

POLYCE

Metropolisation and Polycentric Development in Central Europe

Targeted Analysis 2013/2/12

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EXECUTIVE SUMMARY

The following pages comprise the Executive Summary of the Final Report of POLYCE. It is ought to present the most important findings of the project in condensed form, allowing readers to obtain an overview of elaborations of this research. Texts written in *italic* are considered to give the reader more methodological background information about how to read the following section.

Smart Metropolitan Development

Introduction

POLYCE is analyzing five Central European capital cities and their functionally related surrounding areas: Bratislava, Budapest, Ljubljana, Praha, and Wien. The project emerged from the related city administrations' wish for researching the cities' future competitive and cooperative potentials among each other and towards other metropolises. A main goal was to conduct a comparative analysis of the five cities and their related surrounding areas in order to elaborate in-depth results on their specificities and commonalities. This was ought to draw an up-to-date picture of the preconditions for urban development in Central Europe.

Within this framework the two analytical concepts of metropolisation and polycentricity came into play, as both are seen as drivers of specific paths of metropolitan development. The approach of POLYCE took both concepts into consideration in the context of analyzing the five Central European capitals, also trying to identify their mutual relation – meaning to what extent both can support a sound and balanced metropolitan development.

Terminology

The two analytical concepts of 'metropolisation' and 'polycentricity' are the basis for defining objectives and research aims in POLYCE. Within the project the two concepts are defined as follows:

Metropolisation is a process of urban restructuring that can be defined by specific aspects:

- A spatial concentration of (new) economic functions or population – the latter often caused by immigration (Friedmann, 1986 and 2002; Geyer, 2002)
- Possession of important command and control functions and well-developed connectivity (Keeling, 1995)
- Economic restructuring due to an increase of knowledge intensive activities (Krätke, 2007)
- Specialized functions are unequally allocated within a city or in a polycentric agglomeration (Kunzmann, 1996; Leroy, 2000; Sassen, 2002; Elissade, 2004)

Polycentricity describes the existence of more than one pole or node within a certain territory. The concept has several (interlinked) aspects:

- Morphological polycentricity: hierarchies and structures of nodes according to their size and significance
- Relational polycentricity: flows and interactions between nodes
- Polycentricity in governance: mutual interests, considerations, inspiration, collaboration, complementarity in decision-making in and between the various nodes

Policy Challenge

Both concepts are inevitably connected to the politically more common concepts of competitiveness and inclusion, which are often cited not only on the level of metropolitan policy, but also in European policy documents (cf. EC, 2010). Balancing both these two paradigms is supposed to be crucial for what is called '*smart metropolitan development*'.

The term '*smart*' has become a buzz-word over the last years, although its definition is still quite unclear. While originally indicating a focus on information- and communication technology-related economic activities, it needs an extension when applied to urban development. From this broader spatial perspective (which indeed is closely linked to a policy-perspective) '*smart places*' – as defined by the European Commission in the EU 2020 Strategy (EC, 2010) – have to combine various functions, such as those related to knowledge and innovation, connectivity, or governance. Following, becoming a '*smart city*' implies the '[...] ambition of a city to improve its economic, social, and environmental standards and consequently its competitiveness in urban competition' (Giffinger

et al., 2010, p.304 f.). This of course stresses the importance of governance measures that integrate a variety of actors: from local inhabitants and economic actors to policy-makers.

The main challenges of metropolitan development – which are also referred to in the EU 2020 Strategy (EC, 2010) – are competitive and inclusive metropolitan development. So, ‘*smart metropolitan development*’ indicates the ability of a metropolitan agglomeration to cope with both of these challenges. But not only local facilities of endowment may be understood as potentials in this concern. Smart metropolitan development also covers the activities of self-decisive and independent citizens in terms of awareness and participation. It supports strengthening existing assets and fosters activating new potentials. Consequently, in POLYCE a ‘*smart metropolis*’ is understood as a functionally integrated metropolitan area where processes of both, competitive and inclusive development, take place – the important aspect being, that a balance between these two aspects has to be steered by related governance approaches.

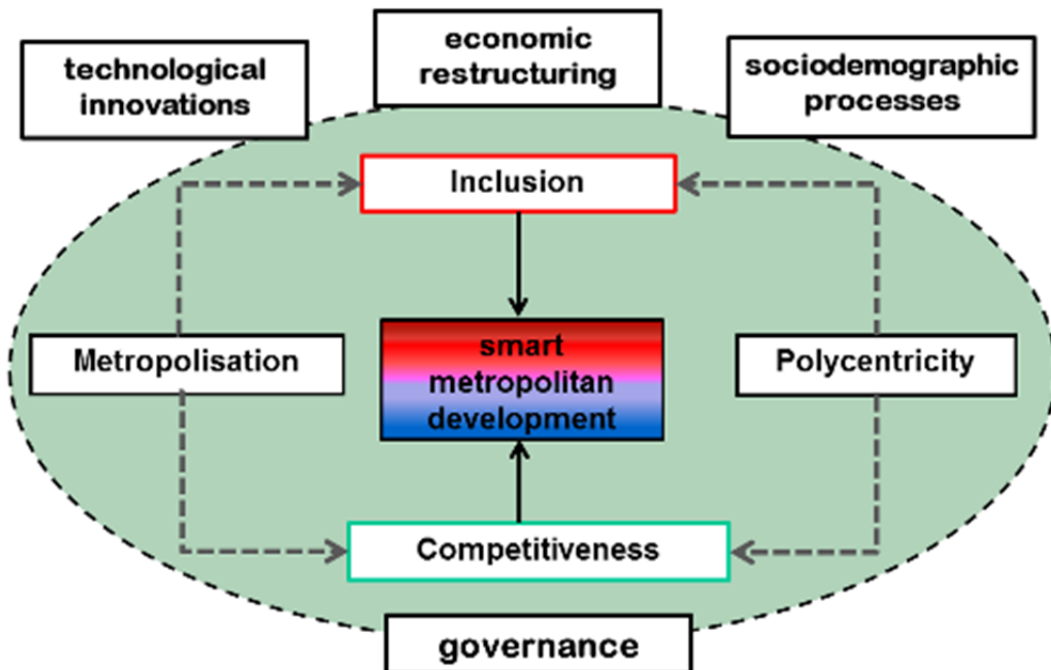


Figure 1: Understanding smart metropolitan development

Recommendations for Smart Central European Metropolises

In the following section potential future activities of each metropolis are sketched in what is called ‘metropolitan agendas’. General development paths are proposed for each metropolitan area first, while current challenges of the respective metropolises are shortly outlined afterwards. The agendas are meant as suggestions for promising future activities for the five Central European metropolises. Rather than as comprehensive metropolitan strategies, they thus represent a structured collection of possible activities. They were developed in close collaboration with a set of relevant local and regional stakeholders in the five metropolises. Above all, the agendas build upon interactive discussions of the empirical project results with a number of selected stakeholders. Therefore, the presented ideas inevitably represent a selective perspective. However, they originate from stakeholder discussions based on empirical project results, and therefore reflect the empirical analyses conducted in the course of the project.

Bratislava's Metropolitan Agenda

Vision

Metropolitan Bratislava should increase its competitiveness through a clear positioning based on knowledge intensive activities in research and development clusters. At the same time, it needs improved cross-border governance approaches to realize a set of strategic activities supporting an inclusive metropolitan development.

Activities

Bratislava should focus on strengthening the position and competitiveness of the metropolitan area by more intensely pushing knowledge-based activities, concentrating on relevant services and research and development clusters.

Challenges and barriers

The central geographic position of the Bratislava metropolitan area within the Danube region is an important potential, which still has to be exploited. Planning approaches and related forms of governance are needed to strengthen the metropolitan competitiveness, which have to involve the whole setting of urban and regional management. Involved actors must focus cross-border management, coordination of activities, common decision-making and other initiatives supporting permanent exchange of information.

Smart metropolitan development

Infrastructural and institutional development have a tendency towards being inclusive, while economic specialization and image strategies are strongly fostering the metropolitan competitiveness. Suggested environmental and governance activities must be understood as having an inclusive tendency only in the first run, while having the ability of improving the competitive performance of metropolitan Bratislava in the long run.

Budapest's Metropolitan Agenda

Vision

Budapest's competitiveness should be enhanced by positioning the metropolitan area as a Danube Region metropolis. At the same time it must not forget tackling a more balanced distribution of economic functions in the metropolitan area as a means to achieve territorial cohesion.

Activities

The underlying potentials to this approach are well seen by stakeholders and cover several fields of action. The activities suggested cover a broad variety of measures, ranging from image-related, infrastructural and governance activities to environmental issues.

Challenges and barriers

Challenges are the administrative capital city's predominance in a rather monocentric metropolitan region with only few subcenters and a heavy concentration of metropolitan functions in the core city. Infrastructural and governance measures softening this dominant situation stand on top of the list, as they could guide metropolitan Budapest to a more inclusive development.

Smart metropolitan development

Metropolitan planning approaches have to take regional potentials of surrounding areas into account even more, as they might support both the city's competitiveness within the Danube Region and a more inclusive metropolitan development at the same time.

Ljubljana's Metropolitan Agenda

Vision

Metropolitan Ljubljana should steer its development through specific activities in the economic sphere and promote its image as an attractive center of education and research. Polycentric development has to be strengthened in order to guarantee a more territorially cohesive development.

Activities

Measures should be taken to improve the functional relations within the metropolitan area. This also includes activities to achieve a more equal distribution of metropolitan functions on a regional level. Ljubljana's importance as European middle-sized city led to a concentration of specific functions in the core city inducing negative side-effects, which must be on the agenda of policy-makers to prevent the city from losing its high living standards. Furthermore, Ljubljana should strive for a more integrated sustainable transport system as well as an improvement of metropolitan embeddedness in the international context. Additionally, the peripheral location within the Central European Danube region has to be compensated by improving transport connections to the other Central European Danube metropolises.

Challenges and barriers

A main challenge for the city lies in its peripheral location within the Central European Danube zone. Consequently, the strategic orientation of the Ljubljana metropolitan region focuses both on the Alpine and Mediterranean macro-regions as well as on the Danubian and Central European territory.

Smart metropolitan development

Metropolitan governance approaches are needed that foster the participation of local population in decision-making processes, potentially leading to more social cohesion. At the same time, the variety of economic activities might help strengthening Ljubljana's competitive position. Governance efforts like institutionalized cooperation and harmonized funding are thus very important for a smart development that balances inclusive and competitive development.

Praha's Metropolitan Agenda

Vision

'Knowledge' is a key term in Praha's metropolitan development, which can foster competitiveness and inclusion at the same time. Further developing metropolitan Praha's cultural image is an objective, as it can serve as both a driver of economic prosperity and social cohesion.

Activities

Knowledge exchange is an important goal for metropolitan Praha on several levels. Cooperation must be intensified on the regional and Central European scale to learn from others, share own experiences, and to get insights into those fields, where metropolitan policy is amendable. Knowledge exchange should also be fostered between relevant actors on a regional level. In this context, Central Bohemia's common cultural values could be actively integrated as a basis for developing a metropolitan image for the city of Prague. These values must be openly discussed to ensure the inclusive character by strengthening a common metropolitan identity.

Challenges and barriers

The greatest challenge for Prague lies in the lack of existing cooperation on a regional level. This will require innovative ways to overcome existing, inherited institutional barriers to cooperation, specifically between the city and the regional level.

Smart metropolitan development

An explicit strategy to foster knowledge exchange on several levels can be expected to enhance not only metropolitan competitiveness, but might have inclusive effects as well. Eliminating inefficiencies and supporting innovative approaches in metropolitan planning will leave space for integrating a broader group of actors.

Wien's Metropolitan Agenda

Vision

Metropolitan Wien is challenged to find the right mixture of strategic activities securing its European competitiveness and its attractiveness for residents at the same time. This approach also includes territorial cohesion on the regional level. Based on a participatory approach, the position and the function of the city within the Danube Region should be defined very clearly.

Activities

The improvement of transport accessibility on a regional level should be a core focus of planning activities in Vienna, specifically with regard to the improvement of regional public transport infrastructure. Wien's vanguard position in terms of environmental development comes into play as a supporter of both economic competitiveness and sustainable metropolitan development. The city should further strive to strengthen its image as a green city (e.g. by expanding the focus on environmental technologies). Governance approaches explicitly integrating social groups who are questioning this future development path must be initiated. Learning processes, implying common decision-making about the allocation of specific metropolitan functions play a decisive role in this concern. Knowledge exchange at common events should be organized periodically to enhance relationships between the core city and smaller centers and to clarify the role of Wien in an urban network within the Danube Region.

Challenges and barriers

A main challenge lies in the existing lack of an integrated urban region in institutional and transport-related regards, but also with respect to the allocation of metropolitan functions in the region. Here, measures should be taken to overcome these barriers for ensuring a territorially cohesive development.

Smart metropolitan development

Strategies to foster knowledge exchange can be expected to have predominantly inclusive effects, while the strengthening of Vienna's image as a green, environmentally-friendly city should also contribute to urban competitiveness by sharpening the image of the city.

Central European Agenda

In the following section potential future activities in the Central European Danube zone are sketched. They are meant as suggestions for promising future activities for the five Central European metropolises. Rather than as comprehensive strategies, they thus represent a structured collection of possible activities. Like the 'metropolitan agendas' above, they were developed in close collaboration with a set of relevant local and regional stakeholders in the five metropolises. Above all, the agenda builds upon interactive discussions of the empirical project results with a number of selected stakeholders. Therefore, the presented ideas inevitably represent a selective perspective. However, they originate from stakeholder discussions based on empirical project results, and therefore reflect the empirical analyses conducted in the course of the project.

Common strategic activities of the five POLYCE metropolises should strengthen the position of each metropolis and improve different forms of polycentric relations of the central European Danube zone. Common strategic endeavors of the POLYCE metropolises have to focus on aspects of territorial cohesion within the Central European Danube zone explicitly. Enhancing polycentric relations might help managing processes of metropolisation and related metropolitan growth.

- Cooperative potentials and assets among the POLYCE metropolises are particularly strong in the fields of knowledge economy, transport management and metropolitan governance.
- Relational capital (e.g. language skills, new administrative and strategic capacity) needs to be improved among Central European stakeholders. This includes (1) improving contacts, and accessibility to information, (2) transforming information into valuable knowledge about partner metropolises as output of continuous and systematic contact facilities, (3)

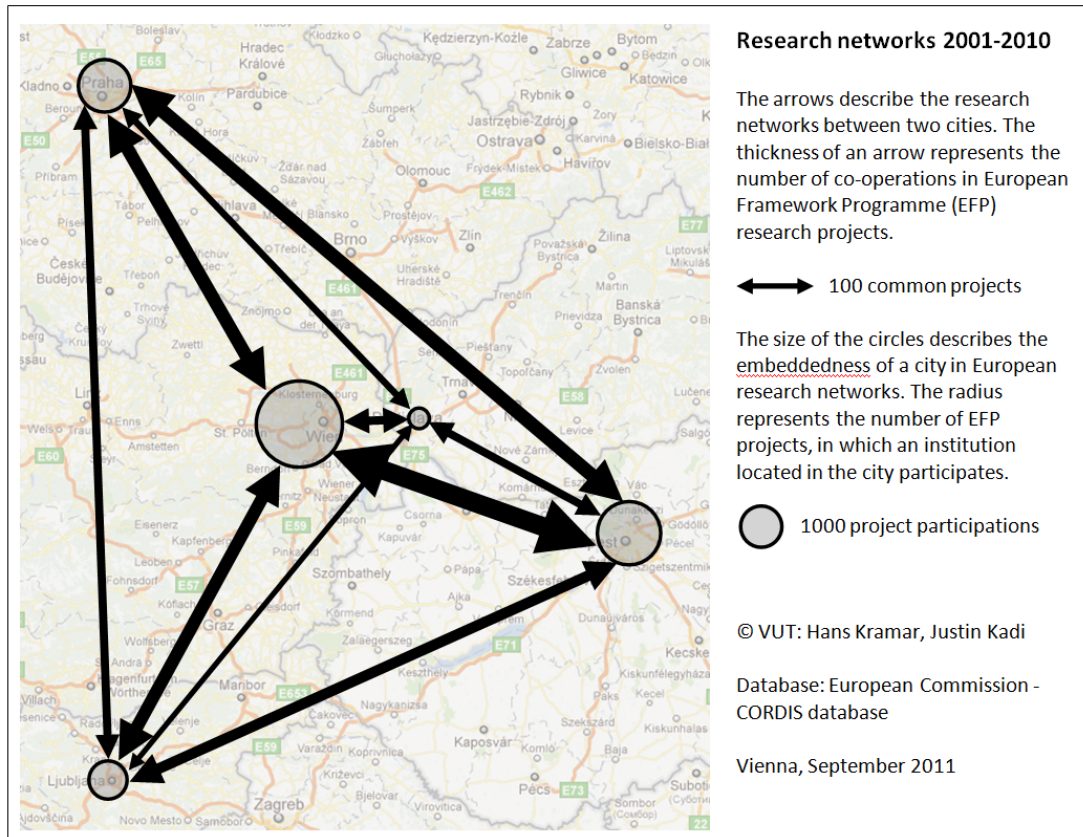
improving common lobbying for interests of central European Danube zone partners within the EU.

