Metroplois) and a zone in which the relationships are less vigorous or exceptional (*Hinterland* in German, also called Metropolitan (macro)region). In our approach, a metropolitan area thus constitutes the internal hinterland zone for the city, and the metropolitan macroregion – the external hinterland zone.

2.2 Types of relations

The basic assumption underlying our line of argumentation is that the relationships between the city and its surroundings are expressed by two categories of flows: periodic–variable flows (e.g. commuting to work), and constant–permanent flows (e.g. internal migrations).

Developing a consistent typology of mutual relationships between the metropolis and its region involves many challenges owing to the multitude of dimensions in which such linkages can be analysed. Among those dimensions, two major ones can be distinguished:

- Sectoral dimension (which inter alia includes the enterprise sector, the household sector and the public sector);
- Material dimension (which includes flows of goods, information, population as well as financial flows).

To the above, another two universal dimensions should be added: time and space. Inclusion of the spatial dimension into the classification described above produces a result shown in Tab. 1. Individual, hypothetical relationships taking into account various types of flows have been ascribed to a spatial-sectoral matrix.

Region City	Enterprises	Households	Public sector
Enterprises	Relocation Exchange	Work Consumption	Purchases Services

Households	Work Consumption	Permanent migration Consumption	Work Services
Public sector	Purchases Services	Work Services	Cooperation Competition

Table 1. Types of intersectoral relationships in the city-region system

Source: prepared by the author.

In summary, the main elements of city-hinterland relations are (see the annex for more details):

- Regional deconcentration of business activity
- Exchange of goods and services
- Infrastructural links
- Commuting
- Migration
- Governance and cooperation

2.3 Changing city-hinterland relations

Globalisation and metropolisation processes are leading to changes in the cities' internal structure and to a transformation of the relationships between cities and their surrounding regions. The spreading of metropolises onto regional hinterland areas can lead to the development of a metropolitan area in which the ties with the metropolis are both strong and wide-ranging. At the same time, the economic ties between the city and its metropolitan area and the surrounding region are weakening (as linkages of the global or continental city network become stronger). This latter aspect of the metropolisation process is much less researched, unlike the concentration processes of central functions in cities and the consolidation process of the global network of cities, discussed above. Many authors have put forward the hypothesis that the regional hinterland is no longer needed by metropolises as it does not offer the resources that are necessary for metropolitan development, and is therefore undergoing a relative marginalisation, while the differences in the development level between the metropolis and its regional surroundings are increasing.

3. Polycentric potentials

Minas Angelidis

Where do particular development opportunities for cooperation exist between cities in polycentric structures and what do they look like in the different parts of Europe? In the case of absence of one/several larger city/cities within a country/cross-border territory, this question should also be analysed in view of medium sized towns/cities and their opportunities for synergies by cooperation. Which links between cities are already there? Which functionalities of these cities represent comparative advantages to explore? Which

complementarities are to be developed in order to reinforce competitiveness and cohesion, and with which territorial entities?
Are there options for supporting balance and polycentric development at European scale? Where would a joint performance of selected polycentric urban agglomerations (e.g. Randstad, Ørestadsregionen, the Rhein-Ruhr agglomeration, the Baltic Pallette, and other polycentric urban cooperation areas) be able to increase the combined competitiveness by performing together? Could such cooperation arrangements also contribute to more European cohesion and to better European competitiveness in the world? How would such polycentric urban agglomerations influence national territories and other cities?
Would it be possible to suggest further polycentric urban agglomerations/zones including large cities in Europe that could improve the development and service provision for their respective regions and hinterlands?

3.1 Polycentricity: aspects, functional content and morphology, levels

Polycentricity has been agreed upon as a major policy goal within European territorial policies; however, evidence on how to exploit "Polycentric Potentials" is still not sufficient. Policies exploiting "Polycentric Potentials" supported secondary cities of urban systems in order to distribute development in space more equally in an attempt to find a compromise between the need for agglomeration economies and the desire to avoid agglomeration diseconomies. However, empirical research demonstrated that whether the respective effects might be positive or negative depends on the scale and level, the functions as well as the morphology of territorial patterns in which the "Polycentric Potentials" are embedded. From this scope, evidence on "Polycentric Potentials" for the whole ESPON territory still remains incomplete.

The *definition of cities as building blocks of urban systems* is of primary importance for the study of polycentricity. From this scope, some researches use *Functional Urban Areas* (FUAs), including the area that is integrated with the city core, e.g. the local labour market. Other researches use *Morphological Urban Areas,* defined on the basis of the density and morphology of cities, as more appropriate concept to understand the role of cities in territorial development.

A main characteristic of the polycentricity analysis is the need to take into account *different spatial levels*. For example, supporting the development of a national capital to improve polycentricity at European level reduces polycentricity at the level of the country concerned –and so on. This is crucial not only for the polycentric aggregates of cities themselves but also for different activities, networking and complementarities which have different effects on polycentric structures at each spatial level.

European level polycentricity has been studied in more depth by relevant ESPON 2006 and other studies, based on sufficient evidence. Exploiting *"regional polycentric potentials"* aims at improving networking and complementarities between cities at the interregional and intra-regional levels. Generally, at this level existing research did not have enough data to use. An important recent research which went in depth on "regional polycentricity" studied only a part of the Western Europe. Thus further relevant research is needed for the entire ESPON territory.

3.2 Urban networks in relation to territorial complementarities

Evidence on global cities and, even more, on lower level urban networkings, remains very often based on attributes because the relevant data are abundant while data on direct links, or even flows, which could more clearly inform on the relationships among the cities as nodes of networks are poor. In this respect, recent research has attributed growing importance to the use of the internal structure of large Advanced Producer Services (APS) as a proxy to measure actual flows of information among cities. The analysis of the

territorial effects of *real flows* through transport means (air-lines, TGV and motorways) also becomes important. However, research on all the latter has been mainly conducted on regional and national case studies, not covering the entire ESPON space.

3.3 Territorial complementarities and "Polycentric Potentials"

Promoting territorial complementarities means that, local and regional authorities, by combining appropriate infrastructures can improve the use of the assets as well as the provision of services in their common territory, thus better address actual economic, social and environmental challenges. More specifically, intense networking among the cities as nodes of an urban system is closely related to the presence of complementary relationships between these nodes. Inversely, enhancing complementarities by integrating infrastructures through planning implementation could enhance cities networking. At the "regional polycentricity" level, there are two basic levels of complementarities: a first, focused on daily commuting, lower level transport and other infrastructures and services and a second, focused on cooperation in business and on higher level infrastructures. Between these types there are several intermediary cases of complementarities.

Several recent studies underlined that promoting complementarities which foster the role of small cities in a network dominated by a strong city could have negative effects. In the same argumentation line: economic actors generally seem to prefer more concentration of APS in "First" cities is preferable compared to less concentration. Thus, the different types of complementarities should be further examined in the perspective of the monocentricity (+ agglomeration) / polycentricity (+ balanced distribution) dilemma. According to some researchers, measuring complementarity in a "Polycentric Potentials" area needs to measure the extent of differentiation (opposite to duplication) between its cities. This differentiation can be related to a wide variety of urban functions. However, the effects of this differentiation on the efficiency of each specific urban system depend on the type / level of complementarities (see above) and need to be further examined.

Service provision in "Polycentric Potentials" areas should be seen as an aspect of territorial complementarities. Most of previous research on this issue referred only to national, regional or local case studies; it did not cover the entire ESPON space. It often focused on the provision of services to the enterprises, while research on the provision of services to the population (health, education etc) was rare and only at NUTS2 level. However, as actual driving forces disadvantage provision of services to the population of the remote rural, the sparsely populated, the island and mountainous areas, the issue is of high relevance

3.4 "Polycentric Potentials" and Integration areas

In the line of the previous arguments, a "Polycentric Potentials" area includes an urban network that presents better pre-conditions to develop complementarities among its cities, in order for the entire area to become more integrated. Studying the potentials to enhance complementarities and integration this seems more important than the measuring existing morphological polycentricity of the urban network.

First relevant research within the ESPON 2006 programme started by the hypothesis that neighbouring cities with overlapping travel-to-work-areas can be functionally integrated and can gain from co-operation. Thus it used 45 minutes isochrones as proxies for travel-to-work areas and a threshold of 10% overlapping among those areas to define 'Polycentric Integration Areas" (PIAs). As it resulted from this exercise, there are many PIAs in West Europe, while there are few in Southern and Eastern Europe, because in the first population densities are much higher and distances between cities are much smaller. PIAs in West Europe are strong while they are weak in the rest of Europe. This approach of "Polycentric Potentials" was criticised by other researchers, both concerning the conceptualisation of PIAs and the use of a uniform isochrone level for all the cities of the ESPON space. An alternative concept was proposed, that of *poly-FUAs,* groups of relatively equal potential FUAs with overlapping travel-to-work areas. In our opinion, the respective ESPON 2006

projects did not go in depth in the analysis of the internal structures and external linkages of the "Polycentric Potentials" areas *at regional level*, due to the lack of data and lack of time and resources for their research.

As the notion of polycentricity is highly scale and size-dependend, it is necessary to more appropriately link the different types (and levels) of urban systems with their surrounding ("Potential integration") areas. A first such typology takes into account: (a) Cities (or urban networks) with more than 1 million people ("global" and "sub-global" cities) and their hinterlands, (b) "Regional" cities (or urban networks) with 250.000-1.000.000 inhab. in territories with more than 500.000 inh. (c) "Provincial' cities (or urban networks) with 100.000-250.000 inhab. in territories with less than 500.000 inhab. Another quite similar typology takes more into account the urban-rural spatial patterns, together with the density of the regions and their proximity to big urban centres.

As previous research suggests, more important linkages to study are the internal linkages of regional territories and the linkages of these last to the upper levels of urban systems, with emphasis on the direct linkages / flows described previously.

3.5 Territorial cooperation and "Polycentric Potentials"

Territorial cooperation becomes more efficient when the definition of the cooperation area is related to Potential Integration areas; that happens in cases interested stakeholders exploit identified "Polycentric Potentials" by improving complementarities in their common territory (by combining appropriate infrastructures and services -see previously). Previous relevant research identified existing cooperations among cities and urban networks mainly on the basis of the cooperation initiatives developed under the trans-border, transnational and interregional parts of INTERREG. Then they more precisely evaluated both the approaches of polycentricity used in different situations and the possible impacts of the respective projects on polycentric development. Further research is needed on the evaluation of the territorial cooperation projects' strategies from the scope of the "regional polycentricity" approach developed previously.

4. Summary: Major future driving forces for European Cities

Jacques Robert

It is important to realise that the above literature reviews only cover a part of the elements influencing the future development of cities. We have, therefore, assembled a broader list of drivers that we think relevant for urban development, based on a review of relevant future-oriented documents (see the annex 6 for the detailed review).

As already mentioned in the introduction to this chapter, one major difficulty in the reflection on driving forces is the evaluation of the impact of the current economic crisis, especially the territorial effects which will probably only become visible within 10-15 years. We have, therefore, classified the drivers into two categories: on the left column, those which seem valid for the medium and long-range despite the changing global context (economic crisis); on the right column, those for which new aspects are emerging (due to the economic crisis or to other factors).

Drivers still valid despite the changing global context	**Drivers on the move in relation to the changing context**
Demography:	***Demography:***
Population ageing (particularly in Eastern Europe); less strong in cities; Increase of the median age of population	Slowing down of progress in fertility rates in some countries due to the crisis
Increase of life expectancy	Legal migrants going back home
	Stronger pressure of illegal migrants

Concentration of immigration in cities (mostly in Western Europe)	because of very negative impacts of the crisis on developing countries (Africa in particular)
Economy: Continuing trends: Progress of the knowledge economy Progress of the service sector Further decline of employment in manufacturing activities Further external competition from emerging economies Maintain of territorial economic imbalances Further leadership of metropolitan areas (most likely) High importance of qualification Negative economic impacts of the decline of the population in working age (mainly eastern Europe) Long-term trend of growing energy price	***Economy:*** Recession and afterwards lower growth rates than before the crisis Deglobalisation of certain sectors due to the crisis Evolution of domestic demand in the EU: will depend upon the macro-economic policies applied Possible increase of inflation or deflation: will depend upon the macro-economic policies applied Revival of endogenous growth: will depend upon the macro-economic policies applied FDIs: Strong reduction in the short and medium term Access to credits for investments: more controlled and restricted Development of the "project economy" Possible economic revival of rural areas Development of "green economy"
Socio-cultural sector: Multi-cultural society Growing segmentation of society Strong disparities in income distribution (will depend upon macro-economic policies applied) Empowerment of elderly in society Possible changes in life styles related to climate change (mobility etc.)	***Socio-cultural sector:*** Strong increase of unemployment Growing levels of social exclusion Possible social unrests and troubles Possible emergence of new solidarity mechanisms
Technology: Continuing trends: growing importance of telecommunications, robotisation, nanotechnologies, biotechnologies etc.	***Technology:*** Lower progress of technology diffusion due to the crisis Growing technological competition from emerging economies Emergence of new materials and technologies in the building sector Emergence of "intelligent" houses and buildings Strong development of solar energy technologies Emergence of new transport technologies

Transport: High level of congestion in urban regions and metropolitan areas Continuing trends: • Growing importance of people transportation • Goods transport: move from heavy goods towards light/high value goods • Growing importance and extension of HST networks • Growing role of low-cost air transport companies if they have the capacity to overcome the crisis	***Transport:*** Lower increase of transport flows during the crisis period; probable resume of growth afterwards Development of new approaches related to greenhouse gas emissions (traffic restrictions in cities, development of public transport, extension of the use of clean technologies) Growing importance of "low speed" transport modes in cities (bicycles, walking etc.) New forms of mobility (retirees etc.)
Energy: Continuing trends: - Further substitution of gas to oil - Further increase of the share of renewable energy sources - Risk of oil depletion - Stronger external dependence of Europe in the energy sector Declining progression/stabilization of car use Suspicion about stronger use of biomass energy	***Energy:*** Lower increase of energy demand during the crisis Strong revival of nuclear energy in Europe Lower investments in the oil sector due to low oil price OPEC has (provisionally) lost the control over oil price Probable emergence of a world cartel of gas producing countries Booming of solar energy Decreasing share of fossil energy in the transport sector
Climate change and related policies: High awareness about climate change and about the role of greenhouse gas emissions	***Climate change and related policies:*** Acceleration of climate change according to recent scientific investigations Intensification of measures aiming at limiting greenhouse gas emissions (new Kyoto Protocol and other international Agreements; traffic restrictions, changes in technologies) Intensification of prevention measures in territorial development policies (rise of sea level, floods, drought/forest fires etc.)
Intra-EU cooperation and macro policies Global maintain of EU institutions and fields of competence (no significant changes in the EU Treaty of Lisbon)	***Intra-EU cooperation and macro policies*** Reconsideration of a number of macro policies by EU and member states (regulation of financial markets; immigration control; control of inflation; regulation of domestic demand; new memberships in Euroland), but difficulties in reaching consensus among EU member countries because of diverging situations among countries related to the impacts of the crisis

EU external relations and further enlargements: Difficulties at WTO level Difficulties in formalizing cooperation with Russia Growing weight of emerging economies in worldwide negotiations	***EU external relations and further enlargements:*** Intensification of economic cooperation at international level for overcoming the financial crisis and defining a more secure global economic basis (possible reconsideration of macro-economic policies; new regulation mechanisms in the financial sector) Slowing down of negotiations related to further EU enlargements Temptation of protectionist measures Slowing down of various external cooperations (Union pour la Méditerranée etc.) Intensification of economic problems outside EU borders (Ukraine, Bielorussia, Caucasian republics) Possibly: facilitation of cooperation between EU and United States
Urban systems and cities Further leadership of metropolitan areas Further progress of suburbanization (depending upon the economic situation) Further development of networks of cities	***Urban systems and cities*** Strong impacts in the short term of the decline of building activities Higher short-term sensitiveness to the crisis of cities strongly dependent upon manufacturing industries, FDIs and tourism Strong impact of the increase of public investments in infrastructures and in the "green economy" Improvement of the urban environment thanks to new transport technologies Possible benefits for medium-sized and small towns from the revival of the endogenous economy

Chapter 2. The data

The review of the state of knowledge in the previous section has raised some open questions and led to working hypotheses which we would like to address empirically in this project. We will explain the working hypotheses and chosen methodologies in the next chapter. Before we do so, a word about data. In the ESPON context where we try to cover a large space, and where we, therefore, rely on statistical analyses to gather information on and understanding of cities in this large space, data is of crucial importance. In this chapter, we will, therefore, present several issues related to data, starting with an analysis of what was supposed to be our prime source, the Urban Audit, presenting some alternatives to that source, but also explaining the strategies to add some cities to the list of those present in the Urban Audit.

1. Data collection achieved, including an overview on statistical and geographical data collected by EUROSTAT, the Urban Audit and national Statistical Institutes etc.

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The project specifications state that "this applied research project shall cover all cities of the Urban Audit as the use of existing data shall facilitate robust comparative analyses of European cities." Thus, the basic idea is that the project should use Urban Audit (UA) data, complemented by NUTS3 approximations of the cities, provided by DG Regio. The Urban Audit data was supposed to be available for the beginning of the project. However, we had to wait until February until Eurostat signalled that the files were reaching a more or less final state and even at that moment a series of quality checks had not been performed and some countries (notably France) had not delivered their data, yet. It is nevertheless already obvious that the data is not easily usable for most of our purposes. We will explain the reasons in the first section, to then present the alternatives we propose.

1.1 Bad state of UA

We can identify three fundamental problems with the UA data:

- Lack of data
- Bad quality of data
- City delimitations

Several reasons can be advanced for these problems:

- The UA is voluntary, so some countries do not put as much effort into collecting the data as they might for mandatory data deliveries.
- A series of variables is only available in census data, and thus in census years. The last UA round had 2004, a non-census year, as reference year.

This is confirmed by the following table based on data provided by Eurostat and showing the response rate by country and by theme.[4] As can be seen in this table, not one thematic field, nor one single country reaches a total of 100% !

Country	Demography	Social aspects	Economic aspects	Civic involvment	Training and Education	Environment	Travel patterns	Information society	Culture and Recreation	Total
BE	84	36	88	77	9	61	55	70	86	**68**
BG	0	0	0	57	0	0	1	2	0	**4**
CZ	5	2	0	5	0	1	0	7	3	**2**
DK	98	75	75	100	95	45	81	79	83	**80**
DE	97	72	100	84	74	80	94	73	54	**86**
GR	97	67	68	62	95	61	12	21	48	**66**
ES	100	96	88	72	80	44	47	98	80	**82**
EE	96	88	72	95	100	68	93	93	100	**86**
FR	2	0	18	58	0	15	0	0	60	**14**
IE	97	67	59	81	85	28	59	46	47	**66**
IT	87	44	20	86	8	32	40	63	42	**46**
CY	2	7	83	48	100	24	15	71	48	**41**
LV	67	85	51	100	78	74	59	89	69	**70**
LT	72	63	95	67	100	65	0	98	84	**73**
LU	89	72	92	62	40	36	48	64	90	**73**
HU	74	84	24	50	90	49	81	98	80	**62**
MT	13	13	65	36	35	47	7	0	48	**33**
NL	100	88	75	72	81	47	80	94	63	**79**
AT	93	63	68	65	90	42	27	21	91	**67**
PL	72	65	40	81	50	67	40	43	95	**59**
PT	80	65	23	87	24	56	57	69	97	**57**
RO	69	41	5	48	30	24	0	29	48	**32**
SI	75	80	87	71	80	64	63	93	69	**77**
SK	75	89	93	98	88	79	97	80	74	**86**
FI	33	89	71	98	84	72	86	95	100	**73**
SE	89	77	71	95	100	56	77	83	92	**79**
UK	70	46	74	54	80	33	24	51	22	**56**
CH	82	57	39	73	39	70	56	68	98	**62**
NO	100	39	77	71	95	47	42	54	61	**69**
TR	72	22	31	43	30	41	11	0	33	**36**
TOTAL	**70**	**52**	**52**	**68**	**51**	**45**	**41**	**51**	**57**	**55**

Table 2. Proportion of variables available in the 2004 Urban Audit round (values in %). Source: Eurostat

In 2001, the situation was slightly better in terms of the response rate (but also far from complete), but at the same time, the 2001 data is obviously less up to date and some of the quality checks implemented now were not in place at the time. Nevertheless, the team working on the second edition of the State of European Cities report, for example, has decided to work with 2001 data, as they have concluded that the 2004 data is not complete enough. Their analysis also shows a very clear national bias in the response rate, thus making impossible even the use of a selection of cities as a sample. As the first State of European Cities report was already based on data from the 2001 round, it seems that it does no make much sense that our project create a third attempt in interpreting the same data.

4 The data is from the beginning of 2009 and some improvements can be noted since then, but only marginally. France will deliver its data in the summer when local micro-census data is ready.

- However, even if data was available, the problem of city delimitations remains. City delimitation is obviously a very difficult task and many different efforts exist (see the ESPON DB project's work on comparing urban databases), but the UA shows some particular issues:
  - While it is clearly understandable that for data availability reasons cities should be defined using existing administrative units, it is not clear why core cities should be defined as units lead by one leading authority[5]. Scientifically, especially at European level, this makes no sense at all, and it is not very clear what the political sense of this definition should be.
  - For different reasons, the national UA coordinators do not always communicate with the individual cities, sometimes leading to very questionable definitions of the city delimitations, not even recognised by the city itself.[6]
  - In some countries, political reasons seem to explain the choice of city delimitations, even if these politically motivated delimitations do not allow a comparison with other European cities.

The ESPON DB team has spent a considerable amount of work trying to understand the different city delimitations and compare them.[7] The following table provided by that project shows that the definition of larger urban zones has very different meanings between countries, thus leading to different meanings of the data related to them.[8]

NAME	Clear functional definition	Probable functionnal definition (to be precised)*	Administrative definition, except for Capital city	Administrative definition
Belgium				
Croatia				
France				
Netherlands				
Poland				
Portugal				
Spain				
Sweden				
Finland				
Germany				
Norway				
United Kingdom				
Austria				
Cyprus				
Denmark				
Slovakia				
Slovenia				

Table 3. Functionality levels in LUZ definitions, Urban Audit 2004, © ESPON DB 2013

5 as was explained during the Urban Audit city panel workshop end of March 2009 in Berlin.

6 idem

7 See the ESPON DB project's first interim report.

8 See the technical report in annex 10 for more details about this table and a comparison with 2001. Our thanks go to the ESPON DB team for this contribution.

**: The methodology used to build LUZ is described very shortly in National Final Reports or other official sources and need to be clarified by furthered research. Sources: Final Reports on Urban Audit Round III (collection of countries), 2008; European Regional and Urban Statistics - Reference Guide; Office for Official Publication of the European Communities, 2008, pp. 16-17; Urban Audit GISCO shape files*

An example at the core city level of such an effect is that of the city of Liège where limiting the core city to the sole LAU2 of Liège led to an underestimation of the core city population, thus falsifying all indicators calculated using this population as a denominator, as many social and economic phenomena are concentrated in the central part of the core city, while its population may not be.