- Discussions show that all five metropolises try to position themselves as hubs in their own geographical context towards outside neighboring regions and countries. Therefore, a territorially cohesive development within the central European Danube zone needs new common strategic endeavors, which not only promote activities improving accessibility through infrastructure investments.
- Historical, social and economic ties of the five metropolises should be a proper base for further cooperation between public institutions, civil society and private businesses. These relations can be extended and deepened by different cross-border networking projects, which can well be subsidized within existing EU-Regional Policy Programmes: Programmes under the objective “European Territorial Cooperation” (ETC), the interregional co-operation programme aiming at fostering all kinds of city networks; the URBACT II-programme which is especially directed at the information exchange of cities; the transnational co-operation programme “Central-Europe” covering not only the five cities but also their hinterlands.
- Since this programme area also includes Poland, Eastern and Southern parts of Germany and the North of Italy, this programme places the POLYCE metropolises in a wider spatial context, connecting them to cities as Berlin, Warsaw, Munich and Milano, which are highly relevant partners for the region.
- Cooperative strategic activities should take the European Strategy for the Danube Region into account. Together, the five metropolises can play an important role in steering the further development paths of this strategy. Promising attitudes to act as initiators and important drivers of specific issues in the Danube region already exist, but have to be well coordinated between all five.

Considering polycentricity, all five POLYCE metropolises stand out in a way, making each an important actor in the Central European urban network. Nevertheless, some still have to improve their inner polycentric structure, strengthen their ties in European economic or research networks, or improve their connectivity. Different kinds of flows, networks and co-operations between cities might stimulate and strengthen each other. Consequently, enhancing political, economic and social networks via related governance measures will definitely improve the conditions for all kinds of interaction between the POLYCE metropolises.

- The urban system of Vienna is by far the most functionally integrated among the five metropolises. The city of Bratislava is best integrated in the balanced system of small and medium-sized neighboring towns, while Ljubljana dominates the urban system of its wider metropolitan region. Budapest, Wien and Praha play a far more dominant role in their metropolitan regions.
- Commuting data clearly demonstrate the difference between the functionally integrated urban system of Wien and urban systems in former communist countries, which are dominated by capital cities through unidirectional commuting to the core city and hierarchical subordination of smaller centers in the surrounding metropolitan area.
- Strong (economic) ties can be recognized between Budapest, Praha and Wien – all three metropolises also being highly integrated in wider European and global networks.
- Although central control functions are to be found in Budapest, Praha and Wien, Wien stands out as hosting more high-ranked firm locations and participating in more European research co-operations than the other cities in the region. Prague, however, ranks first concerning the number of FIRE (finance, insurance, real estate) company relations within the region and also shows strong links to other European or global cities.
- Considering the different city sizes, Bratislava performs quite well in firm networks within the Central European Danube region as well as on the global scale. Ljubljana plays a stronger role in European research networks.

- Inter-city relations in terms of firm and research networks are significantly influenced by travel times and ethnic ties, pointing to the ongoing influence of transport accessibility and historical relations on economic activities.



Map 1: Research networks between POLYCE metropolises (2001-2010)

The Central European metropolises analyzed have one outstanding commonality: they altogether provide exceptional living conditions. Common initiatives must take this aspect into account, particularly if processes of metropolisation imply aspects of growth that might threaten these remarkable preconditions. Furthermore, it gets clear that each of the five can play a different, maybe decisive role as generator of competitiveness of the Central European urban system in a wider spatial context.

- The analysis shows that the five investigated metropolitan areas all perform well in terms of living conditions. Significantly, it is the only metropolitan characteristic where all score above average of the sample of all 50 compared European cities.
- Overall, only Praha and Wien do better than the average of the selected cities. Among the five POLYCE metropolitan areas they do best in economic development terms. Still they profit more from another well-performing characteristic, which are high-rated living conditions. At the same time both suffer from weaknesses in demography, education, and low ethnic diversity – all subsumed under the category People.
- Bratislava and Ljubljana instead perform notably well in the field of People – a fact, which puts these two metropolises in an important position within the five POLYCE cities, concerning particularly those approaches fostering education and ethnic diversity.
- Wien's profile shows its important position as a role model for environmental concerns. Although other Northern and Western European cities outperform Wien in this respect, the metropolitan area obviously shows some valuable conditions among its Central European partners. The same is true for Mobility (subsuming public transport, accessibility and the like), where Wien's position is at least of the same importance.

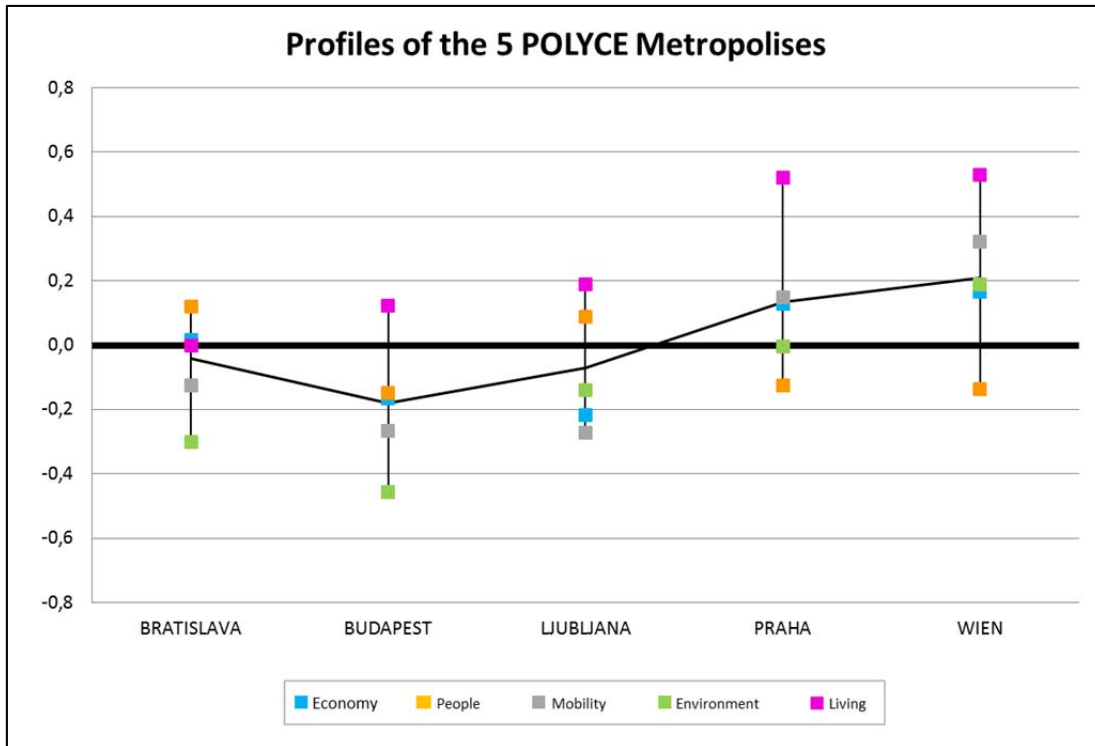


Figure 2: Profiles of the five POLYCE metropolises

All five metropolises face different challenges concerning population growth when recent preconditions of the metropolitan areas are taken into account. Praha, and to a lesser degree Wien and Budapest, should elaborate strategies and specific measures for providing a sound spatial structure in the functional metropolitan area. Contrary, Bratislava, and to a lesser degree Ljubljana, show a potential in their preconditions for population growth. Underlying empirical results depict those factors having positive and negative impacts on coping with urban growth and stress the importance of a sound metropolitan planning strategy:

- Land rent, social distress associated to urban life, as well as urban sprawl indicate the most important urban costs and, thus, negatively influence population growth. Hence, these factors are crucial for urban development in the future.
- Urban amenities indicating metropolitan attractiveness, industrial diversity, relational polycentricity in knowledge intensive activities (research networks), and metropolitan functions (power functions in the political, economic and cultural sphere) all have a clear positive impact on the size of urban agglomerations.
- The identification of the effects of these factors demonstrates the relevance of a sound spatial structure of metropolises in the form of external networking and the reduction of sprawl.
- These factors – linked to a sound metropolitan and planning strategy with corresponding projects – generate higher urban benefits and efficiency, while at the same time reducing the costs associated to physical size. Developing urban quality, urban amenities and attracting human capital-rich professionals is due to generate enhanced attractiveness and competitiveness, once again supporting a wider, more diversified urban realm.

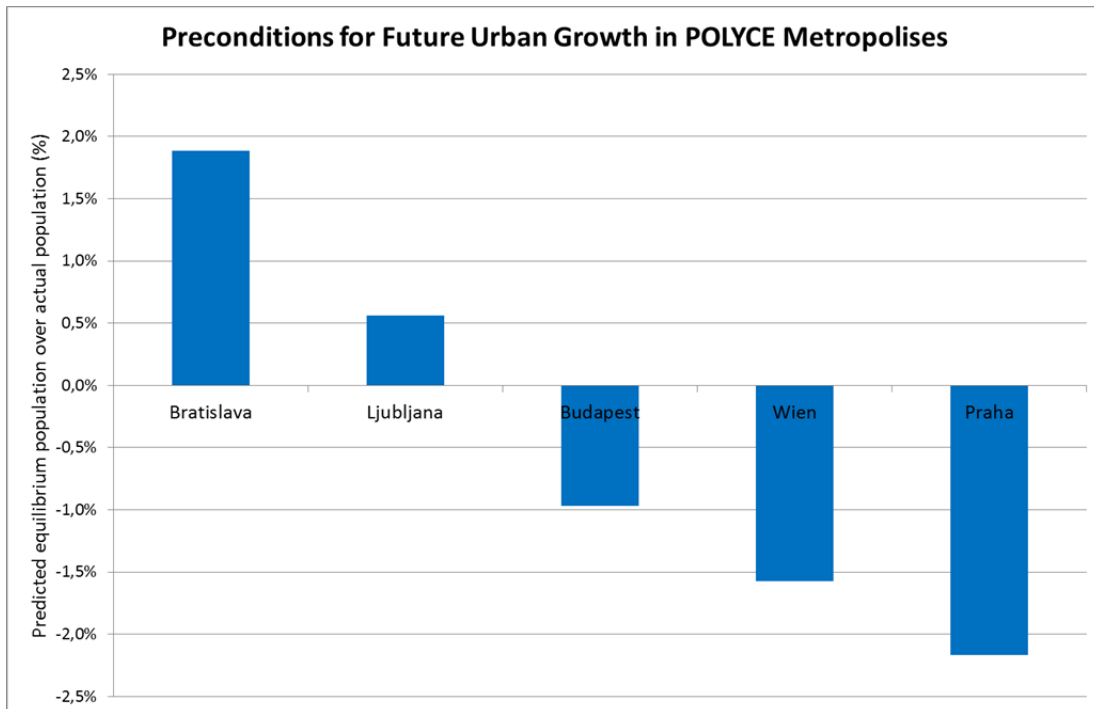


Figure 3: Preconditions for further urban growth in POLYCE metropolises

Need for Further Research

Investigating relational polycentricity: Research can be deepened on the level of Central European functional interrelations. Cooperations and networks between the five POLYCE metropolises and with other European or global urban nodes needs extended exploration, particularly concerning economic and social ties.

The role of medium-sized cities for cohesive development: As this research was based on an investigation of five big Central European metropolises, questions regarding the importance of medium-sized urban agglomerations were not touched. Researching their role in polycentric networks of the major metropolises seems to be of importance, as they presumably have a decisive stake in polycentric and, consequently, cohesive development.

Delimiting metropolitan areas: Spatial distribution of population and commuter relations is only a starting point in defining functionally integrated metropolitan areas. As the need for such definitions was urged several times by different stakeholders, agreeing on a common approach to delimit metropolitan areas should be an instant task.

Governance debates in targeted analyses: The integration of local and regional experts in ESPON's targeted analyses is taking account of the importance attributed to communicative approaches in planning. This recognition is highly valued, although the approach is in some respects too limited. The role of city administrations as project partners is not always clear enough, and while the general claim for integrating other stakeholders is welcome, the time-frame for implementing such methodological approaches is not sufficient. Consequently, governance debates should be conducted, discussing the trade-off between short-term results and in-depth analyses.

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Abbreviations

CC	Core City, synonymous with administrative boundaries of capital city
CED-zone	Central Europe - Danube Global Integration Zone
GaWC	Globalization and World Cities database
GDP	Gross Domestic Product
GVA	Gross Value Added
ESDP	European Spatial Development Plan
ESPON	European Observation Network for Territorial Development and Cohesion, European Programme Initiative
ETC	European Territorial Cooperation, European objective supporting cross-border, transnational and interregional cooperation
EUROSTAT	European Statistical Office
EUSDR	EU Strategy for the Danube Region
FIRE	Finance, Insurance, and Real Estate firm networks, as indicated in GaWC database
FMA	Functional Metropolitan Area, as defined in the POLYCE project via commuter flows
FUA	Functional Urban Area, spatial concept, as defined in ESPON 1.1.1
ICT	Information and Communication Technologies
LUZ	Large Urban Zone, spatial concept, as defined in Urban Audit
MEGA	Metropolitan Growth Area, spatial concept, as defined in ESPON 1.1.1
MR	Metropolitan Region, as defined in the POLYCE project via commuter flows
NUTS	Nomenclature of statistical units
POLYCE	Project acronym: 'Metropolisation and Polycentricity in Central Europe'
TEN	Trans-European Networks
URBACT	European Programme promoting sustainable urban development

REPORT

The following pages comprise the main Report of the Final Report of POLYCE. It is ought to sum up the main findings of the research, giving readers a comprehensive overview of results and recommendations. Texts written in *italic* are considered to give the reader more methodological background information about how to read the following section. Detailed descriptions of the project's approach, the methodology, and specific results are described in the Scientific Report of the Final Report.

1 Introduction

In 2002 John Friedmann (p. XV) concluded that 'Almost the whole world will coexist in a single global urban network, driven by worldwide competition.' This underpins a shift in the understanding of the role of cities. They cannot be regarded as single and independent elements anymore. Their economic importance and development potentials cannot arise from their regional 'Hinterlands' alone. Rather cities are part of a network of different forms of relations, where competition and cooperation become decisive.

Looking at the development perspectives of the urban system in Europe – and Central Europe more specifically – the reasons for an increasingly competitive context can easily be found. The allocation of investments and economic activities across different types of cities follows distinct characteristics on the basis of comparative advantages that cities are able to provide. Under conditions of globalization 'World city formation' is the process by which the global economy impinges upon cities and transforms their social, economic and physical dimensions in relation to their role in the global urban hierarchy (Friedmann, 1986; Sassen, 1991). The emergence of specialized city systems is defining new roles for particular cities or groups of cities in the global urban hierarchy. Those cities integrated into the 'functional city systems' (i.e. cross-border inter-regional urban networks) are also undergoing the process of world city formation - affecting urban form, structure and development. Besides, the issue of competitiveness gained increasing importance in recent years (Parkinson, 2003; Begg, 1999). The fall of the Iron Curtain and the process of integration changed the conditions for urban development - especially for cities in Central Europe. New opportunities and perspectives for economic activities arose along the integration process, providing new market potentials and new patterns of mobility of labor forces and capital. (Rodriguez-Pose, 2002)

Hence, the pressure of competition has increased with globalization and European integration. Cities lost their centrality and dominant central functions on the regional and national level and have become part of the new urban hierarchy on an international level. Consequently, cities need to re-orient their development perspectives – a fact which is particularly true for capital cities experiencing processes of metropolisation. They are stipulated to re-define and re-elaborate place-based strategies that are able to increase their territorial capital with specific assets. (Camagni, 2007; 2009; Giffinger et al., 2010)

Thus, the stakeholders of the five POLYCE capitals emphasized the importance of a research effort that takes these changing conditions into account. They expressed the need to elaborate recommendations that support their work in managing the changing contexts of European metropolitan development processes. This implies:

- Providing an environment for agglomeration growth, sustaining the unique cultural and historical heritage of international importance
- Strengthening relevant networks to create prosperity, better living conditions and long-term, stable work places
- Supporting a network-like metropolitan structure by implementing effective governance approaches
- Increasing the cooperative endeavor with capital cities in Central Europe, in particular in the areas of business, research, culture and urban planning
- Enabling and enforcing strategic metropolitan planning which supports EU Cohesion Policy
- Improving cooperation and establishing polycentric structures that lead to more cohesion in macro-regions
- Supporting territorially cohesive development in Central Europe and the Danube region
- Learning from and supporting each other through the exchange of information and experiences, promoting common interests and developing common projects

1.1 Objectives

The project idea is to analyze recent trends in metropolitan and polycentric development. Evidence-based policy recommendations will be elaborated to foster a territorially cohesive development for the five single metropolises, as well as for the Central European territory as part of the wider Danube region.

POLYCE's main objective is to identify the importance of the mutual links between the processes of metropolisation and polycentric development, and the challenges and perspectives of future urban development. Empirical research addresses structural, functional and strategic relations that are based on competition or cooperation, targeting the five metropolises with their territory and the CED-zone. The following questions are addressed empirically:

- What is the relation between metropolitan size and preconditions for demographic growth? Do metropolitan functions and polycentricity have a decisive impact on demographic growth? What is the meaning of polycentric relations for metropolitan development at different spatial levels?
- What are the characteristics of polycentricity? What do the polycentric systems of the metropolitan level and the CED-zone look like? What are the specific assets/factors driving or hindering polycentric development? Is there a mutual relation between metropolisation and polycentricity?