- As a final point, it is important to note that Eurostat seems seriously understaffed for dealing with the important amount of work linked to the collection, validation and management of the UA data, especially seen the state it often is delivered in (linked to first point)

Whatever the reasons, it has become clear that the 2004 round of UA data is hardly usable as confirmed also by the team working on the second edition of the State of European Cities report. In light of the above issues, the use of any Urban Audit data seems very difficult in the context of this project, or even impossible most of the time. The Urban Audit has great potential as an important source of information and data in the future, but at this stage it is still somewhat work in progress. It will probably take some time until this potential is fulfilled. We, therefore, will have to use alternative sources.

1.2 Alternatives

As our main goal is data availability, the choices of alternatives are limited. One the one side, we can approximate larger urban zones of cities by NUTS3 or even (for the large ones) NUTS2 and thus access the data available at these levels. This is the easiest solution, but obviously with some reservations concerning the actual representativity of NUTS data for the reality of the city. DG Regio has provided such approximations, but the proportion of the population of the LUZ in the population of the NUTS3 is sometimes so small (less than 50%) that we find the use of these approximations questionable. In annex 11 we thus propose our version of such an approximation, both for NUTS2 and NUTS3. Another question is whether to completely abandon the UA, even as a reference for approximations, and rather use NUTS approximations of, for example, ESPON FUA, which should lead to the inclusion of a few more cities into the selection.

On the other side, we could try to use lower-level, i.e. LAU data. The CD-Rom containing the Eurostat SIRE database only reached us during the final editing work on this report and so we do not know, yet, what is available in this database and what is actually usable. The data collection at LAU-level foreseen in the ESPON DB project has also not advanced far enough, yet, to be of use for us.

We thus have to turn to other databases which can be adapted to city level and this actually represents some of the largest data collection effort in this project, notably the collection of firm data from the Orbis database and of transport data from online time tables. More on that in the respective sections on our empirical approaches.

In conclusion, we will have to be very flexible in terms of data, and also accept that if we want to go into depth and not only breadth in the understanding of cities, we might have to leave out some cities in specific analyses. The experience in ESPON 2006 has shown us that this might be preferable to a desperate search for indicators available everywhere, which

generally leads to very superficial, or even outright wrong, proxies to the phenomena we are trying to analyse. We would rather accept white spots on the map if the available data allows in-depth analysis, obviously watching out for possible regional specificities that might be lost.

2. The application of a European standard delineation of FUAs/LUZ, in particular in countries not included in the Urban Audit or in countries with very few large cities.

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In the desire to find a better spatial balance in the analysis of cities, and to extend the coverage beyond the strict ESPON space, it is asked of the project to add some cities to those in the Urban Audit, both in countries already present in the Urban Audit and in others which are not part of the data collection. We presented a preliminary choice of cities and information on data availability in the inception report. As we have received no fundamental objections, we have continued according to the indicated plan. However, even though we have studied in detail the possible delimitations of cities in the different countries, in light of the terrible state of UA data, we will certainly limit our efforts in these countries to NUTS approximations of cities, as it would not be worth our time and effort to collect detailed core city and/or LUZ data if we do not even have that data for UA cities. Because of the delay in information concerning the state of Urban Audit data, and the resulting adaptation of data strategy, data collection for these additional cities is still ongoing.

For more details concerning the cities chosen and proposed delimitations, please see annexes 12 and 13.

Chapter 3. Our empirical contributions

1. Competitiveness

1.1 Operationalising the regional competitiveness approach through simple indicators

On the basis of the competitiveness pyramid presented in the literature review above (see figure 1 in the theoretical part), we decided to map a series of indicators linked to the different drivers of competitiveness. In order to have relevant data, we opted for NUTS3 approximations, unless we had specific city-related data. Wherever possible, UA data will obviously be used, but this will rarely be possible. This part thus presents a few very preliminary examples of a very "simple" analysis of the factors of competitiveness as defined in our competitiveness pyramid. At this stage, these first preliminary "results" should better be understood as examples of what we will deliver than as in a finalised state, notably because of the data still to be collected for some countries/cities. More maps are in annex 2a.

Figure 3 presents the economic structure of the cities (LUZ approximated by NUTS3) in 2005. From these maps, we can distinguish the cities according to their main specialization: high-level services, public services, manufacturing industries. The economic structure of the city has to be put in relation with the insertion of the cities in the global networks, on the one hand, and to the economic performances of the city, on the other hand. Precisely, Figure 4 gives two examples of the participation of the cities in the global economy: transnational headquarters is a good indicator of the commanding function of the city while the offices of advanced services are an indicator of the insertion in global cities networks. This type of indicator could finally enable us to classify cities according to the intensity and the nature of their insertion in the global economy.

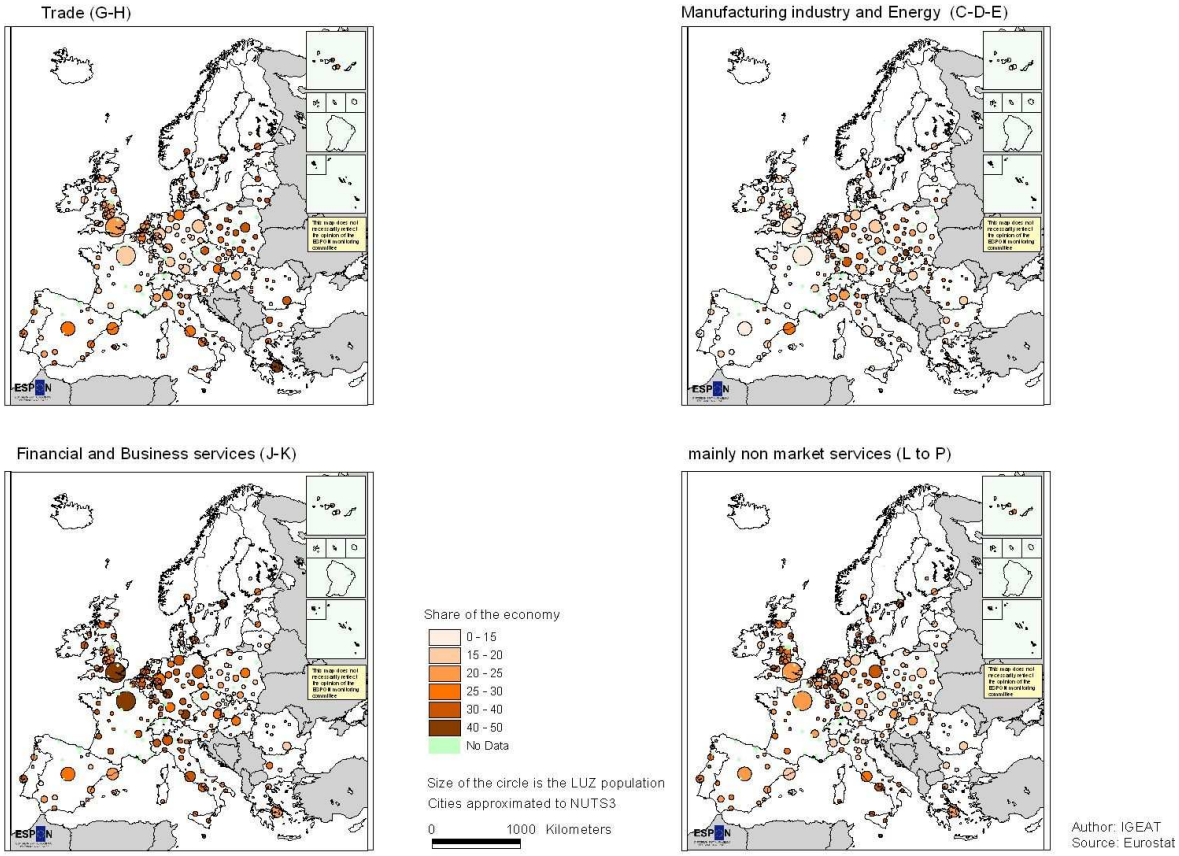


Figure 3. Economic structure of the cities in 2005

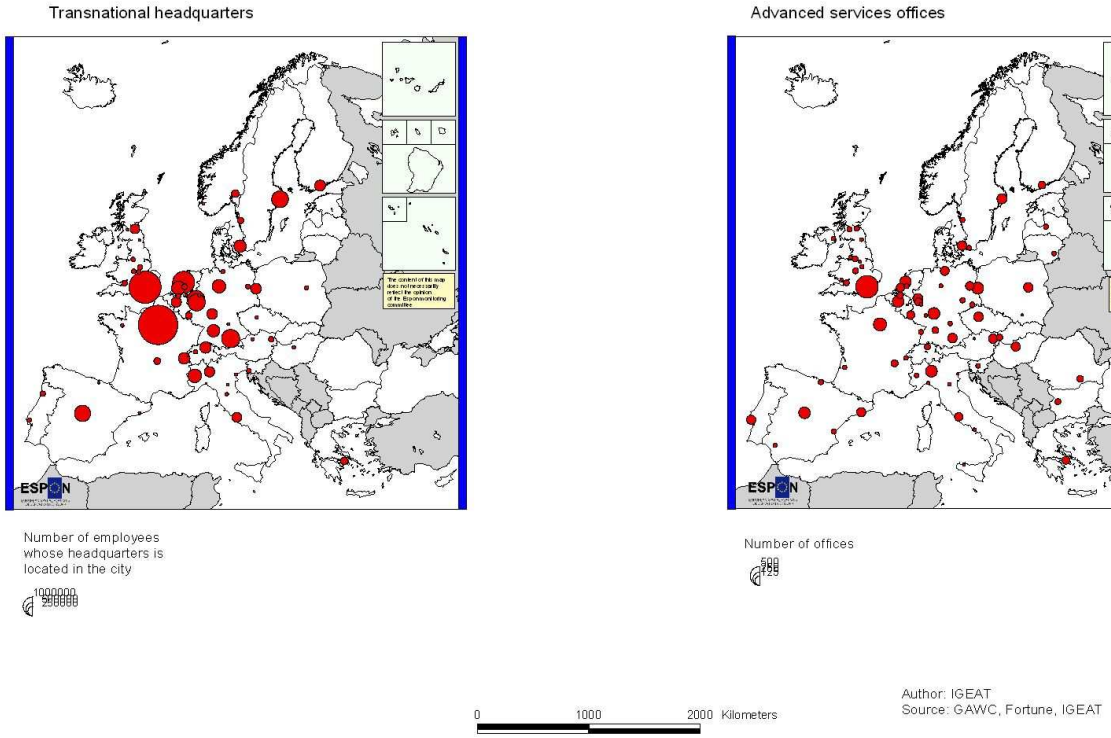


Figure 4. European cities in the global economy

1.2 A meta-analysis of existing typologies

Several typologies of the largest European functional areas are already available from published materials. Five main references (Cattan et al., 1999; Taylor et al., 2004; SDEC, 1999, Rozenblat, Cicille, 2003, Boyle et al. 2004) will be used and compared in a systematic way for producing a new typology of urban functional areas according to the criteria of economic competitiveness. The existing classifications are rarely complete in terms of number of cities that are included, and they may slightly differ according to the indicators that were selected for establishing them. We shall harmonise the information about the type of cities, according to a cross classification of their hierarchical level in Europe, also in the state where they are located, and a degree of specialisation in the activities of the last three main innovation cycles. This harmonisation will be made with the help of a sample of relevant indicators extracted for the urban audit or other sources, and used for cross checking the inclusion in a class and the mean level of the relevant indicators describing the profile of each class.

1.3 Selected networks for measuring urban competitiveness

In order to complete the static cross-sectional typology of cities established according to indicators of capacity regarding economic resilience and innovation adoption, we shall analyse two types of networks that are especially representative of the linkages enhancing these capacities:

Financial links in multinational firms networks

Multinational corporations increase interdependencies between cities by the way of financial links, global value chains and strong (sometimes dominant/dominated) relationships leading to diffusions of various technologies, production modes, enterprises cultures. In order to measure these relationships and the position of cities in corporate networks, we built a database including all the direct and indirect subsidiaries of the first 4.000 worldwide companies groups by their turnover based on the Orbis Database of the Bureau Van Dijk. Each group is seen as a (quasi) tree, owning subsidiaries which themselves own other subsidiaries and so on, resulting in a sample of 700.000 subsidiaries located all over the world, which are directly or indirectly owned (at least at 10%) by the main first 4.000 groups. These subsidiaries are located, defined by their activity sector (NACE) and by their owners and subsidiaries.

Specialised research networks for the next wave of innovative activities (convergent technologies, NBIC):

From the analysis of scientific collaborative networks we may derive some critical inputs regarding the wider geography of European cities' interactions in innovation. In order to study the most innovative scientific sectors, we focus on NBIC technologies (nanotechnology, biotechnology, information technology and cognitive science) commonly named "converging technologies". For the analysis, we consider scientific and technological collaborative links between research organizations within European funded research and technology development projects (RTDs) dedicated to converging technologies. Data come from the EC database CORDIS RTD-PROJECTS drawn from the 2nd to 6th European Framework Programmes for Research and Technological development. We can then create urban networks, by aggregating CORDIS data at the city level for measuring the links which are created between cities by these networks.

1.4 Measuring the relative importance of cities within networks

Several indices and measures can be used for measuring the relative importance of nodes within a graph (network). Here we propose a short presentation of the principal indices we will use (see the annex 2b for a detailed description of each of these indices):

- Polarisation: measures the attraction power of cities
- Degree centrality: the relational activity of a city
- Betweeness centrality: the potential intermediary role of cities within a network
- Indegree: the extent to which a city is commanded by other cities
- Outdegree: the extent to which a city commands other cities
- Variety of geographical orientations of cities connexions
- Variety of types of networks (firms activities or research thematics)

These indicators allow us to examine the positioning of cities within the two types of economic networks studied (financial links in multinational firms networks, and specialised research networks for the next wave of innovative activities), and, possibly, in combined networks, including some of the transport-related data.

1.5 First results

Maps 3 and 4 are first examples of network indicators on research networks. For example, the betweenness centrality indicator (map 3) shows that Paris and London, and more generally European national capital cities have strategic positions within scientific networks dedicated to NBIC which can be interpreted as their potential capacity to control the circulation of knowledge spillovers that flows within European cities, whereas the relational activity of cities as measured by the degree centrality is less hierarchical (map 4).

For the Orbis data, geocoding and validation procedures are still ongoing, so no results are available, yet. First results should arrive during the summer.

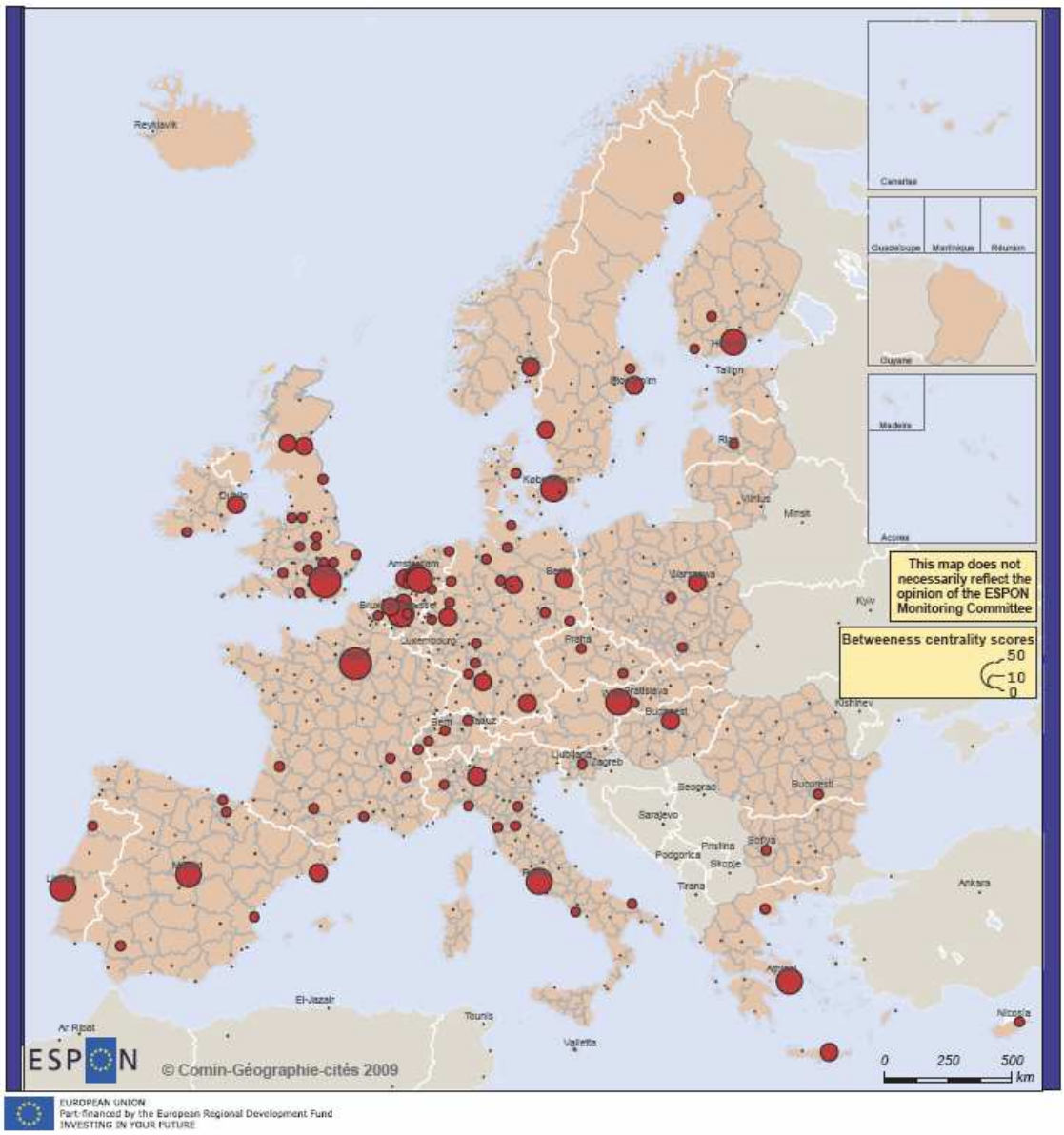


Figure 5. European cities' centrality within scientific and technological networks dedicated to NBIC

Notes: betweenness centrality measures the potential intermediary role of cities within a network: the more a node occurs on many shortest paths between other nodes within the graph, the higher is its betweenness centrality. Here, betweenness centrality (X 1000) is calculated with Pajek software.
Network construction: scientific and technological collaborative links between FUAs. NBIC technologies projects. Data come from the EC database CORDIS RTD-PROJECTS drawn from all Framework Programmes for Research and Technological development, from 1986 until 2006. Undirected and unweighted graph.

Source: NBIC-Euro database.

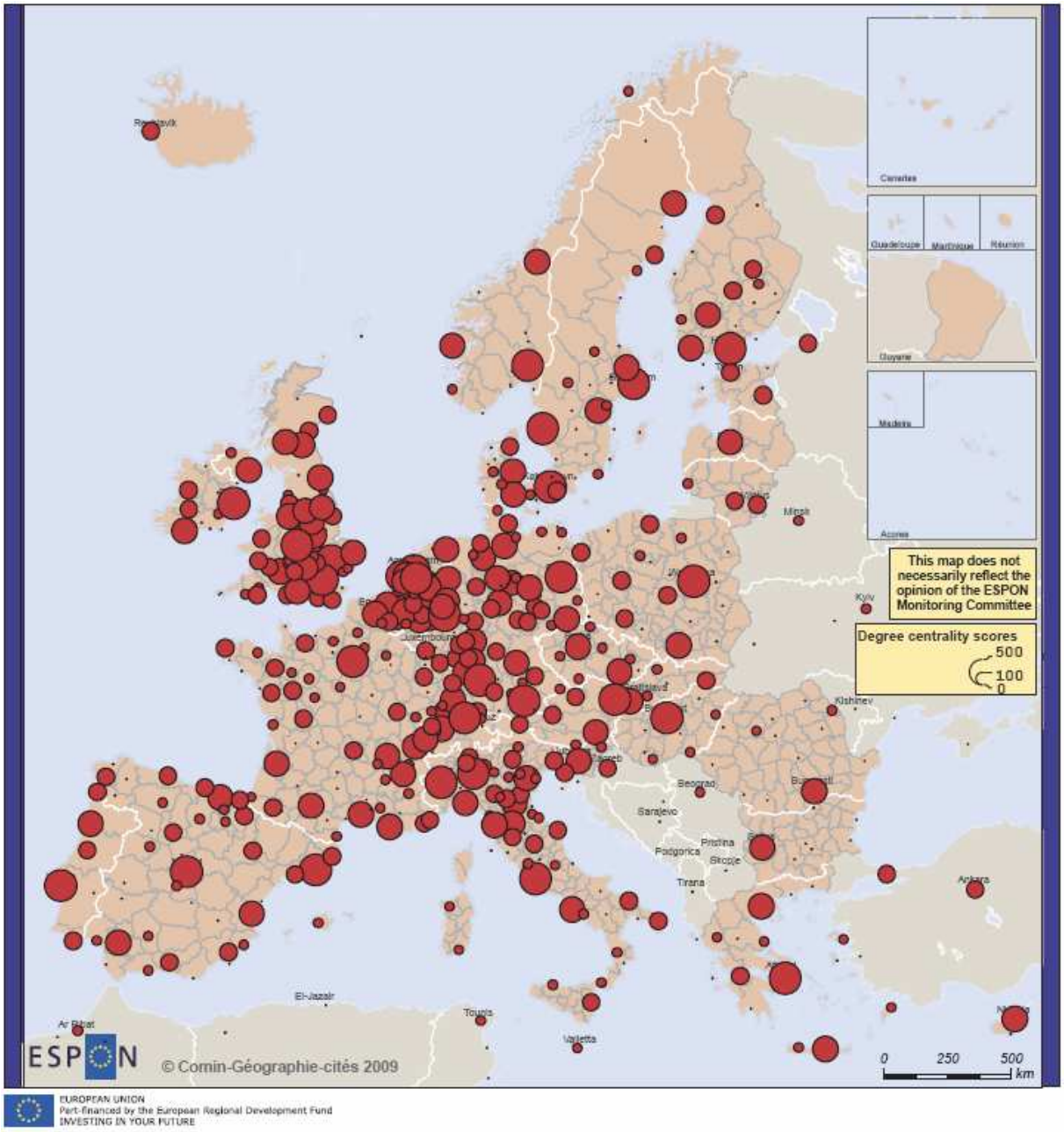


Figure 6. Participation of European cities to the research networks about NBIC (degree centrality)

Notes: calculated with Pajek software. Network construction: scientific and technological collaborative links between FUAs. NBIC technologies projects. Data come from the EC database CORDIS RTD-PROJECTS drawn from all Framework Programmes for Research and Technological development, from 1986 until 2006. Undirected and unweighted graph. Source: NBIC-Euro database

1.6 Dynamic analyses

In addition to the static analysis of networks, we propose a dynamic analysis of urban relations in two ways:

First, longitudinal data allow us to describe the evolution of a network as a sequence of static networks evolving through time. Then it is possible to compare different local or global parameters (e.g. table 2) at each sequence: 1986 to 2006 for research networks and 2007 to 2010 for firms' networks, the latter hopefully providing some first insights into the territorial impacts of the crisis.