Analytical methods based on quantitative information from official statistical sources and officially acknowledged and published ESPON-data sources are applied to answer these questions. The results are used in discussions with stakeholders to answer policy-related questions on the challenges of smart metropolitan development. The term describes the balanced and territorially cohesive development between the strengthening of metropolitan competitiveness and social inclusion according to the EU-Agenda 2020. (EC, 2010) Hence, questions target the policy-level as well:

- What do the metropolitan profiles of the five POLYCE metropolises look like? Do they show any decisive similarities or differences among each other and among a wider sample of European metropolises? Which development factors have a potential for metropolitan distinction?
- Are polycentricity and metropolisation important issues of strategic endeavors in local governance approaches of the five metropolises? How to strengthen the current position of the five major cities as metropolises? Which activities are of importance in supporting smart metropolitan development?
- Which activities are necessary to strengthen polycentric development in the CED-zone? How can the polycentric system in CE be enhanced? What can we learn from project results for the strengthening of territorially cohesive development in the macro Danube region?

Furthermore, policy relevance will be achieved through the discussion and assessment of processes of metropolisation and polycentric development under the perspective of competitive and inclusive metropolitan development. Besides, evidence-based recommendations foster learning processes that strengthen cooperative and strategic planning endeavors within metropolitan areas and between European metropolises.

1.2 Basic Concepts

1.2.1 Metropolisation

Metropolisation is regarded a process of comprehensive urban restructuring, based on a city's ability to compete with others and to gain specific metropolitan functions. *For governance approaches in the metropolitan territory it is important to understand a 'metropolis' as an area, where functional, structural, and strategic issues intersect administrative borders. Specific aspects of the process of metropolisation are:*

- A spatial concentration of (new) economic functions and population having an effect on metropolitan growth and spatial extension of a city through immigration (Friedman, 1986 and 2002; Geyer, 2002)
- Becoming a node in global networks of material and immaterial flows, exercising command and control functions, and providing excellent connectivity between them (Keeling, 1995)
- The emergence of knowledge intensive economic activities in specialized branches of production or service (Krätke, 2007)
- A high concentration of metropolitan functions in the urban agglomeration (BBSR, 2010),
- The allocation of specialized and specific functions as driving forces of economic and demographic development within the metropolis or in a polycentric form within the agglomeration (Kunzmann, 1996; Leroy, 2000; Sassen, 2002; Elissade, 2004)

1.2.2 Territorial Capital

Territorial capital is assumed to influence the ability to compete with other metropolises in a successful way. It consists of different location related endowment factors and potentials and specific forms of cooperative endeavors with strategic planning character. In combination they provide assets as competitive advantages for the attraction of metropolitan functions (Camagni, 2009). Basic endowment and functional related elements are natural features, material and immaterial cultural, technical and social heritage, while infrastructures and endowment related qualities of distinct places are understood as infrastructures. Basic relational elements are 'untraded' interdependencies (like customs, informal rules, understanding) or specific environments (such as institutions, rules and practices, common strategies and policies) (Storper, 1997). Camagni (2009, p.123) identifies 9 different goods which characterize a territory's capital under the aspect of materiality and rivalry.

1.2.3 Polycentricity

The debate on the concept of polycentricity already emerged in the European Spatial Development Perspective (ESDP) (CEC, 1999) and is still well represented within and beyond the ESPON Programme (ESPON 1.1.1, 2005; Waterhout, 2002; Tatzberger, 2008). Any system of centers in a functionally integrated urban system is hierarchically organized, however with tendencies to higher monocentricity or higher plurality between more centers. The latter is usually associated with polycentricity. Polycentricity in terms of higher plurality between centers in an integrated urban system is from a normative point of view seen as creating better conditions for efficient, cohesive and sustainable development in comparison with a monocentric form (CEC, 1999; ESPON, 2005; Kragt, 2006). ESPON 1.1.1 distinguishes between two types of polycentricity, morphological and relational. The former refers to the existence of more than one spatial pole in a given region. The latter refers to relations between spatial poles.

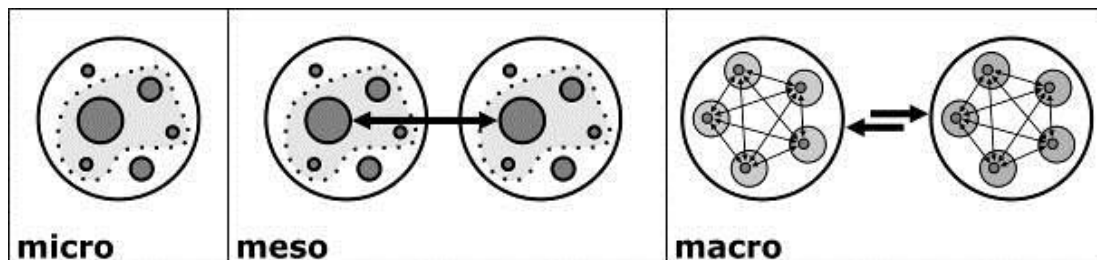


Figure 4: Scales of polycentricity

Polycentricity in POLYCE is analyzed on three spatial levels, including both morphological and relational polycentricity (Figure 4): the metropolitan regional micro-scale, the Central European interregional meso-scale, and the European/global macro-scale of interrelations.

- *On the micro scale on one side morphological polycentricity is analyzed (based on number of jobs and population number). On the other side, relational polycentricity is analyzed (based on commuting flows)*
- *On the meso and macro scale relational polycentricity is analyzed (based on travel time, ethnic and historic relations, FIRE firm networks, research networks and Google web search queries)*

Recommendations will refer to two spatial levels:

- *The five metropolises (core cities with their functional metropolitan area)*
- *The Central Europe - Danube global integration zone (CED-zone)*

1.3 Structure of this report

The report starts with the Central European perspective, spreading the findings on the Central European polycentric system. 'How can relations between the five POLYCE metropolises be analyzed?' and 'How is this system composed?' are the questions that will be dealt with in this section. The process of metropolisation in European metropolises is addressed afterwards. An econometric model is used to identify influencing factors of urban growth and metropolisation, trying to identify which metropolises have a positive or negative balance between urban size and given circumstances.

Zooming in on the five POLYCE metropolises will then allow a comparison concerning between them. What are their distinct characteristics, and what specificities do the local polycentric structures show? The report then goes into detail about each of the five metropolitan areas. Based on European indicators, it will reveal the metropolitan profiles of these territories and show where each of them performs best and which challenges they might face. It will reveal the polycentric structure of the metropolis - in itself and opposite other European urban agglomerations, and the current planning approaches to the concepts of metropolisation and polycentricity. Finally, stakeholders' perceptions are taken into account, assessing not only the validity and importance of empirical results, but giving valuable insight in recent challenges of the respective metropolis. This provides an outlook on potential future activities and ideas for a prosperous metropolitan development.

These ideas are collected and subsumed under the title of metropolitan agendas - an instrument to provide local stakeholders and politicians with ideas on potential future activities for each POLYCE metropolis. Distilling what was researched on a greater spatial level, and together with project findings, it results in a Central European agenda for the territory of the CED-zone, embedding the project and its main findings in EU policy.

Finally, general conclusions not only give an overview to project results, but also hold more guiding recommendations for policy-action and future research.

2 Central European Polycentric System

POLYCE tries to develop and apply the concept of polycentricity, which has already been tackled by related projects (e.g. METREX: Network of European Metropolitan Regions and Areas, METROBORDER: Cross-border Polycentric Metropolitan Regions) over the last decade. Although it tries to reflect and to adopt the basic understanding and terminology of these projects, the concepts and results of POLYCE cannot be directly related and compared to the approaches developed there due to the following reasons:

- POLYCE has a different spatial scale, concentrating only on 5 metropolises in the CED-zone
- POLYCE tries to gain empirical insight to the relational aspect of polycentricity, which is hardly tackled in related projects
- POLYCE has a specific target on metropolisation and polycentricity, which differs both from the network-building approach of METREX and the cross-border focus of METROBORDER concentrating on two case study regions in Western Europe

POLYCE provides an insight into the institutional and structural relations both between the five cities and with other cities outside the CED-zone. According to the definitions given in ESPON 1.1.1 institutional (or political) relations rely 'on co-constructions, co-operation, and on the willingness of territorial agencies to work together on joint projects and strategies' (ESPON 2005, pp.46), whereas structural relations are constituted by the interactions between the actors, including transport, financial, migration or information flows.

Due to poor availability of relational data, it is not possible to cover all aspects of these two dimensions of relational polycentricity. The challenge, however, is to provide relevant data, which give some evidence on the relations between the five cities (meso level) and with the 'rest of the world' (macro level).

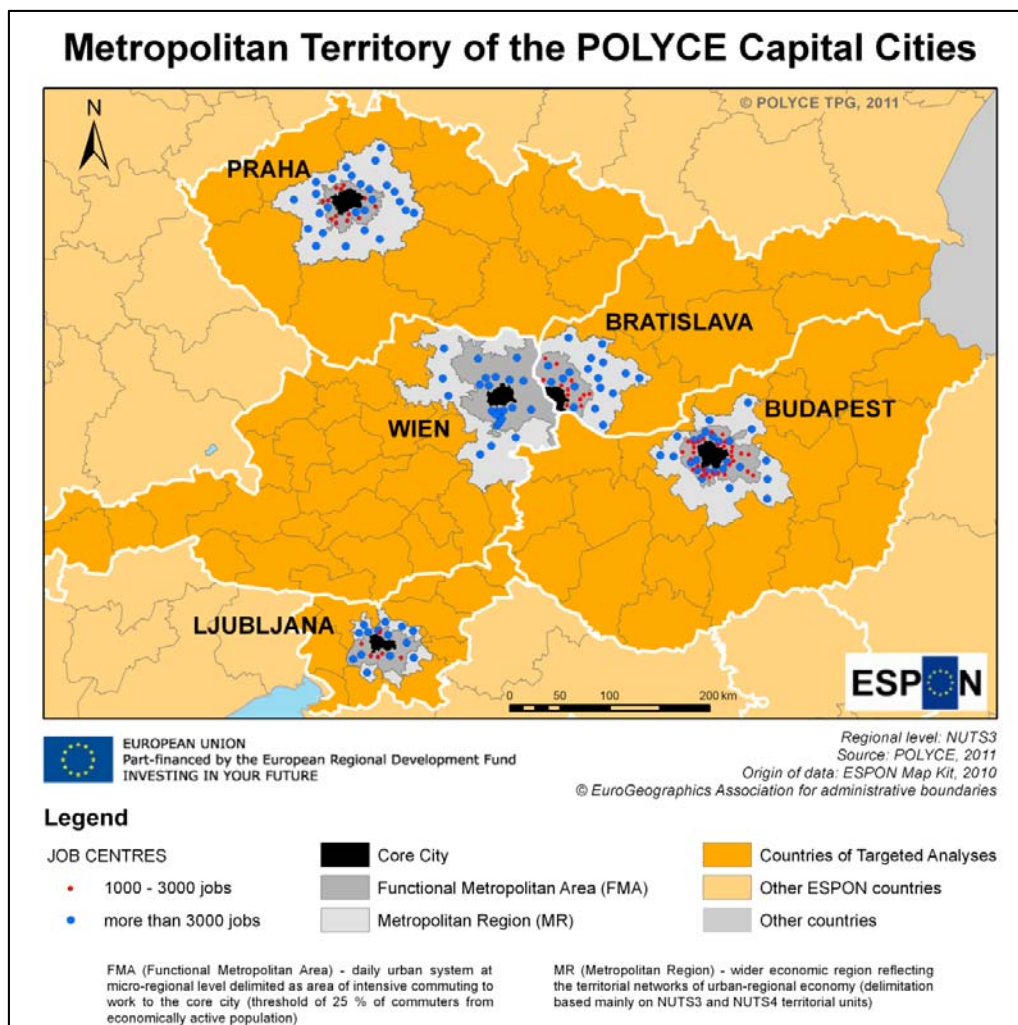
For analyzing polycentricity three spatial delimitations are differentiated (see Figure X):

- *Core City (CC) - capital cities in their administrative delimitation*
- *Functional Metropolitan Area (FMA) - daily urban system at micro-regional level delimited as areas of intensive commuting to work¹*

Metropolitan Region (MR) - wider economic mezz-region reflecting the territorial networks of a city's economy

As the analysis focuses on relations between all five POLYCE cities there is no explicitly deeper investigation of the links between the cities of Vienna and Bratislava, despite their close economic and institutional ties that have developed in recent years. This is also due to the fact that transnational data that go beyond the data used for the analysis are still rather scarce. Currently, there is an EU-financed project underway at Vienna University Technology (TRAFFIC MODEL AT-SK) that collects data on mobility behavior between the two cities, which will provide a useful data source for future analyses.

¹ The delimitation of the FMA is based only on the intensity of commuting to work. Due to the lack of other relevant statistical data this single indicator, which does not fully reflect the whole complexity of relations, has been used as a proxy for all kinds of interaction.



Map 2: Metropolitan territory of the POLYCE capital cities

2.1 Flows & Interactions between Central European Metropolises

Since spatial distances and accessibilities strongly determine economic activities, it is necessary to consider travel times as an important determining factor of actual flows and interactions between different cities. An overview on average travel times between the five cities proves the central location of Wien and Bratislava within the CED-zone, which is expressed by the shortest travel time to the other partner cities. Additionally, the immediate vicinity of two 'twin-cities' implicates very good accessibility with each other. Contrary, Praha and Ljubljana as the northern and southern outposts of the region are less connected to the other partner cities, which means much longer travel times (especially by train). The distances between Wien, Budapest and Bratislava are short enough to allow one-day-trips for business meetings both by car and by train. The distances between this central triangle on the one hand and Praha and Ljubljana on the other are long enough to allow reasonable and competitive air connections. Moreover, rail connections between the five cities are characterized by different quality of rail infrastructure with a huge need to catch up in some areas. Most connections have a satisfying supply of direct trains and a reasonable travel speed between 75 and 95 km/h, which is, however, still very low in relation to comparable polycentric regions in Western Europe. In spite of the low travel speed the 5 POLYCE cities are still well connected to the MEGAs in the Pentagon. In order to remain competitive with air traffic, rail infrastructure in the CED-zone will need strong improvements in the near future.

Since economic, social and institutional interaction is always embedded in an existing network of established relations and traditions, ethnic and historic ties between two cities (common history, culture, language, etc.), which are reflected by inter-city migration flows, are a main influencing factor of any interaction. Comparing the nationalities of the citizens in the five POLYCE countries Austria's role as an immigration country becomes evident: contrary to the four partner states, which did not access the European Union until 2004, Austria has become an attractive destination for migrants over the last 50 years, which can presumably be considered a potential for establishing international networks and co-operations. In spite of some remarkable ethnic relations (Slovakia and Czech Republic, Slovakia and Hungary) also migration between the five partner states seems to be rather weak with only Austria hosting a remarkable number of people from the neighboring states. The enhancement of common networks and co-operations will definitely increase these numbers as a sign of close social and economic interaction on the one hand, and be a good condition for the further deepening of mutual relations on the other.

2.2 Embeddedness in Firm & Research Networks

As has been repeatedly argued, one way of understanding cities under conditions of accelerated globalization is by analyzing the intensity and reach of their external linkages and by identifying their position in a global network of cities (see Taylor, 2004). Building on the conceptual work on the global city (Friedmann, 1986; Sassen, 1991) one strand of research devoted to this endeavor has established in recent years that analyzes inter-city linkages based on FIRE firm locations (Taylor and Walker, 2001). Recent data of the Global and World City Research Network (GaWC), which provides the locations of 100 FIRE firms in 315 global cities, reveal that within the CED-zone, Praha, Budapest and Wien are much better connected through international FIRE firm networks than Bratislava and Ljubljana. This pattern is replicated in the relations between the individual cities, with Budapest, Praha and Wien having by far most relations with each other but much less with Ljubljana and Bratislava. Looking at relations with all other European cities and with cities overseas, Praha again takes the lead and shows the highest embeddedness, followed by Wien and Budapest. Although the importance of inner-regional relations within the CED-zone for the five cities hardly differs, Wien and Praha are a bit less dependent on relations with the other POLYCE cities, underlining their greater embeddedness in firm networks in Europe and overseas. Regarding the importance and the spatial range of the firm locations it becomes evident that the two smaller capitals (Bratislava and Ljubljana) are dominated by other cities in these networks, which might be caused by their comparable small size and low functionality in global competition, whereas Wien, Budapest and Praha hold important control functions in these firm networks. Especially Wien seems to cope successfully with its role as a central economic player in the region hosting more higher-ranked firm locations than their opponents.

Considering research co-operations of the 5 cities in EU Research Framework Programmes (based on CORDIS database) Wien seems to be excellently integrated in European research networks. Compared with Budapest and Praha, which are both about the same size, Wien takes part in significantly more research projects than the two direct opponents, which might probably be attributed to established networks and co-operations with the Western EU member states. Surprisingly, Ljubljana is not far behind Praha but stays far ahead of Bratislava, although being much smaller in population and employment. In addition, the Slovenian capital is one of the few cities, which have increased their project participations from the first to the second half of the decennium, although the number of projects has been reduced due to bigger project sizes. Taking the nationality of the lead partner into account, the results underline the dominant role of Wien in EU-research projects: a share of almost 30% of projects led by Austrian institutions suggests that Wien (as the center of most research institutes) plays a central role in many scientific networks. The number of research co-operations between the 5 POLYCE cities points out that there are especially strong scientific ties between Wien and Budapest, which are both comparably less connected with Praha. Bratislava, which is lagging behind in total project participations, is rather weakly integrated in research networks with other European partners. Wien seems to be in a much more comfortable

situation, because in spite of a big number of project co-operations with the partner cities, it is much more integrated in “external” research networks than the other cities.