Second, there are models of evolving networks allowing us to study the evolution of the entire network with statistical parameters that are used to test assumptions about evolution of networks at global scale.

1.7 Conclusion : dynamics of city networks

According to our analyses of the two large data bases we have on European city networks, with the help of these position indices, we expect to derive a dynamic typology of the situation of cities within the European urban system. Since network dynamics are reinforce the urban hierarchy while at the same time extending the scope of the network, we shall identify which cities can benefit from a future improved situation in the emerging European polycentric urban hierarchy.

According to the participation of cities in the expanding networks of multinational firms, as well as their capacity to participate in the next innovation wave that is measured by their position in the NBIC research network, we shall add a dynamic aspect to the typology of European urban areas that encapsulate some relevant information about their possible future evolution.

2. Accessibility

In order to complement existing accessibility indicators, we propose a series of three indicators to assess the relations between cities and possible determinants of their competitiveness: contactability, attractiveness for business and attractiveness for short leisure stays.

In collaboration with the polycentricity team and the city-hinterland team we will also, if local data is available, provide some analyses concerning the transport relations within their case study areas.

2.1 Indicator of daily accessibility from a city: contactability

As the quality of the link between two poles can be assessed through the possibility to go from the pole A to the pole B, to have enough time for an activity related to work, education or other purposes, and to come back to pole A in a single day, we propose to evaluate the possibility of single day business trip with 6 hours available at destination and within the

time window 6h-22h, in a door to door approach and detailed as follows.

Figure 7. Structure of return trips used as definition for contactability indicators

This criterion can be used to define a minimum service provision for the functioning of city networks and applies on the links in the network.

This family of indicators deals with intermodality by allowing to compare modal accessibilities (rail, air, road), and intermodal accessibility (air-rail), but also by taking into account the initial and terminal parts of the trips.

Concerning the collective transport systems –rail and air– the main data considered is the timetable information.

2.2 Indicator of daily accessibility to a city: attractiveness for business purpose

Reciprocally, one can assess the possibility for a city to host an event gathering people from remote metropolises. The same criteria are used but inversely, to allow for people from city A to get to city B, and to hold a meeting there. The indicator expresses the attractiveness of city B to organize a conference, an event with several persons.

This indicator will be necessary to develop a congress activity of a city, but also more generally useful for universities, research centres, firms headquarters that need to gather persons from several remote cities, for seminars, colloquia and board meetings.

2.3 Indicator of short-stays: attractiveness for leisure purpose

This indicator measures the possibility to do short stays in distant cities for tourist purposes. It measuring the possibility to do the one way trip, focusing on

- Friday air supply,
- direct flights only
- assuming that the return will be possible a few days later (hypothesis to be tested on a sample of OD pairs).

As for the business oriented indicator, we can measure the possibility for a city to emit short-stay trips (measure at origin city) and the possibility for a city to foster short-stay (measure at destination city)

This indicator will also allow a better understanding of the role of low-cost airlines which are more relevant on this type of air mode use, as opposed to heritage airlines more especially dedicated to business trips.

2.4 Data gathering

The data necessary to compute these indicators are timetables for the air and rail transports systems.

Concerning air transport the list of airports is currently under constitution. It will include all commercial European airports. The attention is currently focused at adapting the automatic collecting tool to a website including both classical and low cost airlines1.

Concerning the rail system an automatic query of the major cities and major rail nodes has been executed on the Deutsche Bahn website2. It covers all direct trains between cities in Europe for a typical weekday of the winter 2009. The base of the urban grid is constituted by the Urban Audit list of cities. Currently further investigations are conducted to assess the possibility to complete the database to include smaller cities (e.g. all ESPON FUA). The territorial base includes all countries of the ESPON space up to Moscow. Some parts of the network missing in the Bahn database are currently being completed through national timetable servers: Ireland, Greece, Portugal and Northern Spain.

3. Social Cohesion

The main objectives of the analysis of the social indicators are the following:

- to produce a general picture of social cohesion in the European cities;
- to cross relevant social cohesion indicators with economic data to test the hypothesis of that with the new forms of growth in the globalized and knowledge-based economy, social cohesion is more and more decoupled from economic performances.

3.1 Social cohesion indicators in the Urban Audit

Social cohesion is a complex matter and can be apprehended through many different indicators. Based on an approached proposed by the OECD, we can define 4 types of indicators related to the major dimensions of social cohesion: self-sufficiency, equity, health, participation to social life and social pathologies.

It is important to note that cities have very different types of spatial structures. In social terms, this has huge consequences when comparing social cities between cities. While in some cities, the most deprived districts are located in the peripheral parts of the city, in other cities, poor districts are located near the centre. As a result, social indicators have to be compared at functional urban area (the LUZ) level in order to provide a more homogeneous comparison between cities than at core city level.

A first attempt at using Urban Audit indicators has shown that they are too incomplete to be usable for this analysis. See annex 4 for details.

The most useful part of the Urban Audit concerning social cohesion is the perception survey which gives interesting data about the perception of the inhabitants about several decisive aspects of social cohesion in the cities (services, security….) and covers 75 medium and large cities. To better understand the actual meaning of the perception indicators, in relation to the "objective" situation in the city, we can cross the results of the perception survey with more objective data, notably at NUTS level (see below).

3.2 Alternatives for data and analysis

NUTS3 proxies

To respond to the difficulties in using the Urban Audit we have decided to elaborate a database at NUTS3 level. NUTS3 data of social indicators are relatively poor on an annual base but a bit more consistent for 2001 – the census year – for which data on dwellings, activity, household composition or education are available.

These data will allow giving a more complete picture of social indicators (first objective). It

will also enable us to cross social indicators with economic performances in order to give a first approach to our second objective.

Unfortunately, these data only give average figures for the whole city which is quite insufficient to tackle the social cohesion which also requires data at the individual level (unequal access to incomes, services…) and district level.

Deepened analysis for selected cities

As already mentioned, the selection of cities in the Perception Survey is a good point of departure to produce a more complete and sophisticated database on selected cities. Since many of these cities are very big, they could be approximated at NUTS2 level which gives access to a much wider set of data including from the Labour Force survey.

This database on selected cities combining the perception survey and NUTS2 data will allow producing the following analysis:

- synthesize the perception of the cities by its inhabitant;
- to confront the subjective perception to some – when available – objective indicators, including urban audit indicators of course and data using NUTS3 or NUTS2 proxies
- to confront the subjective and objective social indicators with economic welfare.

The following graphs give some examples of this comparison between subjective and objective data in different fields. The comparison is not always easy to do because objective measures are often incomplete and objective indicators are unsatisfactory. This could explain the absence of correlation between the number of hospital beds and the subjective satisfaction with hospitals since quantity is surely not the most important aspect when citizens evaluate their hospitals. Many other examples – but incomplete in terms of data – show this absence of correlation (housing price and its perception, incomes and financial difficulties…) On the other hand, the perception of easiness to find a job is very well correlated with unemployment rate as well as the share of foreigners in the city seem to degrade the perception of the quality of their integration in the city.

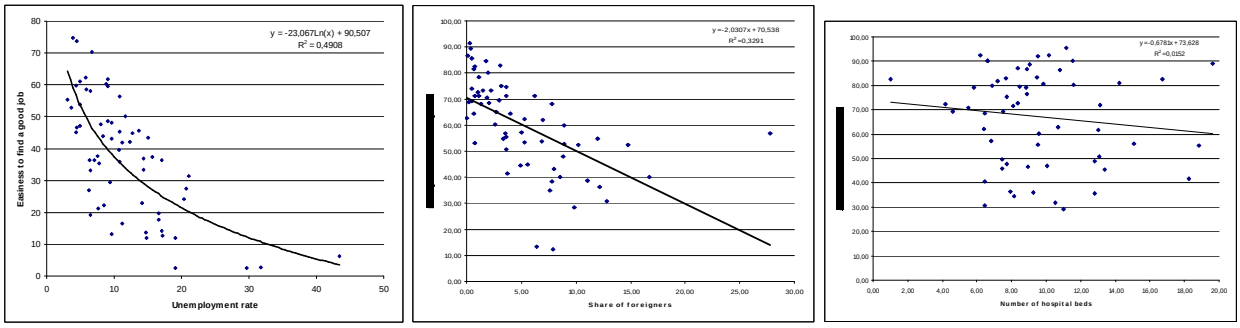


Figure 8. Comparison of perception survey results and NUTS2 data concerning respectively the labour market, foreigners and health services (see annex 4 for larger versions of these graphs)

Case studies

In order to answer the decisive questions of the relationship between economic welfare and social indicators, especially social and socio-spatial inequalities, we will have to select some case studies to gather original and complete set of data at individual and district level.

(Quantiative) Case studies will be selected through two different criteria: the city's position in the world networks (world cities, European cities…), and the national context in which these cities are embedded using the Esping-Anderson typology defining three different types of welfare state in the rich countries: the liberal, the social-democrat and the corporatist (see the annex for details).

The following indicators will be gathered:

- indicators of economic welfare (incomes and GDP/inhab.);
- indicators of economic structure (sectoral and professional structures);
- social inequalities at individual level : distribution of incomes, access to employment according to the graduation level;
- social inequalities at the district level: graduation level, income level and unemployment rate.

We propose the following cases which cover different types of cities in different regions of Europe (provisional list nearly all included in the perception survey): London, Paris, Brussels, Berlin, Stockholm, Zurich, Hamburg, Madrid, Warsaw, Bucarest, Oslo, Lisboa, Malmö, Antwerp, Athens.

4. Environment

4.1 Introduction

This section provides first, preliminary and incomplete, results on the analysis of types of growth of European cities which should help to better understand the process of urban sprawl.

The second step of the work, to be developed, will relate these typologies with different environmental issues like transport, air pollution and emissions in the European cities. As there is a big gap in knowledge to understand to what extent there is a differential impact of certain policy options (polycentricity, competitiveness, overall performance) on the environment we will also attempt to address this at least partly in the coming months, thus analysing the relation between the three sides of the sustainability triangle in the development pths of cities.

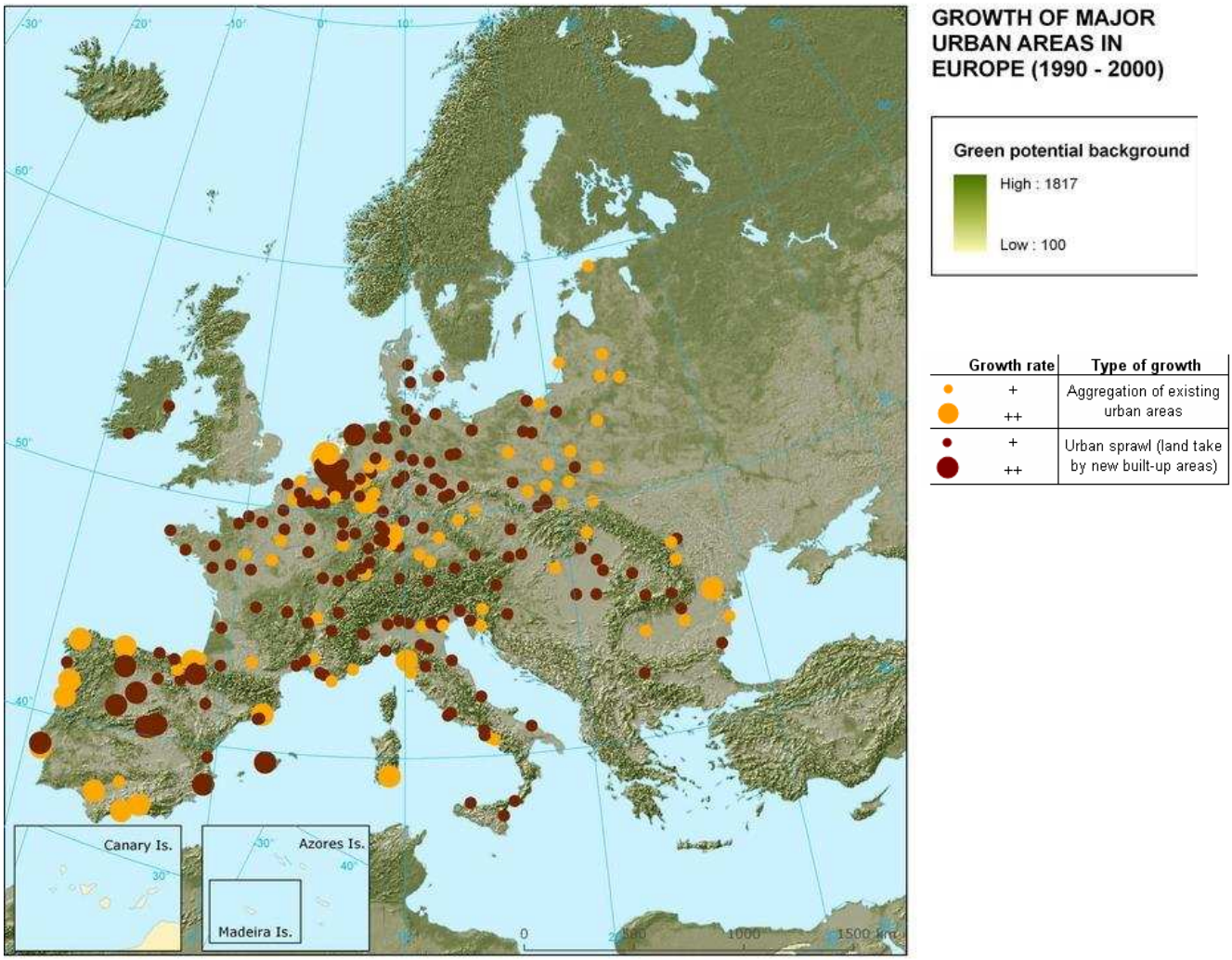
4.2 First results on urban sprawl

The growth of urban areas in Europe has been taking place at different rates in the last decade (1990-2000): from 0.7% up to 70%. Rapid growth of many European urban areas is explained by two different processes:

- New built-up areas have been connecting existing scattered settlements. As a result, former small urban areas become part of the same conurbation.
- The growth is mainly due by new built-up areas. This would be an example of urban sprawl.

Combining the rate of growth with this typology, four groups of cities can be identified (Map 7):

- Urban areas with small to mid rate of growth (< 20%) due to aggregation of existing settlements. They are mainly located in central and eastern Europe.
- Urban areas with high rate of growth (>20%) dominated by the aggregation of existing settlements. Most of these cities are located in Spain, mainly on the coast, and Portugal, followed by Netherlands.
- Urban areas with small mid rate of growth (< 20%) caused by increase of new built-up areas. These cities are scattered all over Europe, although they are less frequent in Spain and Portugal.
- Urban areas with high rate of growth (< 20%) caused by increase of new built-up areas. These conurbations are located in Spain, followed by Portugal and Netherlands.



(UK is missing because landcover changes were not available at the time of processing the information).

Figure 9. Type of growth of urban areas in Europe (1990-2000)

As can be seen in Figure 8 different processes of urbanisation are related to different efficiency in the use of the land: urban areas resulting of aggregation of existing settlements show a higher degree of redevelopment over existing built-up areas. On the other side, urban sprawl is less efficient recycling existing urban fabric. This pattern is modulated by the rate of growth of urban areas: at higher rates the percentage of redevelopment is reduced.

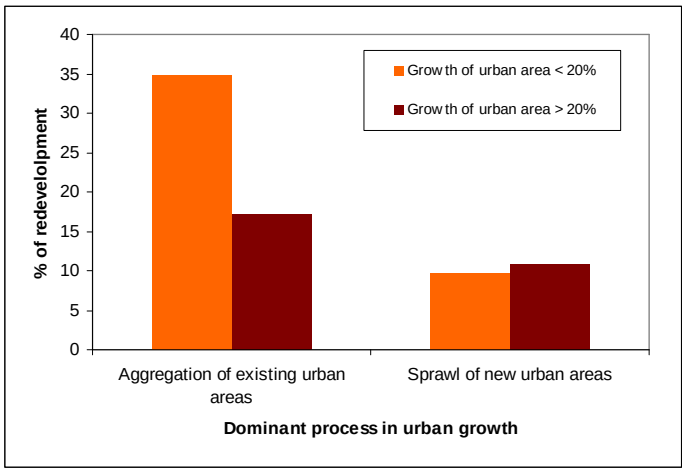


Figure 10. Redevelopment of existing built-up areas as percent of total increase of built-up area (1990-2000)

The effect of rapid growth is also observed on the land taken by built-up areas inside the cities (Figure 9): up to 25%, as an average, is taken in the case of sprawl of new urban areas.

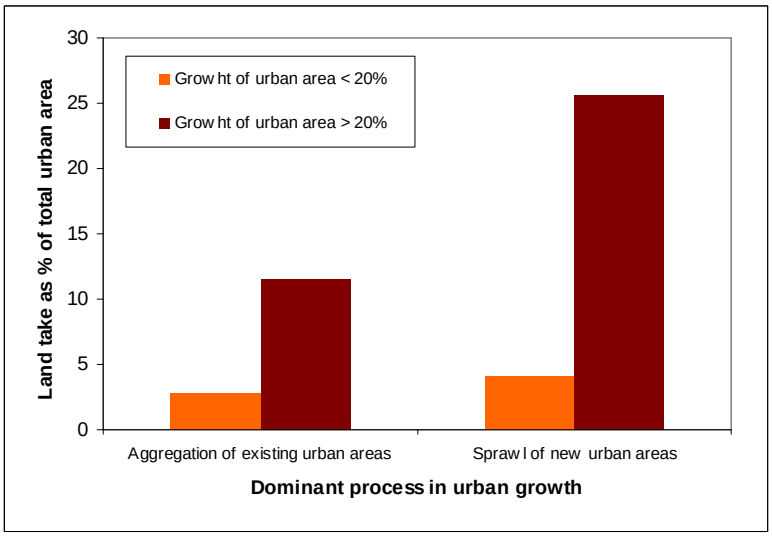


Figure 11. Land take by built-up areas as % of total urban area (1990-2000).

The new built up area is mainly used for residential purpose and, in all cases, dominated by the growth of diffuse urban fabric. Industry is relevant in the following cases:

- Larger cities
- Smaller growth rate
- Northern and eastern cities.

4.3 Next steps

As already mentioned, the next step in the analysis will be to relate these different types of growth paths and mecanisms to other environmental indicators and to economic and social development paths in order to study possible links between them.

5. City-Hinterland relationships

The research intends mainly to describe the current situation and changes in the linkages between the metropolis (the metropolitan area) and the outward regional surroundings (the metropolitan macroregion). The analysis will be focused on different aspects of such relationships, ranging from economic cooperation through the impact of the developing city on its surroundings to various services and supplies provided to its regional hinterland by the city that might be derived from different theories.

At the first stage, research focused on the European level including a typology of metropolitan macroregions based on GDP level and growth that may allow verifying the hypothesis that the difference in the level of development between metropolis and its region has been increasing as a result of metropolisation process. At the next stage, the analysis will be enhanced by including other aspect of relations between the metropolis and its region. As a result, this should allow formulating more detailed hypotheses on how the city and the hinterland influence each other and which types of cities pull their regional surrounding forward. These will be examined in detail on the basis of selected case studies at the regional level.

The selection of metropolitan areas (cities) and urban macroregions (hinterlands) for the purpose of city-region analysis required an establishment of a number of rules related to: size of LUZ, correspondence between LUZ and NUTS3, combination of neighbouring metropolitan areas, directly neighbouring NUTS3 regions, predominance of larger metropolitan area regions and separate hinterlands. Using these rules, we distinguished 83 metropolitan/urban macroregions for which the configuration of LUZ and NUTS units allowed the delimitation of a city and its hinterland through NUTS approximations. See annex 7 for the detailed criteria, a map and a country-by-country discussion of specificities).

The sample of macroregions selected for analysis was strongly varied in terms of area, population and GDP values. This was true for macroregions as a whole and for their constituent parts, i.e. metropolitan regions and regional hinterlands. It means that the results are strongly dependent on the regional context, which reinforces the need to carry out the analyses in the form of case studies which would complement the statistical surveys of the macroregions undertaken at the European level.

The first part of the empirical study aimed to:

- discuss the developmental dynamics of the core areas in these macroregions compared to other urban areas (see annex)

– compare the degree and dynamics of the internal disparities in the macroregions measured by GDP per capita,

– compare the dynamics of economic growth in the macroregions' constituent parts, i.e. metropolitan regions and regional hinterlands.

The macroregions covered by the study were characterised by a prevailing tendency for increasing the disparities in the development level between metropolitan areas and areas surrounding them (Figure 10), while the declining scales of internal disparities were less frequent. These observations can mean that metropolisation processes spurred a faster development of large urban centres, which at the same time resulted in an increase in the development disparities within the metropolis-region system.

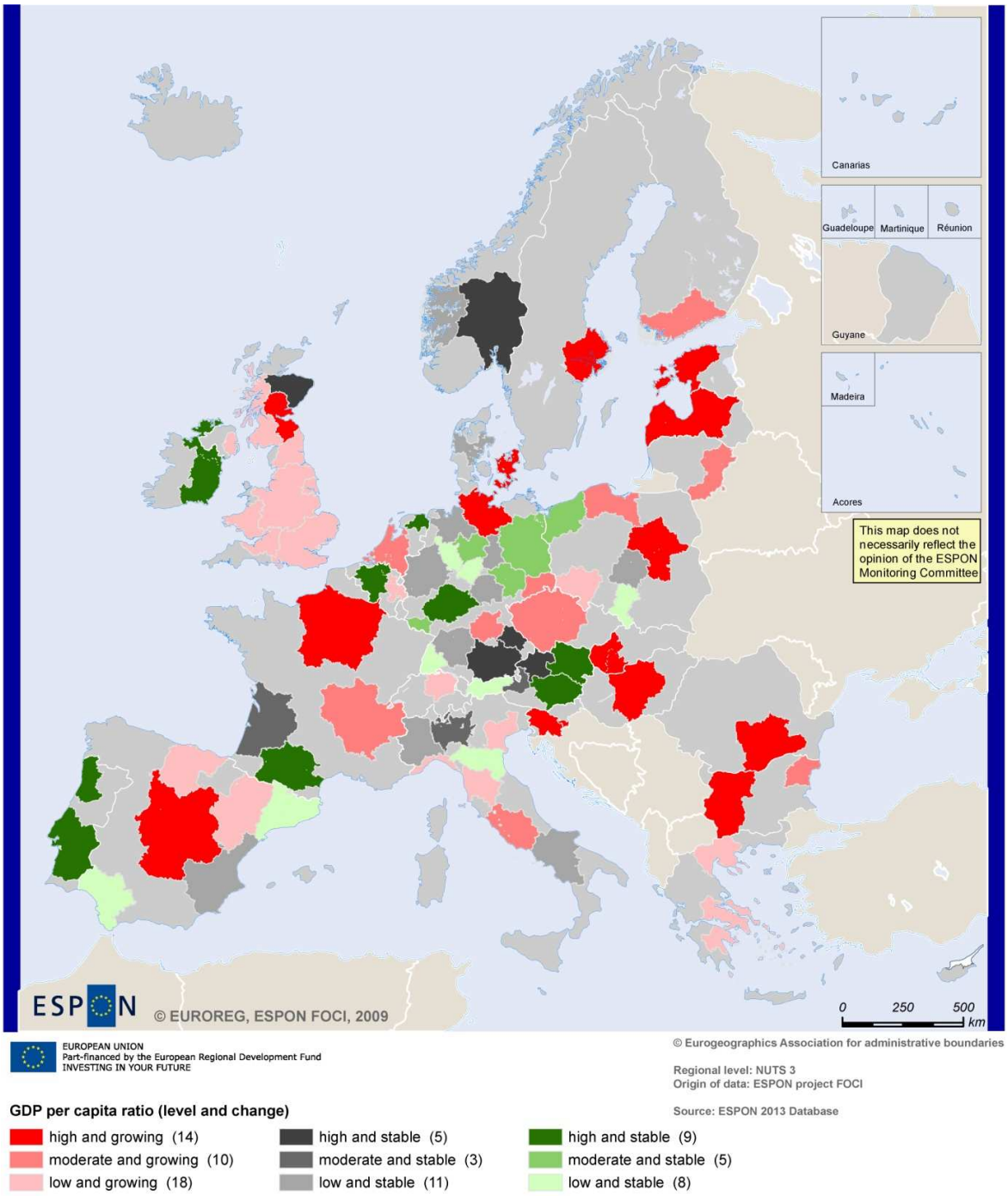


Figure 12. Typology of macroregions based on GDP per capita ratio level and change

Source: prepared by the author.