To get some rough indication on social relations between the five cities the frequencies of web searches regarding one of the other cities were examined. The analysis indicates that Wien is the most important node in the CED-zone and the main destination for searches from Ljubljana and Budapest, while Wien’s population distributes its attention to Praha, Bratislava and Budapest almost evenly. The relatively small number of incoming search connectivity in Ljubljana indicates its peripheral position within the region. Praha has stronger linkages to Wien than to Bratislava, which is, however, more strongly connected to Praha than to Wien. Furthermore, the results express the different relevance of the other cities in the CED-zone compared to other European cities. Strikingly, Wien does not only attract more attention from the five POLYCE cities than Praha, Bratislava, Budapest and Ljubljana, but also than London, Paris and Barcelona.

The data indicate that these different aspects of relational polycentricity are not independent from each other: Even though the technological revolution in the telecommunication sector offers new opportunities for exchanging information and knowledge, there is a slight evidence that both travel times between the 5 cities and ethnic ties between their home countries have a significant influence on the number of firm and research networks. Furthermore, it can be assumed that different kind of flows, networks and co-operations between cities are connected in some way and therefore stimulate and strengthen each other.

2.3 Intra-Metropolitan Polycentric Structures Compared

Besides looking at relations between the five metropolises it is of interest to compare specific similarities and differences of the POLYCE cities and their metropolitan areas in terms of their internal polycentric structure as well. Population, jobs, and commuting relations between job centers were therefore analyzed on the levels of core city (CC), metropolitan area (FMA) and metropolitan region (MR).

CCs, FMAs, and MRs significantly differ in their size. The different systems of administrative boundaries in the three similarly sized cities of Budapest, Praha and Wien effect in metropolitan regions of strongly varying size in terms of the number of municipalities (Budapest: 284; Wien: 507; Praha: 1.149). This indicates unequal conditions concerning the polycentric structure, but is also an important influencing factor of inter-communal collaborations that must be taken into account.

Looking at the metropolitan regions in terms of population and jobs, Budapest has the largest population in the sample. Wien concentrates the highest number of jobs, while Budapest and Praha are almost equal in this concern. Relatedly, the number of jobs per 100 inhabitants is a useful indicator. Only Bratislava and Praha show a ratio better than 1:2, with Ljubljana and Wien slightly behind, and Budapest scoring worst.

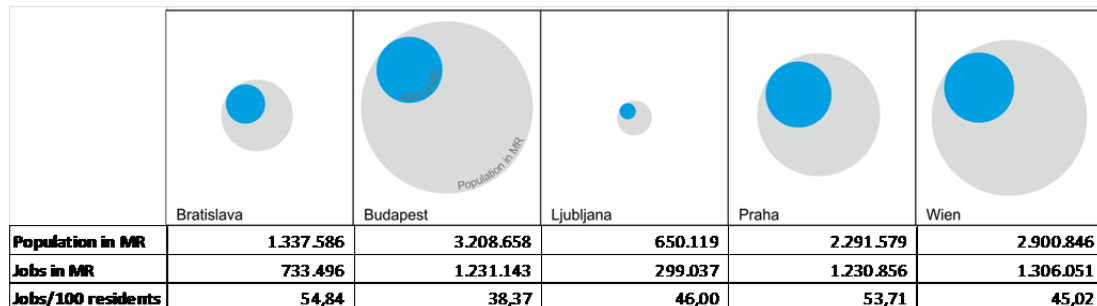


Figure 5: Ratio of jobs to population in POLYCE metropolitan regions

While the three big cities dominate their MR in population and jobs, concentrating more than half of the population and over 60 % of all jobs of their MR in the core city, the two smaller capitals have a lower dominance. In this respect Bratislava shows the lowest dominance with 33% of population and 43 % of jobs of the MR in the administrative boundaries of the capital city. Thus, Budapest, Wien and

Praha show an enormous morphological mono-centricity in terms of job centers in their MRs. Although Bratislava and Ljubljana are also by far the largest centers in their MR, their domination is not that overwhelming.

Besides, relational polycentricity was analyzed, evaluating reciprocal commuting-to-work flows between centers in the respective FMA and MR. Striking differences between Wien with high levels of commuting reciprocity (approaching 60%), and the other cities (approaching 20-40%) were revealed. This indicates a high degree of functional relational polycentricity in Wien's MR. Only Praha's FMA shows more than 40% of reciprocal flows in 2001, reflecting residential and job suburbanization that started in the second half of the 1990s. Unfortunately, up-to-date information, which would reflect the situation around 2010 is not available. It is likely that due to rapidly developing suburbanization the share of reciprocal flows would be quickly increasing. The situation around 2000 clearly demonstrates the difference between the more open and functionally integrated organic urban system of Wien's metropolitan region, and urban systems of the former communist countries, that are still dominated by capital cities and their labor markets through unidirectional commuting to the core city and hierarchical subordination of centers in the metropolitan region to the core city.

The aggregate view on all relations between job centers in MRs and FMAs clearly shows the difference between Wien, where hierarchical unidirectional flows virtually do not exist, regions of Praha, Budapest and Ljubljana, where hierarchical relations still dominate (accompanied with first signs of developing reciprocal linkages between selected centers) and Bratislava, with only 23% of reciprocal flows in the MR and even less in the FMA.

Comparing measures and indicators of morphological and relational polycentricity, it becomes clear that they do not correspond. For instance, the FMA of Wien is highly dominated by its core city in morphologic terms, yet the region shows high levels of functional relational polycentricity. On the other hand, Ljubljana's metropolitan area is much less dominated by the core city of Ljubljana itself, indicating a predisposition for functional polycentricity. However, the level of reciprocity and relational polycentricity is still low in Ljubljana's metropolitan region. Thus, both indicators, those of morphological and those of relational polycentricity, must be taken into account.

2.4 Polycentricity in policy, planning and decision making

European Union Territorial Agenda specifies that cities which act as regional centers should cooperate within a polycentric model of urban and regional development. The object of ESPON POLYCE study is a specific region of territorial co-operation within Europe, the area where Central Europe and Danube regions overlaps. The region consists of Austria and former socialist countries of Czech and Slovak Republics, Hungary and Slovenia. Under socialism, the development of national urban systems was an integral part of central planning. National settlement structure was conceived as a hierarchically organized system of central places with balanced division of roles between individual levels of national, regional and local centers. Issues of balanced development within an urban system were implicitly present in socialist policies. This also included intra-urban level with the development of neighborhood centers accompanying the city core and planning of urban agglomerations with secondary centers to the main core(s). While this settlement planning system was radically refused in Czech and Slovak Republics and Hungary, Slovenian case shows continuity from pre 1990 to recent developments. A new issue which appeared on the agenda for all countries and their capital cities after the breakdown of Iron Curtain and the rapid development of internationalization was competition for investments, labor, firms, organizations, etc. within unifying European space. In the former socialist states, macro-economic reforms and faith in free market dominated the 1990s. The role of planning regulation of spatial development has begun to be recognized only since the turn of the century and especially since the accession to the EU. The new agenda of territorial development considers polycentric settlement and regional systems as guarantees of balanced, functional and effective growth.

In ESPON POLYCE we understand polycentric urban system as functionally integrated socio-spatial entity. It consists of multiple urban nodes whose development is influenced by governance strategies that recognize, consider and support future enhancement of mutual interests, complementarities, synergies and potentials for collaboration. In ESPON POLYCE we focused on two levels of polycentricity in policy, planning and decision making:

1. position of capital city region within Central European Danube region and Europe;
2. position of capital city region within national urban and regional system and internal polycentric organization within capital city region.

2.4.1 Position of capital city regions within national system, Central European Danube region and Europe

Is the position of the capital city region or the capital city itself within Central European and Danube region and European space recognized and specified in capital city documents, national government documents, and documents of regional governments and urban governments of centers in metropolitan region? All the five metropolises (Wien, Praha, Budapest, Bratislava, Ljubljana) are major nodes and key command and control centers in their respective national urban and regional systems playing the role of gateways between home country and external world. All capitals pay attention to trans-European transport networks (TEN-T) that link them into wider European space and especially to Western Europe. The capitals differ in their explicit attention to the enhancement of their international positioning. Wien and Budapest clearly pronounce their ambitions to play the role of a supranational center. Budapest aims to strengthen its role as the capital of the Danube region and of a gateway city to South Eastern Europe and the Balkan. Wien claims to be an economic center of South-East Central Europe. Instead of cooperation in wider regions, Wien, Praha, and Budapest see themselves as direct competitors for business investments and functions. In the case of Ljubljana and Praha the aspirations for a supranational role are not defined that clearly. Specific is the relation between Wien and Bratislava due to their proximity. Bratislava understands that joining Wien can enhance its international position. Both capitals see potential in common growth of the so-called Twin City Wien-Bratislava as a core of Euroregion Center (Euroregio Mitte - Euroregión Stred). The initiative Centrope with the motto "We grow together – we adhere together" clearly defines Wien and Bratislava as the nucleus of the wider region involving parts of Austria, Slovakia as well as Czech Republic (Brno) and Hungary (Győr).

2.4.2 Internal polycentric organization of capital city regions and their position in national urban and regional systems

What is the position of the capital city region or the capital city itself within the national urban and regional system? Is there a strategy or plan of polycentric organization within metropolitan region? Is polycentricity recognized as an important normative concept? Are there other concepts of urbanization or urban system management in the metropolitan region? Is the collaboration between cities in the metropolitan region institutionalized? Are there coordinating institutions at metropolitan region level? Is there metropolitan strategy of urban system development approved by metropolitan government, regional/provincial governments? Or is there cooperation based on a bottom up coordination among municipalities in metropolitan area?

Praha and Wien metropolitan regions suffer from the lack of coordinated spatial planning. Core cities and their FMAs / MRs are separated in independent regions (Praha and Central Bohemia) or provinces (Wien, Lower Austria and Burgenland). Recent Austrian Spatial Development Concept ÖREK (2011) recognizes polycentric structures and the City Development Concept: Stadtentwicklung Wien 2005 - STEP 05 stresses decentralized concentration as key principles for strengthening international competitiveness of Wien. Wien City Development Concept emphasizes the need for mutual voluntary cooperation between the city of Wien and surrounding provinces. However, planning and policy documents in Austrian provinces discuss interregional cooperation of micro-regions, however, they do not consider Wien.

Praha strives for coordination of spatial development with surrounding Central Bohemia Region. Regional Development Programme of Central Bohemia admits that Praha is the natural center of the settlement-regional agglomeration that economically, historically and culturally connects Central Bohemian region with the City of Praha. However, these priorities have not been fulfilled and the issue of urban system and its hierarchic or polycentric organization is not systematically discussed and implemented. Cooperation between the Central Bohemia Region and Praha is most developed in the area of public transport aiming at region-wide integration of all transport services into a single tariff payment system through the commitment and cooperation of municipalities of the Central Bohemia Region with the City of Praha.

The Hungarian National Spatial Development Concept declares a need to balance Budapest's dominancy in the national settlement structure through the strengthening the position of the regional poles (cities of cc. 100-200 thousand inhabitants). There are several strategic and spatial planning documents that influence and govern the development in Budapest metropolitan region operating on three spatial levels: Central Hungarian Region, Budapest Agglomeration and Budapest city. The development of polycentric spatial structure is not a major issue. Budapest's metropolitan region is seen as a network of micro-regions with autonomous service centers, rather than partners of the core city. The Spatial Development Concept and Strategic Programme for the Budapest Agglomeration (2007) distinguishes a three tier system of sub-centers in the wider metropolitan area proposing that the coordination between the core city and its agglomeration should be managed by the Budapest Agglomeration Development Council, which however, has only limited decision-making powers.

Spatial Development Conception of Slovakia (2001) does not address the issue of polycentricity. The more recent National Strategic Reference Framework of Slovak Republic for 2007-2013 deals with polycentricity at national level in terms of transport infrastructure connecting regional centers. On the metropolitan region level, Bratislava dominates its administrative region characterized by rural settlements and small towns and intensive daily commuting to work, schools and services. There is a priority for de-concentration of employment to suburban municipalities. The impact of the city of Bratislava transcends the boundaries of the Bratislava region to areas in the neighboring Trnava region. However, there is no inter-regional cooperation between the two regional governments of Bratislava and Trnava concerning settlement development.

Despite Ljubljana is the largest urban center in Slovenia it contains only about 15 percent of country population. Slovenian urban network and settlement system is the most polycentric among ESPON POLYCE countries. The Spatial Development Strategy of Republic of Slovenia (2004) promotes polycentric urban development of Slovenia through 51 centers of (inter)national, regional and inter-municipal importance, which are the key employment and service centers in Slovenia. Ljubljana and Central Slovenian region do not enjoy any special position in the framework of national regional policy and programming activities. Regional Development Agency of the Ljubljana Urban Region supports integrated regional development based on the hierarchy of central places in the region rather than metropolitan polycentrism. Spatial Plan of the City Municipality of Ljubljana (2010) pays attention to the threat of the decline of the city center and urban sprawl with using the concept of decentralized concentration emphasizing the development of larger number of small centers.

3 Metropolisation and Growth of Central European Metropolises

3.1 Costs & Benefits of Urban Development

Different cities can achieve different size according to the specificities of their context. The question arising here is: “What are the determinants of equilibrium city size?”²

A simple urban growth model was set up which provides the framework for the empirical analysis. The model is rooted in the literature summarized in Fujita (1989), and moves from the work in Camagni et al. (1986) to Capello and Camagni (2000). Efficient city size depends heavily on the internal productivity and competitiveness of the activities and functions encompassed by the single cities. An agglomeration of a few low-order activities may be supported by a limited number of inhabitants, while a cluster of advanced activities needs and feeds a wider urban population, overcoming the increasing urban costs with a superior productivity. Assuming the following implicit urban cost and benefit functions is the starting point:

$$C = f(\text{size}, \text{rent}, \text{malaise}, \text{sprawl}) \quad \text{and} \quad B = f(\text{size}, \text{amenities}, \text{diversity}, \text{density}, \text{metropolisation}, \text{polycentricity})$$

The choice of arguments for cost and benefit functions is based on the literature summarized before. In particular, the literature usually finds a non-compact urban form to represent a cost for dwellers (e.g. Jacobs, 1961; with however a notable exception in Glaeser and Kahn, 2004), and equally identifies in a general distress effect the possible consequence from over-concentration of people in large urban areas. This last cost to agglomeration is here labeled as “malaise”. On the benefit side, quality of urban amenities (Carlini and Saiz, 2008), sectoral diversity (Jacobs, 1969), density effects, and the innovative notions of metropolisation and polycentricity are included as arguments adding to the understanding of urban benefit functions.

In both equations urban size represents both a cost as well as a benefit for the city. Size is therefore a dual concept, representing a joint source of positive as well as negative externalities for city dwellers. This assumption is the key to solve the model and obtain an estimable function. In order to get an estimable function assessing the relative importance of different urban size determinants, we assume full spatial equilibrium, so that marginal costs equal marginal benefits. The assumption of spatial equilibrium, which allows to close the theoretical model underlying the empirical results of this analysis, has been often questioned for the European case. However, recent findings on the impact of the mobility of researchers, as well as on other forms of proximity fostering inter-regional and inter-urban relations in the EU context have been thoroughly explained by the ESPON KIT project.³ This condition is represented in Figure 6. Eventually, we obtain:

$$\ln(\text{size}) = \frac{\ln(\kappa/\alpha)}{(\alpha - \kappa)} + \frac{\zeta}{(\alpha - \kappa)} \ln(\text{amenities}) + \frac{\theta}{(\alpha - \kappa)} \ln(\text{diversity}) + \frac{\chi}{(\alpha - \kappa)} \ln(\text{density}) + \frac{\mu}{(\alpha - \kappa)} \ln(\text{functions}) + \frac{\nu}{(\alpha - \kappa)} \ln(\text{networks}) - \frac{\beta}{(\alpha - \kappa)} \ln(\text{rent}) - \frac{\delta}{(\alpha - \kappa)} \ln(\text{malaise}) - \frac{\gamma}{(\alpha - \kappa)} \ln(\text{sprawl})$$

where size represents equilibrium size of the city equalizing urban costs and urban benefits - the basis of this part of the project analysis.

² The definitions of the theoretical concepts and notions of metropolisation and polycentricity lying behind this approach follow chapter 1.2 of this report. By ‘city’ we mean the urban agglomeration in the sense of a functionally integrated metropolitan area, crossing administrative core-city borders.

³ The Politecnico di Milano, who holds main responsibility for carrying out this part of the project, is Lead Partners of the ESPON KIT project.

The empirical test of the model is based on a set of 59 Larger Urban Zones, EUROSTAT's definition of the concept of a Functional Urban Area. This choice is mainly motivated by data availability, since the data set merges information from two main sources (EUROSTAT and the ESPON project 'Future Orientations for Cities'). Indicators are described in full detail in the scientific report, chapter 3.

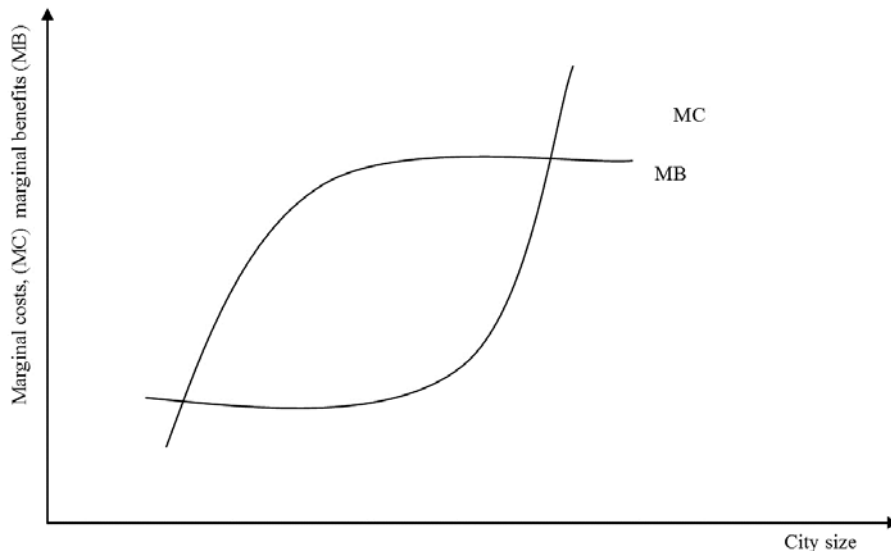


Figure 6: Marginal costs and benefits for city size

3.2 Preconditions of metropolitan growth

The econometric results of estimating the main model (Figure 42 in the Scientific Report) show a remarkable adherence with theoretical ex-ante expectations. If the spatial equilibrium assumption does hold, and people are more or less free to move and look for better life conditions, these estimates provide a reliable first-layer assessment of urban size determinants in the European urban system. In particular, results show:

- Land rent is the single highest cost for urban dwellers, which is reflected in the highest parameter estimate within our framework
- A relevant endowment with urban amenities, with the highest parameter estimate being associated to this benefit variable, also explains equilibrium city size. Amenities and industrial diversity alone explain about 25% of the total linear variance
- Relational polycentric urban development is associated with a larger urban size
- Cities with a denser presence of power functions also reach a larger size
- Finally, the presence of administrative and power functions typical of a city hosting high-rank financial functions contributes to the equilibrium city size

More generally put, these elaborations demonstrate the relevance of a sound spatial structure of metropolises in the form of external networking and the reduction of sprawl. All named elements, linked to a sound urban planning, generate higher urban benefits and efficiency, while at the same time reducing the cost associated to physical size. Developing urban quality, urban amenities and attracting human capital-rich professionals is due to generate enhanced attractiveness and competitiveness, once again supporting a wider, more diversified urban realm. A potentially beneficial and virtuous cycle of urban development may be triggered along these lines.

Confronting actual urban size in the sample with the virtual equilibrium size of cities (Map 3) reveals the following. Most European cities are close to the predicted equilibrium, indicating good preconditions for further urban growth. Among POLYCE cities Bratislava and Ljubljana as well as Wien and Budapest show only marginal positive or negative residual growth potential. Besides, there are two smaller groups of cities with important deviations:

- Those with strong positive residual growth potentials, indicating that the preconditions may allow for further urban growth. This is predominantly the case for medium-sized cities.
- Those showing negative residual growth potentials, indicating that recent preconditions might not be adequate for further urban growth. This is mostly the case for large cities. Praha, as one of the POLYCE stakeholder cities, belongs to this last group.

Potential Population Change in EU Metropolitan Areas



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Equilibrium population/actual population in EU FUAs

- Absence of potential growth given present structure (-6% - -2%)
- Balanced actual urban size (-2% - 2%)
- Potential growth given present structure (2% - 6%)⁴

Map 3: Potential population change in EU metropolitan areas⁴

Regional level: LUZ
Source: Politecnico di Milano, 2012
Origin of data: ESPON Polyce 2012
© EuroGeographics Association for administrative boundaries

⁴ The metropolitan areas illustrated in this map represent the city sample of 59 Large Urban Zones (LUZ) as indicated by Urban Audit and used in this analysis for testing the empirical model. It shall be noted that it therefore is not a comprehensive list of metropolitan regions as indicated for example in the ESPON SGPTD project.

Empirical results allow the identification of city-specific variability: some cities show an actual population which is lower or higher than the equilibrium city size predicted by the model. Differences can be explained by good or bad governance, thereby suggesting future strategies for more efficient urban planning and sound economic and social 'visions'. However, residual growth possibilities, given the negative impact estimated for the sprawl measure, suggest that cities expected to grow in the forthcoming years may look for denser urban forms, thereby increasing the efficient use of the already urbanized soil.

For the five POLYCE cities results show marginally different potentials. While the three bigger metropolises of Budapest, Praha and Wien seem to have reached their growth potentials, Bratislava and Ljubljana show higher potentials regarding the framework needed for future population increase. Thus, they need to take these differences into account in their planning endeavors when trying to steer urban development towards future growth.

4 Central European Metropolitan Profiles

Metropolitan profiles of a sample of European cities (defined as agglomerations within functional metropolitan areas) were elaborated for two reasons:

- *To find how each of the five POLYCE metropolises performs in the European urban system*
- *To depict their metropolitan appearance, i.e. their common and distinct potentials as a basis for strengthening their competitiveness and initiating cooperative actions.*

4.1 Comparing POLYCE City Metropolitan Profiles

The profiles show that each POLYCE metropolis is facing its specific challenges, while at the same time all can draw upon certain strengths that could potentially foster their distinctiveness. Across the five characteristics (Economy, People, Mobility, Environment, Living), all metropolises except Bratislava perform best in living conditions. Anyhow, both Bratislava and Ljubljana metropolitan area are doing exceptionally well in the field of People, even outscoring Wien and Praha. All five metropolises have living standards that are above the sample's average, which is one of their most important commonalities. Interestingly, only the economic performance of Bratislava's metropolitan area can contribute positively to the profile. In the three bigger metropolises this value nearly equals the respective overall score, while in Ljubljana metropolis it shows a clearly negative tendency.

The metropolitan areas of Wien and Praha are almost similar concerning their high values in living conditions, while both show a weakness concerning the 'population'-factor, which subsumes demographic structure, qualification, life-long-learning and the metropolitan appearance of the city. Environmental issues seem to be a specific problem for the metropolitan areas of Bratislava and Budapest. Interestingly only the performance of the metropolitan area of Wien is above average in this concern, but it still doesn't contribute positively to the high overall score. Altogether the metropolitan area of Wien is situated in the top quarter of all analyzed cities. But its profile differs from those of other well-performing metropolises. The majority of analyzed Scandinavian and Western European metropolises on top of the list (e.g. Stockholm, Copenhagen, Helsinki, Munich or Brussels) are showing far better results in the fields of Economy and People, while all have worse scores in terms of Environment. Hence, Wien shows clear differences regarding its metropolitan development, indicating it has specific potentials for positioning in the European urban system.

Budapest's and Praha's metropolitan areas instead show different pictures. While the Czech metropolis also performs well in the European comparison (its only characteristic clearly below average is People), Budapest's metropolitan performance shows a worse tendency. Like the other four POLYCE cities the metropolitan area profits from its high living standards, but suffers from problems in the other fields, especially Environment.

The two smaller metropolises of Bratislava and Ljubljana instead both show good results in the field of People. Interestingly, only in the Bratislava metropolitan area it is not the living conditions that make the best category of the profile, but People. For both environmental concerns and Mobility seem to be problematic fields. Especially for Mobility this contrasts the two best-performing metropolises of Praha and Wien.

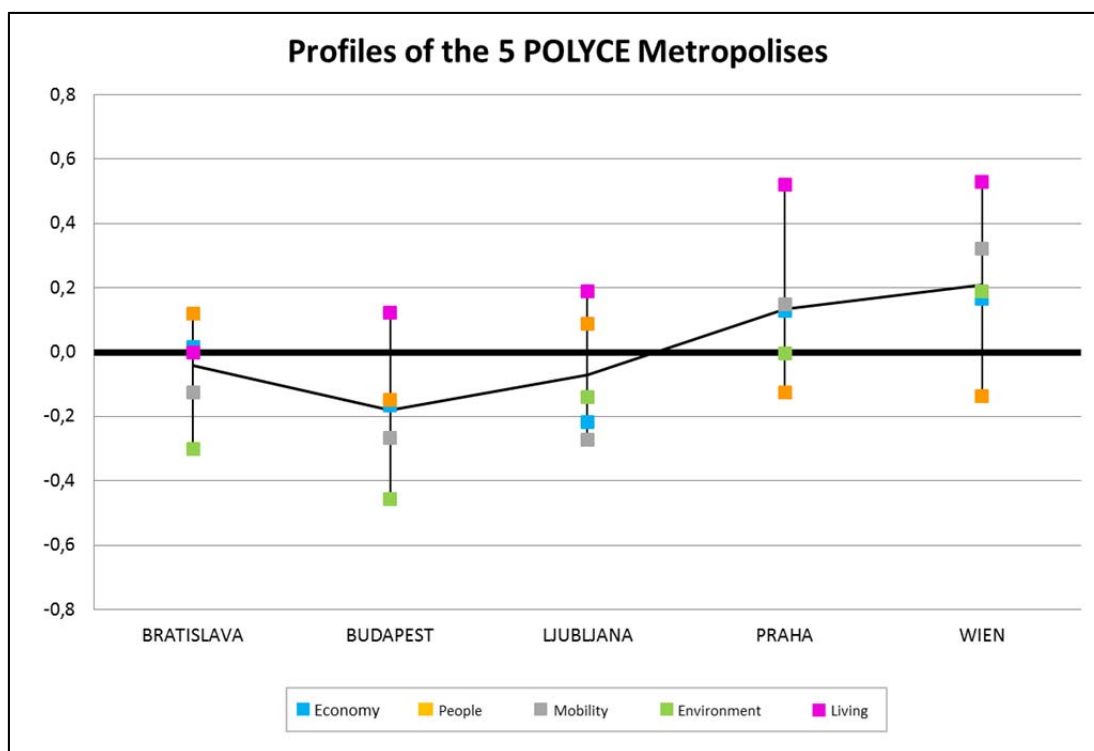


Figure 7: Profiles of the five POLYCE metropolises

4.2 Similarities & Differences of POLYCE City Metropolitan Profiles

Similarly to the investigation of urban growth patterns, two types of metropolises can be distinguished: Budapest, Praha and Wien with heterogeneous characteristics, wide-spreading above and below the sample's average on the one side, and Bratislava and Ljubljana, offering a very compact profile in all categories on the other. While the metropolises of Wien and Praha show an overall performance above average, Ljubljana's, Bratislava's and Budapest's metropolitan area score lies below mean values.

The overview makes clear that all five POLYCE metropolises can play different roles in the Central European urban system. The metropolises of Bratislava and Ljubljana for instance have the highest potentials in the fields related to People throughout the five, but still this is the overall worst performing category of the POLYCE metropolises.

Economic activities, as supposed, are a more distinct characteristic of some Western European and Scandinavian metropolises, but still Wien and Praha are competing here with metropolises like Berlin, Milano and Brussels to name only a few.

Concerning environment-related issues Wien is the only POLYCE metropolis right now performing well in the European sample, outscoring also Copenhagen or Stockholm. Nevertheless, environmental characteristics are not the strength of the POLYCE metropolitan areas.

The most important commonality of all five is indeed the fact that they all have high living standards above the sample's average - a promising potential for common future activities that must be taken into account by policy makers, planners and the like.

4.3 Competitiveness & Inclusion in POLYCE Metropolises

The identification of metropolitan profiles allows for a policy oriented discussion of smart metropolitan development, which aims at balancing competitive and inclusive development. Competitiveness is characterized by high standards of economic performance, knowledge intensive,

innovative and creative activities and international embeddedness (i.e. accessibility and attractivity for international businesses and congresses). On the other hand, inclusion aims at equal opportunities accessible to all. It allows the participation in processes of change, regardless of individual circumstances, and ensures that all people can cope with changing circumstances for the goal of a cohesive society. Concerning these two variables, findings show:

- According to the results, Wien is the most competitive POLYCE metropolis, while still suffering from labor market problems (high unemployment rate) and fewer R&D funding until 2006. In Bratislava, Budapest, and Ljubljana economic performance, international embeddedness, (public) investments, and international accessibility need to be improved in order to enhance their competitiveness in comparison to Wien, Praha, or other European cities.
- The share of foreigners in Wien and Praha is higher than in other metropolises with comparable economic performance and competitiveness. Still though, there is some deficit in human capital potential in Wien and Praha due to a small share of highly educated people and only little participation in life-long learning activities. This is the other way round in Ljubljana and Bratislava.
- Although environmental indicators reveal some deficits in all POLYCE metropolises, the profile shows a way more positive outcome concerning Wien's environmental situation, which is likely to be an asset in comparison to other metropolises. Environmental management should be improved in other POLYCE cities to become a competitive advantage and provide high quality of living standards.

Hence, international accessibility and business embeddedness, educated labor force as well as good environmental and living conditions for residents and visitors are in fact the most important competitive assets of European (and POLYCE) metropolises. Regarding inclusive development in POLYCE metropolises, results reveal some challenging outcomes:

- Good economic performance, which indicates economic wealth, paired with unemployment and lower income levels point to deficits in cohesion. This is a potential threat to some POLYCE metropolises, particularly Wien, but to any other European city as well. In other POLYCE metropolises the economic transformation and development trends of the past 20 years produced lower unemployment rates and more diverse jobs in the private sector and new business ventures.
- Structural differences in economic activities within POLYCE city regions are evident, especially in Budapest and Bratislava. These disparities are increasing due to a concentration of economic activities and better paid jobs in the capital cities. The recent economic and financial crisis had direct effects on the increase of unemployment, and the decline of real and disposable incomes with a direct impact on the decline of economic and social cohesion in POLYCE metropolises.
- Structural deficits also relate to metropolitan regional infrastructures. The public transport systems of the POLYCE metropolises show deficits in the metropolitan regions, although satisfaction with the facilities in the core cities is rather high (e.g. in Praha and Wien). The situation could also be improved in Budapest and Ljubljana with better public transport facilities in the urban region. The availability of ICT in the metropolis is another important indicator of inclusion and territorial cohesion, which – despite great efforts in the past 10 years – needs to be further improved.

5 Metropolitan Reports

This chapter presents five short reports on the most relevant project results from the perspective of the five POLYCE metropolises. Its primary purpose is to provide a concise overview of specific characteristics of the five metropolises that were identified in the course of the analysis. Each city is described regarding existing planning strategies dealing with polycentricity and metropolisation, the current metropolitan profile, the polycentric structure, and the perception of urban development by selected stakeholders. This comes out of, on one side, quantitative analyses (metropolitan profile, polycentric structure) and on the other, qualitative assessments of selected aspects (existing planning strategies, stakeholder perceptions). The integration of an analytically-oriented, quantitative approach with a governance-oriented qualitative approach is meant as a starting point for the development of evidence-based policy strategies for the five metropolises. *The analysis is focused on the metropolises and therefore, if not stated otherwise, presented results relate to the wider territory of a functionally integrated metropolitan area, and not just the core city.*

Two further clarifications are necessary. First, the presented data on metropolitan profiles comes out of an analysis of European datasets available for the five cities. It was attempted to use the most recent available data. Nonetheless, in some cases the need for comparable data for all five cities made it necessary to draw on older datasets. The profiles include data on local and regional levels, and thus they represent metropolitan rather than city profiles. Second, the presented stakeholder perceptions draw on two sources, a survey among a set of 12-15 stakeholders per city, and a stakeholder workshop with 15-25 participants per city. Necessarily, the results are therefore selective and not representative for a larger population. However, they still represent an insight into the perception of urban development issues by a group of relevant experts in the five cities.⁵

5.1 Metropolitan Report Bratislava

Bratislava's development is influenced by the immense change undergone within the past years as the result of the political change in the late 1980's. The change on the political level has influenced the administration of the country, the local economy, and culture, as well as the physical structure of the Bratislava city and region. The process of spatial transformation escalated within the past ten years when the process of suburbanization started to spread to Austria and Hungary. This particular development has become a recent challenge for planners for the Bratislava metropolitan area. Nevertheless, Bratislava's unique position – asymmetric within Slovakia, but close to the neighboring countries – opens possibilities for creating a vital metropolitan territory.

5.1.1 Metropolitan planning strategies of Bratislava

The city and region of Bratislava have several strategic and planning documents on the national, regional, cross-border-regional and local level. Polycentricity, polycentric development and the issue of metropolisation are always presented as one of the strategic goals of the main documents. Despite this fact the issue of polycentricity and polycentric development are not mentioned explicitly in any of the existing documents, always tackled marginally mainly in non-binding documents. One of the problems for unsatisfyingly evolved polycentricity within the metropolitan region is inefficient transport system seen in contrast to Bratislava as a job and market center of and in contrast to the polycentric housing accompanied by the provision of the necessary service.

On the national level there are two documents relevant for the development of Bratislava city and Bratislava region. The Spatial Development Conception of Slovakia 2001 is a long-term strategic document approved by the Government and it is divided into several chapters (Bratislava is

⁵ More detailed information on the methodological approach and data sources for the presented results can be found in the scientific report.

presented as component of European area). The document National Strategic Reference Framework of Slovak Republic for 2007-2013 (NSRR) directly deals with polycentricity at national level in terms of transport connection. The document also notes that Bratislava region has a peripheral location within the Slovak Republic.

The document Economic and Social Development Program of the Bratislava Self-Governing Region for 2007-2013 acknowledges that Bratislava itself is absolutely dominant in the Bratislava Self-Governing Region as for the population rate, as well as the economic center, center of management of the territory, transport node etc. Strategic objective in the programming period 2007 - 2013 focuses on increasing of competitiveness based on the sustainable development. On the other hand the Operational Program of Bratislava Region (OPBK) implements and elaborates with more detail the strategic priority of the NSRR. It states that compared with developed regions of EU countries the Bratislava region uses its development potential only partly. Bratislava as the main settlement within its region and the capital city of Slovakia at the same time is a multipurpose center of regional and nationwide (partly international) significance. Both documents are crucial for the regional development of the Bratislava region.