The development dynamics in the macroregions was rather distinctly correlated with the nationwide rate of growth. Putting the rate of growth in the context of the national average made it possible to clearly show the differences between the regions within a given country (Figure 11). Macroregions where a fast development of the metropolitan area was accompanied by a speedy development of its surroundings could be viewed as a proof of the lack of barriers to the diffusion of developmental processes. On the other hand, an inverse situation could point to structural differences or low accessibility which hampered the diffusion processes or, alternately, to the backwashing of developmental resources from the

periphery into the region. In a situation of a slower development of the centre, its surroundings as a rule coped slightly better than the mean value. This could either indicate relatively weak intraregional linkages or point to a competent use of endogenous resources by the regional hinterland (e.g. related to the development of tourism or modern industries). Nevertheless, there also existed macroregions where both the metropolis and the remaining part of the macroregion were developing tangibly more slowly than the national average; this could be seen as a proof either of their strong intraregional ties or of their structural affinities.

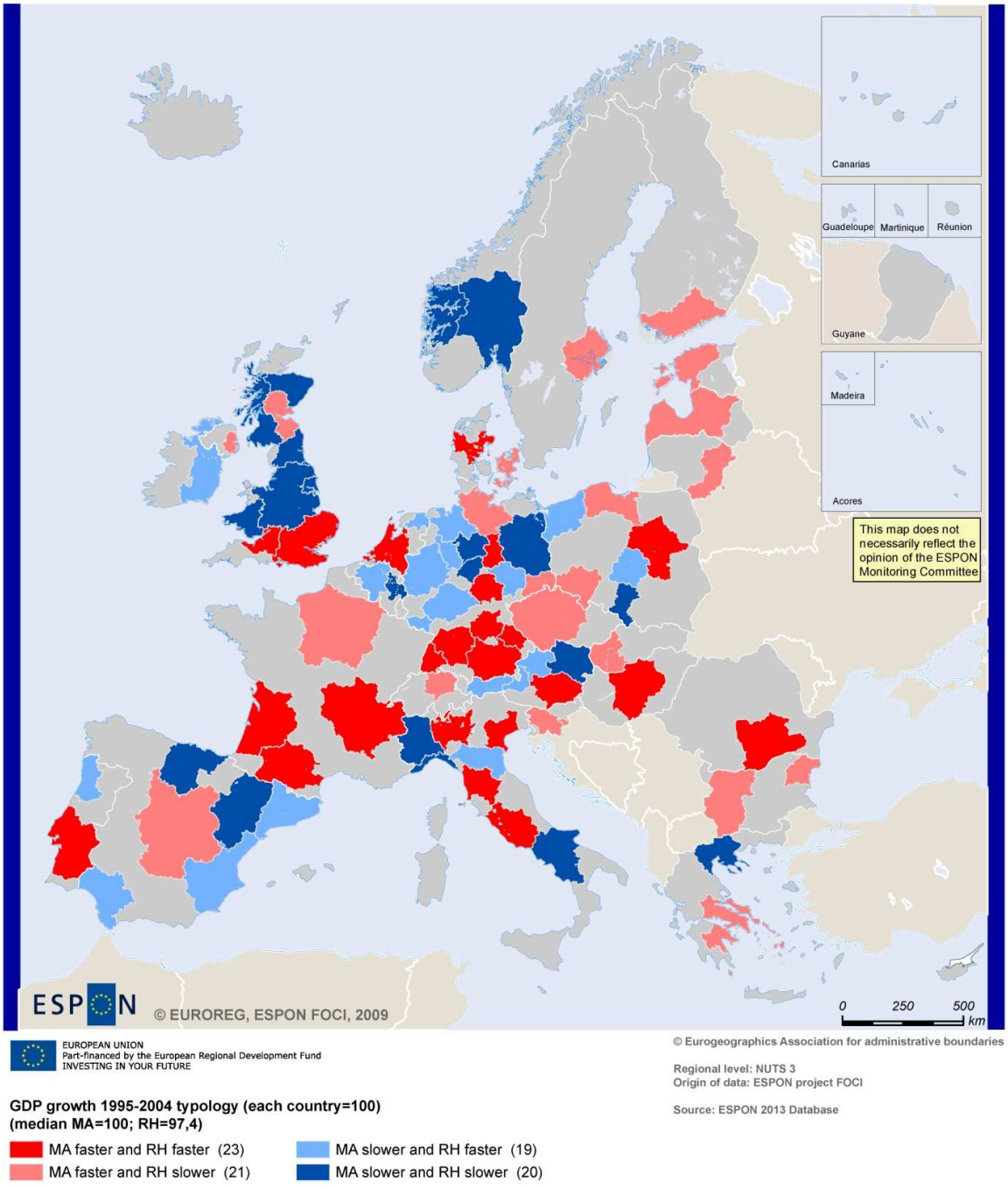


Figure 13. Typology of macroregions based on GDP growth 1995-2004 of constituent parts compared to national average

Source: prepared by the author.

To understand the dynamics of the metropolis-region system in terms of the disparities in the level of economic development as the manifestation of the mutual relationships between a city and its surroundings, we will compare in the next step metropolitan areas and their regional hinterlands in terms of the following crucial aspects: settlement patterns, population change, economic structure, labour market, enterprises sector, innovativeness (R&D expenditures and employment), human resources, technical infrastructure, tourist and business attractiveness.

Based on the data collected, we will prepare a typology of: a) metropolitan areas, b) regions representing their regional hinterlands, and, resulting from them: c) typology of macroregions. Depending on the comparability and completeness of the compiled statistical data, in the research procedure we will either use multidimensional comparative analyses (factor analysis, cluster analysis) or will carry out a multivariate analysis of variance (MANOVA) for the types of macroregions which were distinguished in terms of the level and dynamics of economic development.

However, as statistical data at this scale is scarce, we will study these city-hinterland linkages mostly on the basis of selected case studies. Based on the typologies provided above, we made a tentative selection of macroregions for the study, based on two assumptions: a) macroregions should represent extreme types in the compared evolution of the cities and their hinterland, and b) macroregions should illustrate various situations with regard to the regional GDP dynamics as compared to the national average. In consequence, also taking into account operational aspects, we selected the following macroregions for further research (see annex for more details on these regions):

1. High degree of intraregional disparities and considerable increase: **Warszawa** and **Stockholm**

2. High degree of intraregional disparities but decrease: **Toulouse**

3. Low degree of intraregional disparities, but rapidly growing: **Glasgow**

4. Low level of differences and continuing falling tendency: **Barcelona**

Obviously the above set cannot be regarded as a representative sample. Nevertheless, it can be reasonably expected that the sample in question will allow for a better understanding of some aspects of the relationship between the metropolis and the region in rather extreme situations.

At the regional level, the planned research will include, on the one hand, questionnaire surveys of representative samples of enterprises focusing on organisational structure, supply and sales markets, location factors and level of innovativeness and, on the other hand, in-depth interviews with relevant stakeholders. Such case studies should also allow for collecting additional detailed data at the NUTS5 level on the location of economic activity, commuting, transport networks and changes in land use pattern.

6. Polycentricity

M. Angelidis, M. Lennert, G. Karka

6.1 Introduction

Both the conceptual complexity of the concept of polycentricity and the need for the data on firm and transport networks which will only become available during the next months have lead to the fact that we cannot, yet, present any results of empirical analyses. Intense work has gone into the study and discussion of possible approaches to provide both original and relevant results on the question of polycentricity. Our general objective is to move from an

approach based on the attributes of individual cities to a more network oriented one, thus going from the past morphological approaches based on potential links to one trying to assess "real" links. We will use the network data on firms, transport and (where existing) commuting to identify such existing relations. In this context, we also will have to find a compromise between the need to cover the entire ESPON space and the desire to study polycentricity more in detail and in a way relevant for policy making. The two are unfortunately often mutually exclusive. Our analysis will try to respond to both demands, but, just as in the rest of the project, we will prioritize understanding over coverage. We propose a statistical analysis across (as far as possible) all the ESPON space, and case studies which should allow to go more into depth.

6.2 Statistical analyses

As any analysis of regional polycentricity only makes sense when taking into account all cities of relevant size, the Urban Audit selection of cities is not very useful. We will thus use the FUAs identified in the ESPON 2006 projects as building blocks of the urban systems.

In the desire of moving from morphology-based potential polycentricity to a measure of "actual" polycentricity, we have also decided to use an adapted version of the ESPON 1.1.1 Potential Integration Areas (PIA) as they represent an example of a transport-network based identification of potentials and thus provide an interesting framework to fill with more functional measures.

Any notion of polycentricity is obviously inherently scale-dependant. Our research will focus on "regional polycentricity": on how to improve networking and complementarities between cities at the interregional and intra-regional levels. We will examine which urban networks, polycentric or monocentric, are already integrated and which present potentials to become more integrated. However, even when looking at the same regional scale, the size and types of cities vary so much that it is necessary to elaborate distinct approaches depending on these variables. Notably, we can distinguish three types (or levels) of polycentric relationships:

Cooperation in business and on higher level infrastructures, creating competitive networks and network clusters and improving provision of higher level services

This first type of relation is essentially between large urban areas, be it the ESPON 2006 MEGA or higher level PIA (often above 500.000 inh.) containing at least one large city (above 250.000 inh).

In order to define the metropolitan areas to include in this category, we started from the 77 MEGAs of the ESPON 2006 1.1.1 and 1.4.3 projects. Some of them are mono-nuclear (more monocentric) while others are part of poly-nuclear entities defined as poly-FUAS by the ESPON 1.4.3 project. Apart from them, there are some other poly-nuclear metropolitan areas which do not contain any MEGA.

Their size allows us to approximate them with NUTS3 areas.

For these areas we then propose to:

- Measure the intensity of the internal linkages of these areas as well as of their linkages with other cities / nodes of their national territory based on the transport, firm and research network data.
- Using these network data as well as point "attribute" indicators by constituent city (in order to get an idea about their comparative sizes and functions) approximate a degree of "actual" functional polycentricity in these areas.
- Examine the joint performance of each PIA to identify possible relationships between degree of polycentricity and economic, social and environmental performances.