The unique position of Bratislava and its region provides sufficient possibilities for the international cooperation mainly within the Central-European space. The most international projects are being accomplished together with Austria, Hungary and Czech Republic. Projects as CENTROPE - Development Studies are dealing with the future visions of the cross-border region. The document Euroregion Center introduces an analytical and conceptual material for development of the "Twin City Wien-Bratislava" region as the core of the Euroregion Center. The main assumption for the development of "Central European region" are common territorial planning, aligned construction of infrastructure, supranational organization in the field of management and public transport as well as cooperation in the education sector. JORDES and KOBRA, both INTERREG III projects, are presenting an analytical study of geo-economic region Wien – Bratislava – Győr as well as are dealing with the aim to achieve the adhesion of the Bratislava city with neighboring Austrian territories.

5.1.2 Bratislava's metropolitan profile

Bratislava performs better as the average of 50 European cities; on the other hand we can follow several characteristics of the city where Bratislava is lagging behind, mainly with regard to assessment of environmental quality (environment), international accessibility (mobility) and assessment of urban services (living). While comparing Bratislava with the other four POLYCE cities Budapest, Ljubljana, Praha and Wien, the most similarities can be perceived in comparison to Ljubljana. This resemblance just to Ljubljana can be explained by a very similar size of these cities, as well as the similarity of the city administration history (before 1990's Bratislava and Ljubljana were not the capitals) effecting the overall development of the city.

- **Living:** In this category performance of several characteristics is strongly contradicting. On one hand Bratislava is seen as an attractive metropolis for tourists, but on the other hand the state of art of the cultural facilities is significantly lagging behind (poor support, mainly financial, of the cultural facilities caused by the lack of money and interest). The other contradiction is between very good provision and accessibility of health facilities to the lack of affordable housing and a negative assessment of urban services. Overall, Bratislava is seen as a safe metropolis for living.
- **People:** In this category Bratislava performs rather well, mainly due to the stable population of city and region, Strong suburbanization, perceived mainly in mid-1990's, slowed down in the past few years with population being rather stable, even showing a slight increase recently. Along with Ljubljana, Bratislava scores positively due to education. This is mainly due to the core city's function as capital, housing universities and supplying the labor market with a high number of people with higher education.
- **Economy:** Results shown for this category are fully in accordance with and a logical sequence of the physical positioning of Bratislava. Positive values for knowledge-based economy follow the results for education (People) and the overall image of the city.

Strategic documents represent Bratislava as a center for the knowledge-based economy in the Central-European region, followed by the lowest unemployment rates in the whole country. The negatively performing factors are R&D-funding, international embeddedness (which is due to a strong gravitation towards Wien) and structural disparities.

- Environment: The overall performance here is rather negative, even though Bratislava metropolitan area has a great potential due to its attractive of environmental conditions. Other categories as land use, pollution, resource consumption and especially environmental quality perform negatively.
- Mobility: Public transport was for many years already perceived as one of the weakest points of the city itself. Low standard of public services followed by the increase of the transport prices and cancelation of the public transport lines cause the negative altitude of citizens towards public transport. On the other hand, commuting to the city is sufficiently provided. Negative values for international accessibility are caused by several decisions made in the past, e.g. postponement of the highway construction towards Budapest and Wien, missing high-speed train connections to other European cities and the proximity to Wien with its airport.

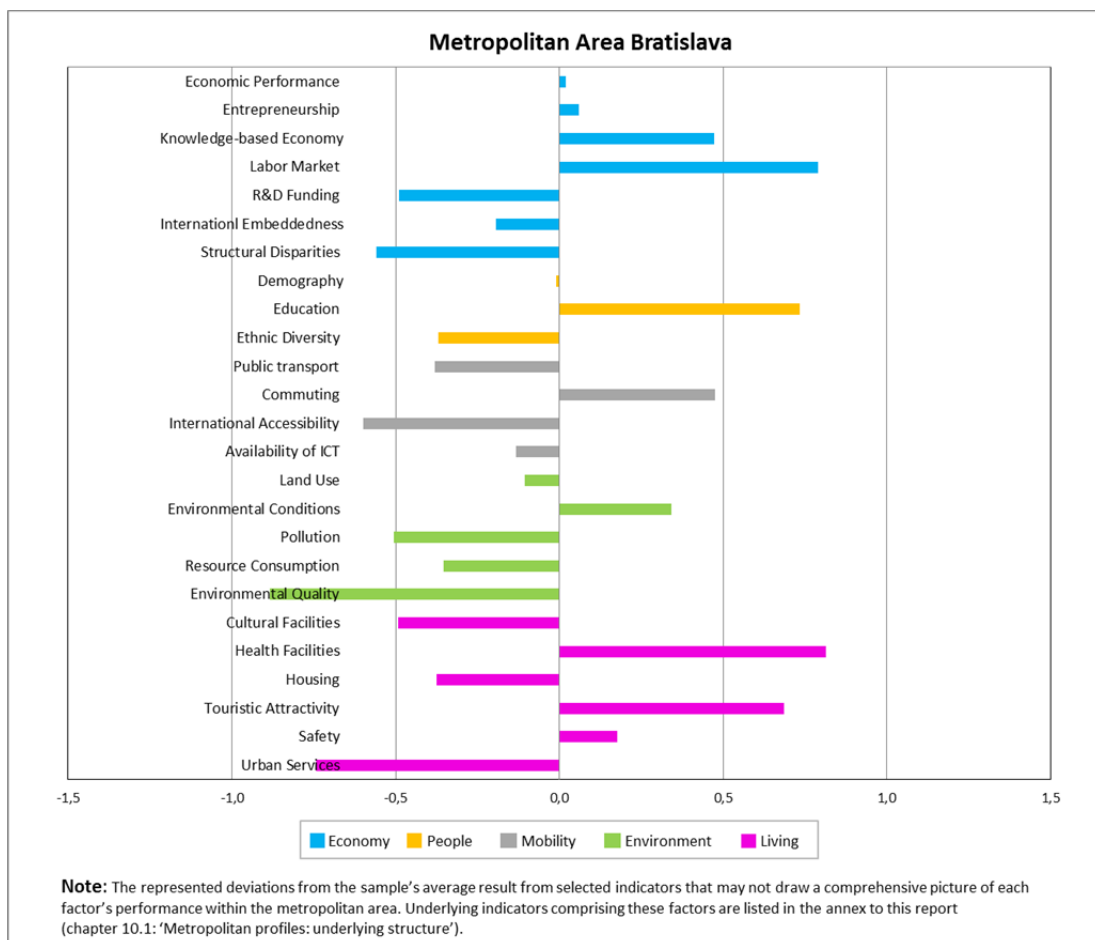


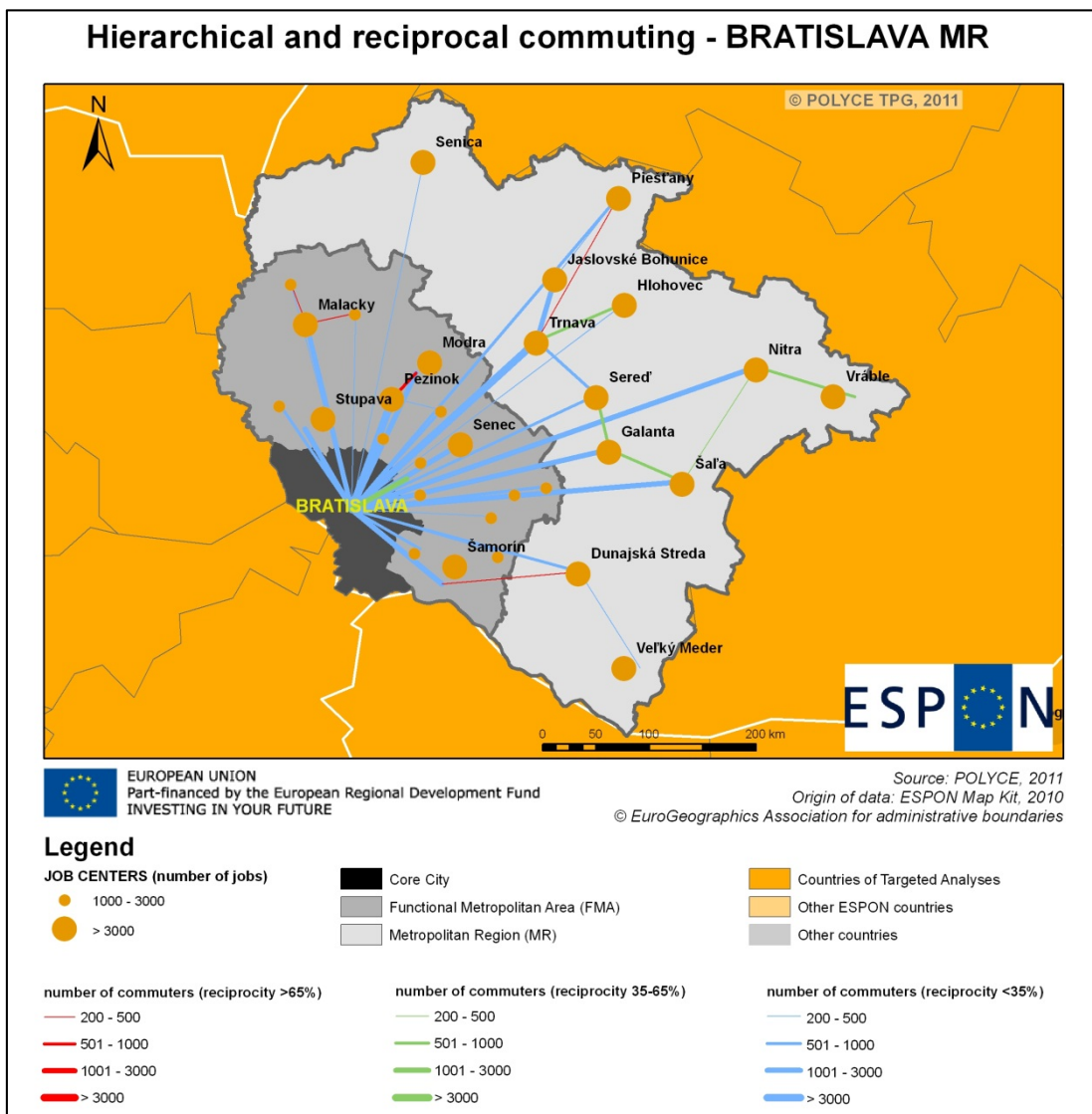
Figure 8: Profile of Bratislava metropolis (factor level)

5.1.3 Polycentric relations

The core city of Bratislava is equal to its administrative boundaries from South and South-West neighboring with Austria and Hungary. Therefore the relations of polycentricity of the CC and of its functional metropolitan area and furthermore of the metropolitan region are presented only with respect to the inland part of Slovakia. It is important to stress that this analysis is based on data available from the census 2001. For this analysis only city centers with more than 1000 and more

than 3000 jobs were considered. Reciprocity of flows is categorized into three groups; under 35%, 35-65% and above 65% of reciprocity of commuting with the core city Bratislava.

This picture is based only on the official statistics and does not express the real state of art. Deformations are caused by strong suburbanization of Bratislava mainly within its metropolitan area and intense commuting within the whole metropolitan region not considered in official statistics. From this observation it is obvious that many official residents of Bratislava possess more than one dwelling. The common praxis is to live in the suburban areas while renting the actual dwelling in the core city and to commute on a daily basis. This feature cannot be shown in statistics due to the analytical approaches. When having a closer look at the metropolitan area of Bratislava we will be able to trace reciprocity flows only for those cities which are providing more than 1000 jobs. This can mislead the overall perception on the commuting reciprocity. The functional metropolitan area consists of many communities functioning as satellites for Bratislava where actual reciprocity flows are equal to those shown, but were not considered for this analysis. The metropolitan area is not defined by the administrative boundaries of any NUTS2 region, but consists of several NUTS3 regions relevant for the polycentric relations. In this area only job centers above 3000 are considered.



Map 4: Commuter flows between job centers in Bratislava metropolitan region

The only really misleading message from this analysis is the absence of polycentric relations towards the so called “fourth quadrant” of Bratislava. Based on the statistics, nor Austrian, nor Hungarian, nor Slovak gives the data on the commuting from the suburban areas of Bratislava located in

neighboring countries. When talking about the metropolitan region and functional metropolitan area we have to stress missing information on the reciprocity mainly with the CC of Wien. There are many students and employed citizens commuting on the daily basis to Wien. Due to the missing statistical information we are not able to describe if this case considers neighboring cities located in Austria, Hungary and Czech Republic.

5.1.4 Bratislava metropolitan area in stakeholders' perceptions

Bratislava is predominantly considered as center of research and education, a dynamically growing historical city, and center of finance and business. Despite an industrial past, the city was not considered industrial in the survey. The results indicate that the mainstream perception of the city is related to historical heritage and recent economic development (before crisis). According to opinions of the respondents, Bratislava is predominantly perceived as an expensive, yet attractive and safe city. The social climate was considered to be indifferent and competitive – a rather critical perception of this field. The positive connotations –tolerant and cooperative – were mentioned less frequently. Such expressions indicate a lot of conflictive potential with low social cohesion (individualistic and business driven climate).

It seemed that respondents leaned toward the belief that successful economic development of Bratislava in recent years was not sufficiently backed by research, development, innovations etc. Societal dimension is perceived more skeptically: especially social integration and international orientation/open-mindedness were rather mediocre. On the other hand, social mobility was rather high; it seems that respondents took into the consideration considerable share of employers from other Slovak regions employed in Bratislava business landscape. Environmental, infrastructural and institutional dimension were confronted with heavy criticism. Especially sustainability of land use structure, green mobility, quality of public services and e-governance were considered to be weak points of Bratislava. Quality of above mentioned services was considered to be poor.

5.1.5 Towards a metropolitan agenda for Bratislava

The eccentric position of Bratislava within Slovakia provides new possibilities towards the neighboring countries. The city profile was formulated several times by now. However, the city position is still insufficient and not well profiled. New forms of governance are needed to strengthen competitiveness of Bratislava within the metropolitan region which will apply changes of the city and region management. Actors involved in the process should focus on the cross-border management, coordination of activities held in the metropolitan region, common decision-making, regular meetings, share of the common databases and all activities supporting permanent exchange of information. Past projects and activities have concentrated on the unique position of the capitals Bratislava and Wien and the technical infrastructure to provide adequate connection of centers. In future Bratislava should orientate predominantly on the physical structure considering as its administrative territory so different municipalities within the metropolitan area. The strength and potential of this specific space lies in its competitiveness to Bratislava and Wien and at the same time enables inclusion of this area to the existing territory. Development of this space should strengthen the position and competitiveness of Bratislava within the knowledge-based economy while concentrating on relevant services and R&D-clusters.

5.2 Metropolitan Report Budapest

The post-socialist period brought about a further increase in regional-economic imbalance within Hungary. Budapest and its metropolitan area as the economically most advanced region of Hungary with gateway-functions became the absolute winner of the transformation. Its dominance in economic, political and cultural terms clearly increased in the last two decades. Policies aiming at improving regional balance within Hungary have been on the agenda since the change of regime. However, the implementation of these policies has only limited results so far.

5.2.1 Metropolitan planning strategies of Budapest

Facilitating metropolisation and polycentric development is a definite policy goal of Hungarian planning. Polycentric development is slightly deeper anchored in the spatial vision of the country than metropolisation. Counter-balancing the dominance of Budapest has been a long-standing policy goal of spatial planning. This implies that enhancing polycentric development is a widely spread and accepted concept in Hungary and penetrates policies at different decision making levels.

Polycentricity at the national level is conceived as an aspiration to counterbalance the weight of Budapest via strengthening the position of regional poles in a distance of 150-200 km from Budapest (e.g. Szeged, Pécs, Debrecen, Miskolc). The National Spatial Development Concept puts an emphasis on strengthening the role of regional centers and their cross border co-operations with major cities in the neighboring countries as well, but does not focus polycentricity at a larger (e.g. Central European) scale. On the regional level metropolitan polycentricity is defined as cooperation among 'metropolitan hubs' embracing a 60 km radius around Budapest. The Integrated Urban Development Strategy of Budapest supports spatial de-concentration of business and administrative functions enhancing an increased metropolitan competitiveness. The metropolitan region here is defined on a functional basis and exceeds the statistical boundaries of the Agglomeration of Budapest (Budapest FUA) and also of the NUTSII region (Central Hungary). According to the Strategy, fostering polycentricity demands an increasing inter-connectedness of the centers lying in the wider metropolitan zone that creates the spatial framework of the agglomeration economy of 3.5 million people. Improving polycentric development locally is defined in the agglomeration's development program through a territorially balanced structure of local value production, as it is based on (overlapping) employment catchment areas of the metropolitan centers.

The concept of metropolisation is as widely used in Hungarian planning documents as polycentric development, but considers only the space around Budapest. The National Spatial Development Concept set the medium term goal of a "competitive metropolitan region of Budapest" to be achieved by the following measures:

- Strengthening the international business functions and European relations of Budapest as a gateway city to South Eastern Europe and the Balkan
- Utilizing the advantages of the high-tech industries, knowledge based economic activities and the highly qualified labor force of the city
- Strengthening the international tourist hub character of the city
- Developing a livable city and metropolitan region through comprehensive environmental management and planning and the revitalization of brownfield sites
- Rehabilitating the densely built neighborhoods and increasing the size of green spaces
- Developing a balanced and well-functioning agglomeration around Budapest by preventing urban sprawl, strengthening the sub-centers, and modernizing transport links
- Enhancing the inter-municipal cooperation through joint institutions

5.2.2 Budapest's metropolitan profile

The city exceeds the average of the 50 metropolises of the sample only in the field of living conditions, whereas in terms of the other four characteristics Budapest is lagging behind. The handicap is especially strong with regards to the environmental conditions.

- Living: The greatest strength of Budapest seems to be the quality of urban services (education and health, housing, etc.). The city is scoring well concerning cultural and health facilities, with a poorer performance regarding safety and housing conditions.
- People: Budapest is performing worst among the investigated POLYCE metropolises concerning this characteristic. The metropolitan profile shows problems with an ageing and shrinking population, the latter caused by suburbanization (a process that has slowed down in recent years, with a migration surplus since 2008).

- Economy: Budapest has a strong position regarding entrepreneurship (meaning a high proportion of new businesses, a low level of bankruptcy and a high density of headquarters), innovation and institutions involved in R&D-activities.
- Mobility: The metropolitan performance here is the poorest in the fields of public transport and commuting. Despite recent development and the extension of Budapest airport, the international accessibility of the agglomeration is lagging behind the European average.
- Environment: Environmental concerns score above European average, which is mainly due to the attractiveness of natural conditions. Considering other factors, however, Budapest is less advantageous - a fact especially true for environmental quality (cleanliness of the city), the level of pollution and the land use criteria.

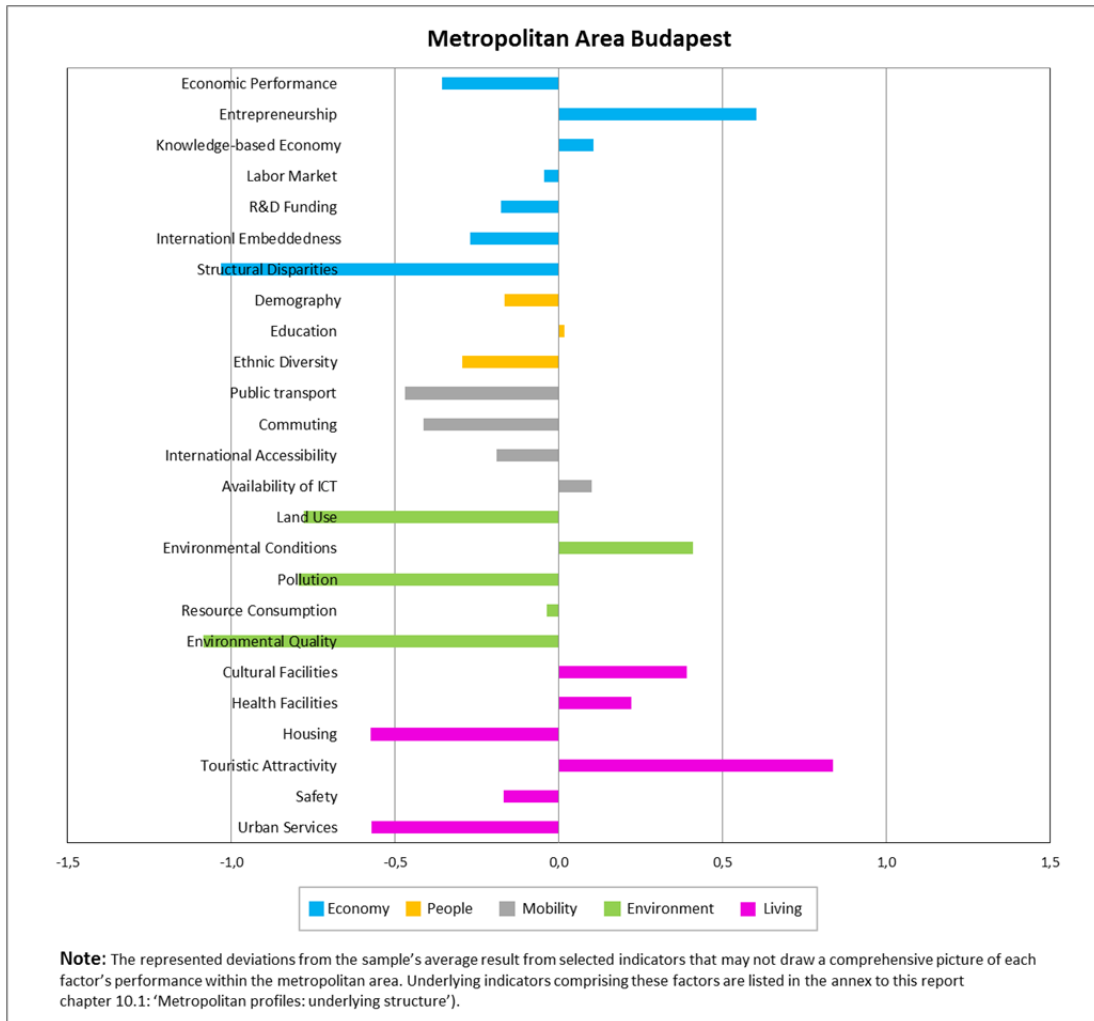


Figure 9: Profile of Budapest metropolis (factor level)

5.2.3 Polycentric relations

According to population size, Budapest has the largest metropolitan area among POLYCE cities. Concerning the jobs available, Budapest core city also shows the highest concentration of employees (856.000) among these five. This fact seems even more important, as the city's metropolitan region is way smaller than the ones of Wien and Praha. According to spatial distribution of population and jobs, Budapest metropolitan area is firmly monocentric. The number of jobs in the core city by far exceeds the number of population. Comparing Budapest with Praha and Wien reveals a similar distribution of population and jobs in the functional metropolitan area, while on metropolitan regional level Budapest has the highest value.

The difference between morphological and relational polycentricity is also a striking character of the metropolitan region of Budapest. The Budapest metropolitan region is characterized by a large number of small and medium cities enhancing the economic vitality. On the other hand, the core city as a primary residential area and job center unequally dominates the whole region. This implies that Budapest metropolitan region - similarly to the one of Ljubljana - has great opportunities to establish a polycentric functional urban structure, counterbalancing the dominance of the capital.

The amount of mobility in Budapest is the greatest among POLYCE cities and its commuting flows exceed 50% compared to second-ranked Wien. Not more than a third of those trips are made among metropolitan centers. The rest is directed exclusively to Budapest, implying an extraordinary level of spatial mismatch in residential and job functions. This underlines the strongly hierarchically organized metropolitan region of Budapest, where the massive outflow of residents was not followed by the suburbanization of services and industry. This results in a mismatch in spatial distribution of population and jobs and a very high level of commuting directed almost exclusively to the core city.

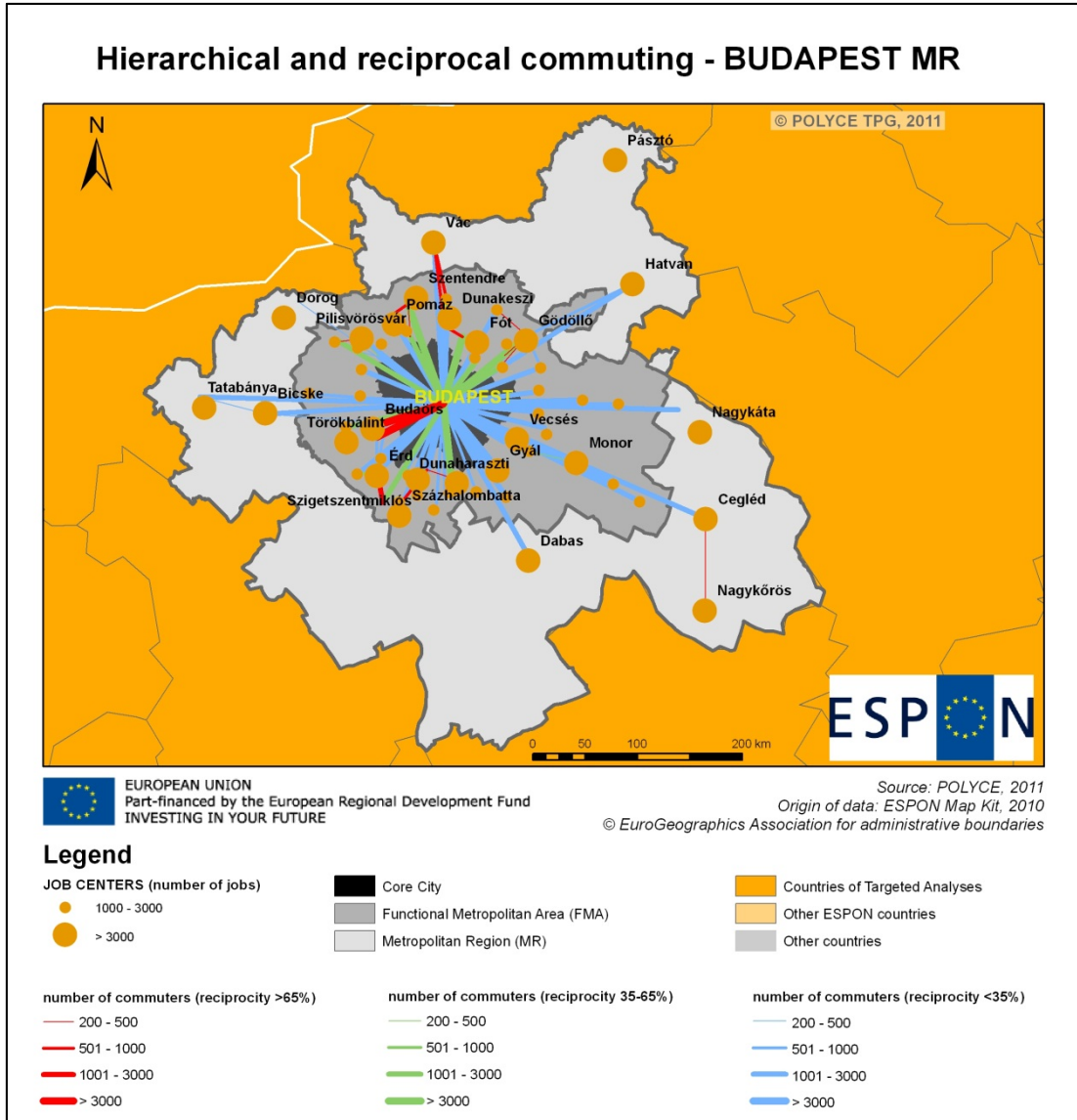
Relations between Budapest and other POLYCE cities hold no surprise. Wien and Bratislava are easily accessible via rail and road networks - the distances are short enough to allow one-day-trips for business meetings. Nevertheless, travel speed (between 80 and 95 km/h) is still very low in relation to comparable polycentric regions in Western Europe. Travels to Praha without overnight stay can only be realized by plane. Ljubljana, which is badly connected both by rail (more than 8 hours) and air traffic (no direct flights), can only be accessed by car in a reasonable way (4 ½ hours).

Compared to other European countries Hungary shows a rather low share of foreigners (1,8%), with only 1% coming from other EU-countries, which can presumably be considered as a handicap for establishing international networks and co-operations. Regarding the CED-zone the country hosts an almost negligible number of people from the neighboring states (less than 0,1%), which shows that the country has not yet succeeded in establishing new connections and relations in spite of existing historic ties. The enhancement of common networks and co-operations will probably increase these numbers as a sign of close social and economic interaction on the one hand and hopefully help to deepen mutual relations on the other.

Considering the city's embeddedness in international firm networks Budapest finds itself in a competitive situation with Praha and Wien, which are approximately on the same level. These three cities are also strongly connected with each other, with the strongest ties between Praha and Budapest. This result might be related to the fact that Wien is relatively less dependent on relations within the CED-zone and more strongly directed to networks in Europe and overseas. According to the importance of the firm location Budapest hosts more high-ranked firm locations than Praha, but significantly less than Wien, which indicates that Budapest seems to cope quite well with its role as an economic center of the region with important control functions.

Also the comparison of participations in EU Research Framework Programme projects shows that Budapest seems to be quite well integrated in European research networks. Compared with its two direct opponents, which are both about the same size, Budapest participates in less research projects than Wien but in more than Praha. In these networks a share of 13% of projects is led by Hungarian institutions, which is significantly less than in Wien, but more than in the three other cities. The numbers of collaborations with the four partner cities point out that there are especially strong ties in scientific research between Wien and Budapest, which are both comparably less connected with Praha. Additionally, Budapest seems to be in a comfortable situation, because in spite of more project co-operations with the partner cities, the share of project participations within the CED-region is not higher than in Praha.

Hierarchical and reciprocal commuting - BUDAPEST MR



Map 5: Commuter flows between job centers in Budapest metropolitan region

5.2.4 Budapest metropolitan area in stakeholders' perceptions

According to project findings Budapest's importance is based predominantly on its function as capital city and business center. It accommodates the seats of international organizations and companies and concentrates large parts of national research and education capacities. It is perceived a historical city, a fact corresponding with Budapest's role as destination of international tourism (which is among the most prospective sectors of growth according to the estimation of local stakeholders).

The performance of local economy contributed significantly to Budapest's success in the last five years, while social tensions in the city have increased. This has been coupled by a massive deterioration of physical infrastructure and ecological capacity. Performance of public services such as education or health care is a widely debated issue, although it was assessed rather positively by stakeholders. Institutional endowments proved to be the most unfavorable and devastating dimension for local development capacity. Both, the administrative system and the inadequate political environment have been criticized. The mismanagement and overlapping political competences contributed significantly to the moderate performance of Budapest in the last five years.

Urban development trends and future potentials of Budapest were perceived positively. However, there are several threats (increasing social inequalities, bureaucracy, and corruption) that hamper the development prospects. Strengths of Budapest are related more to its location and natural characteristics, and historical as well as cultural richness. Its weaknesses are related to the unclear roles in the city's management, lack of strategic coordination in development and public management issues amongst the municipalities, lack of cooperation and the severe inequalities in society.

Stakeholders stressed that finding an urban niche in Central Europe is very difficult, since these cities developed in the frame of the same cultural domain for centuries. Distinctiveness is suggested to be found in cultural endowments that are rooted in the period of the Austro-Hungarian Monarchy and which have contributed to the competitiveness of Budapest since then. Also, cooperation possibilities have been raised, which are not rooted in common cultural and historical traits, like joint destination marketing for the Central-European capitals.

A consensual finding was to acknowledge that rivalry would weaken the position of Budapest. Therefore, an active cooperation among metropolitan centers is required for better utilization of cooperative synergies.

5.2.5 Towards a metropolitan agenda for Budapest

A novel metropolitan-scale planning and development institution could become an asset in Budapest's development path, as the present territorial structure around Budapest shows a patchwork type pattern without any cohesion. The highly centralized unitary political system of Hungary did not favor the concept of polycentricity or any decentralization of decision making in the past. Polycentric development at all levels should be enhanced through active cooperation among metropolitan centers and better utilization of cooperation synergies.

The dynamic economic, cultural and tourism sub-centers around Budapest (small and medium-sized cities like Gödöllő, Budaörs, Szentendre, Vác) seem to hold a potential in this respect, while planning measures haven't been taking related aspects up much yet. This refers to metropolitan transport with related services like Park&Ride facilities as well.

Furthermore, Budapest needs to intensify its relationships with cities in the wider metropolitan catchment area - cities about 80-100 km away (e.g. Tatabánya, Székesfehérvár, Dunaújváros, Kecskemét) - and with capitals of the neighboring countries like Bratislava, Wien, and even Zagreb and Beograd. Concerning Central European city networks Budapest should emphasize its unique character (e.g. the peculiarities of Hungarian culture or the image of city of spas), which should as well be part of official city marketing and branding.

5.3 Metropolitan Report Ljubljana

In the past 20 years Ljubljana has been exposed to the international challenges of globalization, Europeanization and internal transformation. The independence of Slovenia from the former Yugoslav Federation in 1991 was an important 'trigger' for the capital city formation, resulting in strengthened administrative, financial and business functions, and enhanced cross-border links with other cities in Europe, also with cities in former Yugoslavia. As a result, the City Municipality of Ljubljana and the (statistical) region of Central Slovenia (known as Ljubljana urban region since 2002) became the most important locations of economic activities in Slovenia, while preserving the environment, social cohesion, and quality of life for local citizens is a pursued goal at the same time.

Due to the lack of administrative regions (provinces) in Slovenia, the cooperation between the City Municipality of Ljubljana and the 25 other municipalities in Ljubljana urban region is not sufficient for an effective implementation of different horizontal and vertical strategies.

5.3.1 Metropolitan planning strategies of Ljubljana

It is evident that Slovenia is one of the most polycentric European countries (ESPON 1.1.1, 2004), which is a direct consequence of spatial development and regional policies since the end of the 1960s. Consequently, all new strategic planning documents formulated at various spatial levels refer to further polycentric development of the settlement system, with an emphasis on sustainability and territorial cohesion.

The Spatial Development Strategy of the Republic of Slovenia (2004) is further promoting polycentric urban development of Slovenia by defining 51 centers of (inter)national, regional and inter-municipal importance and (potential) functional urban regions. The Regional Spatial Development Concept for Ljubljana urban region (2010), managed by the earlier founded Regional Development Agency of Ljubljana Urban Region, is filling the gap between the national and municipal planning level until the administrative regions (provinces) in Slovenia are realized. The goal is, to '[...] achieve a high level of global competitiveness and high-quality living through encouraging creativity and co-operation.'