The results of this analysis will be a typology crossing polycentricity and performance which

will also allow target some case study areas.

Daily commuting, lower level transport and other infrastructures and services, allowing a group of cities to share resources and possibly reach a "critical mass" for economic competition through the exploitation of their complementarities

These types of relationships are relevant **within** both the previous mono-nuclear or poly-nuclear large entities as well as in PIAs which are not dominated by large cities. The individual constituents of these PIAs are not easily approximated by NUTS units and many are not included in the Urban Audit. Data for all of Europe is thus very scarce. However, wherever possible, we will also provide the analysis of the existing firm and transport relations within these PIA. In addition to that, we propose two (potentially three) contributions to the research:

- A better definition of the lower level PIA. We made a first such attempt with the use of the PIAs of ESPON 1.1.1 which led to certain problems. We will proceed to a second attempt with the help of PIA defined according to the 45-minutes (or less) isochrones, approximating Isochrone areas to municipal boundaries using a threshold much more than 10% (of the municipality area) used by ESPON 1.1.1 and a threshold of overlapping between adjacent areas less than 33% used by ESPON 1.1.1. We will also use here certain first relevant results of the WP2/Networks and transport.
- Case studies (see relevant section further down)
- If the LAU2 data in the SIRE database (the data of which was not available to the team, yet, at the moment of writing) permits: comparison of some simple variables to gain some very basic ideas of complementarities on issues such as educational status and age structure)

Cooperation in service provision in order to allow service providers to retain a sufficient size for efficiency while ensuring service coverage for the entire population

This type of relation generally takes place within regions which are distant from large urban centres. They are usually (but not always) predominantly rural. Usually their population at NUTS3 and PIA level is lower than 500.000 inhab. They are more often situated outside of the EU "blue banana" region. Again, data is scarce (notably because we would have to consider a large number of cities with less than 50.000 inhab.), and we propose essentially two contributions in addition to the network analysis wherever that is possible:

- A study of service provision on the basis of point data on universities and hospitals that was used in the Green Paper on Territorial Cohesion and which will serve as an example of such an approach which could be reproduced at national or regional level to study this issue of service provision.
- Case studies (again, see below)

6.3 Case studies

In light of the extreme scale dependence of the notion of polycentricity and the need to understand the interaction between scales, but also the national governance and planning structures, we propose to use an original, multi-scalar approach to case studies. We propose to study three large transnational areas across different scales and thus across the different types of interactions identified above. The proposed areas are:

- North-Western Europe (N-W E)

- Baltic Sea Area (BSA)
- Eastern Balkans

The majority of case studies will address cooperation and complementarities both at the first and the second previously distinguished levels. According to the specificity of each case, one of two levels will be addressed in brief. The different groups of case studies will provide complementary insights of the European regional polycentricity.

A limited number of cases within these areas will address the cooperation in service provision, notably in sparsely population or geographically handicapped regions.

Examples of case studies within these areas include: comparison of poly-nuclear Metropolitan areas: Randstadt – Rhur9; trans-border polycentric development: Greece – Bulgaria and a case in BSA; transnational polycentric development: Baltic Sea area, a case in N-W E and Eastern Balkans; capital city / national urban system: two cases, remote territories: remote and sparsely populated territories in Northern Europe and mountainous regions in Greece.

Case studies should also reflect the very important disparities in "Polycentric Potentials" areas among North-Western Europe and Southern and Eastern Europe. The more precise and final selection of case study areas will be made on the basis of first statistical results for the entire ESPON space.

– **Cooperation in business / higher level infrastructures, daily commuting / lower level infrastructures**

Research on cooperation in business and on higher level infrastructures will concentrate in evaluating the degree of existing complementarities and networking and the lack of linkages by infrastructures and services among its sub-centres and its sub-units. Social disparities in relation to the provision of services will also be analysed. On this base we will evaluate the performance of each one MA.

We will first use attribute data / indicators corresponding to each sub-centre of the MA. Then, internal and external linkages of the MAs will be studied using data on firms' internal structure (with focus on APS) and transport (road, rail, air) linkages. We will compare the composition of each sub-unit of the MA by economic sectors and examine the degree of complementarity of the economic pattern of each sub-unit to the others. Finally, we will evaluate the concordance between political and morphological as well as functional polycentricity in relation with governance and regional identity.

Finally, we will conduct web based surveys on the internal linkages of advanced producer service firms with a limited number of firms' executives in order to understand the importance of links within businesses.

– **Daily commuting, lower level transport and other infrastructures and services, allowing a group of cities to share resources and possibly reach a "critical mass" for economic competition through the exploitation of their complementarities**

Research on daily commuting and lower level infrastructures and services will prioritise the collection of the necessary local data to understand both existing links and

9 As previous research indicates, the Randstadt region does not seem to have developed important functional linkages compared to Rhine-Rhur. The use of additional data on internal linkages will already allow us to advance in the comparison of their performance and deeper research using local data and/or expertise should allow understand some of the factors that explain the difference.

complementarities, notably in terms of infrastructure and resource sharing and complementarities, but also in terms of attempts to reach a "critical mass". We will also study the governance structures and existing policies concerning cooperation. Finally, we will conduct interviews with key persons.

- **Cooperation in service provision**

Individual cases on mountainous regions, island regions, dispersed population areas and other remote rural areas will be proposed after the first results of the work in this section, but integrated in the three above spaces.

Research in these case studies will complement the statistical analysis of provision of health and education services to the population in order to understand more in detail the issues of access to different services and to go to a more detailed level than that of universities and hospitals. If possible, local data will be used, but mostly local expertise.

Methodology

In all three categories of case studies the FOCI responsible workgroup will use existing bibliography and sources and existing data. It will then require local expertise to deal with lack of data, existing analyses as well as to conduct interviews with key actors.

We will elaborate a detailed case study guide before launching the individual case studies.

Chapter 4. Conclusions and outlook

1. Next steps in scenario elaboration

Participatory Scenario Development

David Ludlow

FOCI will create a participative scenario building process, engaging with a carefully selected group of stakeholders from across Europe, representing a wide variety of interests and perspectives.

Scenarios should be relevant for potential end users, and it is therefore useful to involve them in the design process from the outset. This is even more relevant if, as with FOCI, scenarios address large, complex and rather uncertain problems that affect the interests of many different societal groups and are thus likely to stimulate controversial discussions.

The scenario process will thus contain the following elements of stakeholder involvement:

- **Scenario Development** - FOCI project experts develop the alternative scenarios.
- **Scenario Validation Workshop** – to be held in Brussels in the Autumn 2009 involving selected key European stakeholders from the various European and related institutions with distribution across policy sectors and geographical regions including DGRegio, ESPON etc. The workshop will review key uncertainties, driving forces and the scenario logics, as well as considering potential land-use related environmental impacts with the aim to provide creative input into the scenario development process. Outcomes will include validation of the initial choice of scenarios made by the project team.
- **Scenario Iterations** - stakeholders, experts and scenario writers engage in an iterative process of refining storylines until a set of compelling, coherent, plausible and relevant stories and simulations about the future are reached. The methodology offers time for iterations and the refining of qualitative and quantitative assessments, combining participatory-driven storyline development, scientific rigour, imagination and expertise from different perspectives. It can create well-founded and provoking scenarios that really represent a wide range of angles about possible future developments.
- **Policy Options Development** – engagement with key stakeholders of the policy making community including relevant DG's of the European Commission as well as the pan European city networks (Eurocities, UBC, CEMR, Metrex, ICLEI etc) in the development of alternative policy options for the scenarios. This process will address the specification of alternative policy options and the design of policies that can contribute to the planned mid-term review of European Cohesion policies in 2010.

- **Scenario Development Outreach** - in parallel with the above a process of open scenario development outreach is instigated. The main objective was to have the widest possible diversification in terms of interests and perspectives on the issues, comprising stakeholders and experts from across Europe with a broad diversity of backgrounds, i.e. policy-makers representing important levels of decision-making,

i.e. European, national and regional, the pan European city networks (Eurocities, UBC, CEMR, Metrex, ICLEI etc), researchers, as well as representatives of interest groups and independent thinkers. This outreach uses a variety of meeting opportunities created in collaboration with the City Networks and other agencies to solicit comments and contributions to the scenarios, to secure regional validation of the knowledge base i.e. the main trends and driving forces and of the hypotheses, and to communicate scenario results.

2. First indications on the conclusions and policy relevant options that could be the outcome of the project

Introduction

At this stage of the research it is obviously impossible to already give first policy options. However, as the project is clearly future-oriented with scenarios as main outcome it is important to reflect on the types of scenarios and the possible scenario hypotheses to come to an understanding of whether they are relevant for policy makers. Policy options will flow quite automatically out of the chosen scenarios, reinforced through the stakeholder involvement described earlier.

Preliminary considerations for the choice of scenario types and hypotheses

Jacques Robert

The choice of scenario types and scenario hypotheses very much depends upon the types of messages to be delivered in a particular context. Presently, the main challenge is to deliver messages in the context of a deep economic and social crisis likely to ensure compatibility and convergence between measures to be adopted in the short and medium term to overcome the crisis and the long-term objectives of territorial development (sustainable development, competitiveness of cities, territorial and socio-economic cohesion etc).

In this respect, it is essential to take into account the global context in which the crisis has emerged and its possible evolution as well as a number of macro policies (economic, social, technological, environmental), together with alternative possibilities to conceive them. A particularly important aspect is the interplay between macro-policies on the one hand and regional/local policies applied to urban systems and cities on the other.

The emergence of the crisis has de facto introduced an important differentiation of drivers and evolution paths: on the one hand those which are likely to continue independently from the crisis and, on the other, those which are strongly affected by the crisis or which have been generated by it. The second group requires an exploratory approach in the scenarios, while the impacts of the first group are better known (see ESPON project 3.2). The interplay between the two groups is of particular relevance for the elaboration of scenarios.

A first choice has to be made about the hypotheses related to the global context. Either a single global context will be the background for all the scenarios or alternative evolutions will be considered in relation to the global context (for instance: "further globalization" and "deglobalisation") which will lead to the elaboration of various groups of scenarios.

A second level of choice is related to the various ways of coming out of the crisis (the post–crisis paths), especially in terms of macro-policies applied over a longer period. The crisis obliges to reconsider a number of macro-policies. The possibility exists for more or less substantial changes in the macro-policies which could be highlighted in different scenarios

and made explicit as to their impacts, as framework conditions, for the development of urban systems and cities. Examples about alternative sets of macro-policies could be:

- the continuation of neoliberal policies limiting domestic demand as well as social cohesion, promoting exports and globalisation, favouring FDIs and exogenous development;
- the resurgence of neo-Keynesian approaches enhancing domestic demand and allocating higher amounts of public resources to economic and social infrastructures, promoting endogenous activities targeting the single EU market.

The exploration of interactions between macro-policies on the one hand and local/regional policies for cities and urban systems on the other would make possible to identify which macro-policy contexts are more favourable to the fulfillment of objectives related to cities and urban systems and which macro-policy contexts are relatively incompatible with the fulfillment of such objectives, or of some of them. This exploration would also enable the identification of possible synergies or contradictions between the two levels of policies.

Exploratory policy scenarios taking into account the evolution of a number of drivers in relation with the crisis and with other factors seem most appropriate to deliver relevant messages on alternative evolution paths for cities and urban systems as well as on the most appropriate combinations of policies likely to achieve them. Classical trend or baseline scenarios do not seem appropriate in the present context. Rollback scenarios cannot be easily elaborated in a context of general uncertainty with changing drivers.