On the local level the Spatial Development Plan of Ljubljana (2010) with (land-use) Plan(s) based on the Vision of the City of Ljubljana by 2025 (2007), and the Sustainable Urban Development Strategy and Spatial Development Concept of Ljubljana (2002) are currently in force. All pursue the following goals:

- Realizing the 'ideal city' with optimal city size for living, working and recreation
- Realizing the 'sustainable city' with preserved natural environment and cultural heritage
- Realizing the 'Slovenian metropolis' and competitive European capital city

The principle goal of spatial planning documents is 'smart city growth', emphasizing urban growth and revitalization of Ljubljana as a city of art, culture and knowledge. The plan emphasizes the quality of life for local citizens, preservation of local identity, enhancement of city competitiveness, and use of information technology - all fostering the process of metropolisation of the city. At the same time it is trying to counteract unwished development trends, such as suburbanization and urban sprawl, decline of the city center, and loss of the urban identity due to expansion of market forces and globalization of the cityscapes.

Concerning metropolisation, the following projects named in the strategic documents of the city are of specific interest: the new sports center "Stožice", the new university and technical library, a new medical center, and the improvement of transport infrastructure. Furthermore, Ljubljana is promoted as a gateway city with a central position in the (potential) EU-region Alpe-Adria-Pannonia. Strengthening the innovative, competitive, and attractive position of Ljubljana is mentioned as well. The geo-strategic location of the city needs to be enhanced by strengthening the links and networks with other capital cities in the EU and other city-regions in Central Europe, South-East Europe, and the Mediterranean basin.

5.3.2 Ljubljana's metropolitan profile

Ljubljana lies slightly below the average value of the 50 compared cities. Its metropolitan profile is similar to one of Bratislava but shows differences to those of Wien, Praha or Budapest. Compared to the European sample, Ljubljana shows positive values in Living and People, but negative ones in the other three characteristics.

- Living: Decisive factors for the high score are the quality of urban services, touristic attractiveness and, relatedly, cultural facilities. Nevertheless, the metropolitan area is not performing well in all categories of this characteristic. Housing (due to a high share of small dwellings) and an unsatisfying supply with doctors are the negative influencing factors.
- People: The high value results mainly from the factor education (consisting of the proportion of tertiary educated people, number of students and participation in life-long learning), while ethnic diversity is still a challenge to face in future activities.
- Economy: The well-performing factors here are the labor market (mainly due to a low unemployment level), while negative values can be found in low ERDF- and regional policy

funding, international embeddedness (small number of headquarters of transnational firms and their subsidiaries in the region) and entrepreneurship.

- Environment: Within the factors land use and resource consumption (amount of collected solid waste, protected natural and green areas) Ljubljana is scoring rather well, while the overall score for Environment is not contributing positively to the overall profile of the metropolis. This is mainly caused by negative scores in some natural conditions and air pollution, which are obviously problematic in the city.
- Mobility: The negative values in Mobility can be explained by the rather bad performance in international transport accessibility. Taking the low connectivity and smaller capacity of Ljubljana airport into consideration, it gets clear why the city is not doing so well in this respect. Also, commuting has a low score compared to other POLYCE cities, which is due to the higher number of daily commuters to the city of Ljubljana.

Compared to the other four POLYCE metropolises Ljubljana is rather competitive due to its low unemployment rates, high educational level and environmental preconditions. The attractiveness for visitors and tourists and the quality of urban services are two more potentials. The city's competitiveness might be improved by improving the international embeddedness in European urban networks, implying strengthening the attractiveness for foreign investments and companies, innovative activities, foreign citizens, inter-city accessibility and regional mobility. Inclusion could be fostered first and foremost by providing more affordable housing for rent and purchase, and health service measures.

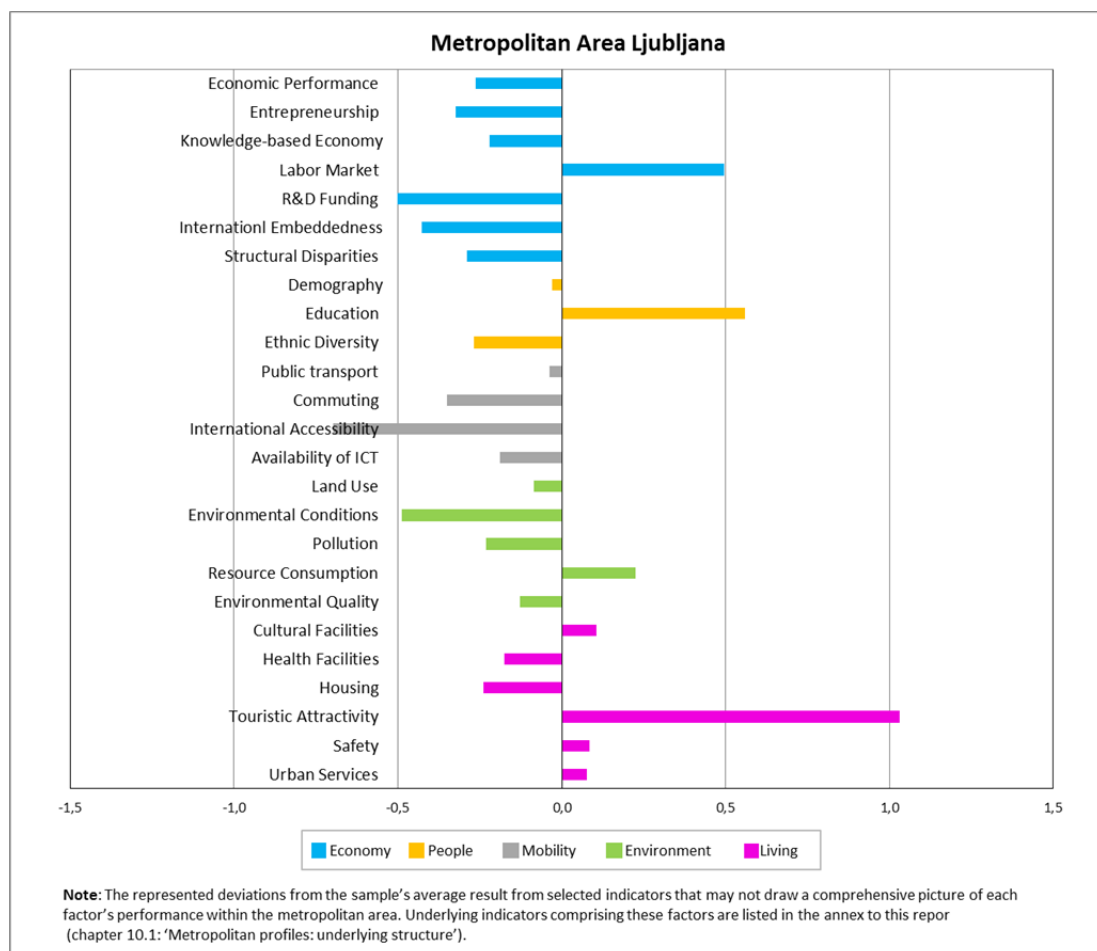


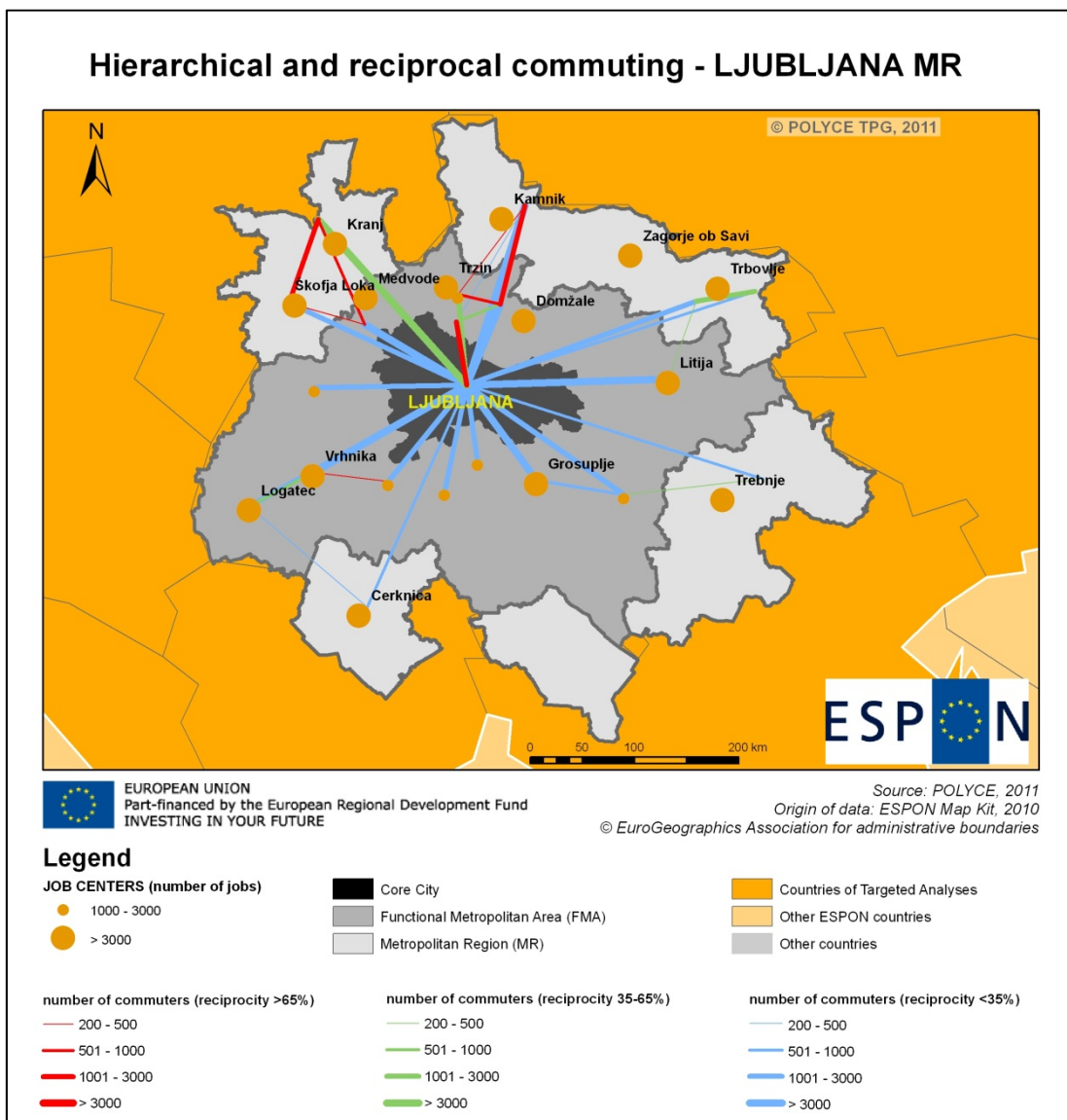
Figure 10: Profile of Ljubljana metropolis (factor level)

5.3.3 Polycentric relations

Ljubljana metropolitan region shows a large concentration of jobs and services in the core city, which might be explained also by a decline of (well-paid) jobs in other urban centers in the region. This is contrary to expectations arising from the polycentric development policy in Slovenia explained above. Negative effects of higher concentration of jobs in the city of Ljubljana are intensive daily commuting, and consequently higher pollution and traffic congestion in the city.

The share of foreigners is mostly made up by citizens from former Yugoslavia, only few come from other POLYCE countries. A larger number of people of Slovenian origin can only be found in Austria. Most business links and connections (i.e. FDI, subsidiaries of foreign firms, export-import links, etc.) in Ljubljana metropolis come again from Austria, only very few from other POLYCE countries. Research connections between Ljubljana and the other four cities are better concerning the participation of local universities, research institutes and other eligible partners.

In comparison with other POLYCE metropolises Ljubljana is very badly connected by rail, taking into consideration the slow average speed of trains (60km/h). Overall, international polycentricity of Ljubljana metropolis is rather weak, with some exceptions of links to Wien, making clear the need for improvements in the near future.



Map 6: Commuter flows between job centers in Ljubljana metropolitan region

5.3.4 Ljubljana metropolitan area in stakeholders' perceptions

Resulting from the stakeholders asked in the city-wise survey, strengths of Ljubljana obviously are to be found in the city's geo-strategic location in (Central) Europe, its cultural and historical heritage and related high attractiveness for tourism and economic activities.

Ljubljana experienced intense economic growth and urban development between 1999 and 2009. The city and urban region performed particularly well as highly attractive business location but conversely seemed to struggle with a decline in social cohesion. The implementation of new transport and infrastructure projects, especially the improvement of integrated and green public transport were named as important future perspectives for the city regional development. Potentials are also seen in renovation of old buildings and pushing forward the renewal of brownfield areas. Both the strengths and weaknesses of Ljubljana are related to city endowments and to horizontal and vertical policy and decision-making as well as management activities (infrastructures, services, etc.) in the city, and between different municipalities in the Ljubljana metropolitan region.

Referring to stakeholders' statements, the newly suggested and not yet implemented development projects seem inconvenient due to the lack of financial resources since 2009. Instead, the wish for more public participation in city planning, more efficient city and regional management, and the implementation of 'soft' policies in city and regional development were claimed.

Ljubljana's attractiveness as cooperation partner is often stressed, notwithstanding the administrative and bureaucratic obstacles. Ljubljana should enhance cooperation links and networks with other POLYCE metropolises except Wien, as well as with near-by city regions in the Alps-Adriatic cross-border region and Western Balkans. Cooperation in research and education, the enhancement of cultural and economic links, and the participation in city and professional networks are some of the potential ideas named in this respect. Improving the connectivity to other cities in Central and South-East Europe is of course a main goal to be achieved soon, so cooperative actions can be implemented more easily.

5.3.5 Towards a metropolitan agenda for Ljubljana

The discrepancy between the morphology of the metropolitan settlement system and functional relations between metropolitan centers and sub-centers is one main challenge that needs to be tackled. Reasons might be deferred planning initiatives and local government reforms of the past. Strong inter-municipal competition for provision of new housing, shopping, business and infrastructure facilities is not supporting a correction of the situation.

Ljubljana's importance as European middle-sized city led to a concentration of specific functions in the core city of a large metropolitan region, inducing negative side-effects, such as intense daily commuting by car with traffic congestion and environmental pollution in the city. Those negative impacts must be on the agenda of policy-makers in the upcoming years to prevent the city from losing its high living standards.

Poor links and connections of Ljubljana to other metropolises are one major point of critique. The rather low international embeddedness of Ljubljana in European urban networks might originate from this, as well as the small number of foreign HQs and subsidiaries.

Wide improvements are needed regarding metropolitan governance approaches, encompassing cooperation of municipalities and various stakeholders, participation of local population in decision-making processes, improvements in social cohesion, and more city cooperation in (Central) Europe. Furthermore, accessibility is a topic to take up. An integrated and sustainable transport system and improvements concerning the city's international embeddedness are claimed.

5.4 Metropolitan Report Praha

Praha dominates the settlement and regional system in the Czech Republic. The city accounts for 12% of the country's population, 15% of jobs and over 25% of the GDP. Praha has a special status, as it is both municipality and region, enclosed by the Central Bohemian Region.

As other post-communist cities, it has been under intense dynamic transformation of urban morphology and land use as well as urban politics. Urban landscapes formed under socialism had to be adapted to new conditions shaped by the political, economic and cultural transition. The main transformations in the spatial pattern of Praha include the commercialization and expansion of the urban core, the dynamic revitalization of some sections of the inner city, transformations of socialist housing estates and the radical transformation of the outer city and urban hinterland through sprawl-like suburbanization.

Local politics and planning have been reformulated according to principles of market economy and democratic decision-making. Some market-driven urban reconfigurations present major challenges, requiring new forms of urban management that are not yet perfectly implemented.

5.4.1 Metropolitan planning strategies of Praha

Praha has retained a centralized principle of a single plan encompassing the whole city jurisdiction. Some major centers taking over citywide functions are proposed in compliance with the principle of a polycentric development of Praha in the Land Use Plan of the City (1999, as well to be found in the draft for the new plan 2009). This is in line with the Strategic Plan for Praha 2008, which declares the objective of developing a polycentric city structure as well. In this respect it is a follow-up to the Strategic Plan from 2000 which already tried to identify important sub-centers of several functional concerns. Now, the development of expansion sites for the city center is under way, but suburban shopping sites mushroomed fast as well in other non-planned sites and the outer-city secondary centers have only partly been completed.

On the metropolitan region level a common strategy is missing. The last executed attempt for a single, coordinated plan for Praha and Central Bohemia dates back to 1975. The Planning and Building Act (2006) requires that all (legally binding) territorial plans on local as well as regional level shall be coordinated with neighboring communities and regions in the respect of infrastructures that cross the borders of the relevant territory. This at least prevents some discontinuities, but cannot influence problems like suburban sprawl and therefore asks for a more comprehensively coordinated development.

On the other hand, the Regional Development Programme of the Central Bohemian Region (2006) envisions its territory as being a dynamically growing, economically powerful and competitive region with strong and mutually beneficial relations and ties to the city of Praha. The vision calls for a region-wide integration of all transport services into a single tariff payment system, motivating the use of public transport. In fact, the Praha-based Regional Operator of the Praha Integrated Transport (ROPID) serves a great part of central Bohemia. In this way, the pragmatic reality advanced the ideas of strategic documents. What remains is that neither of the two regional administrations seeks for institutional support of the coordination of their development, which is a main challenge in Praha's future metropolitan development.

5.4.2 Praha's metropolitan profile

Praha ranks second in the sample of POLYCE cities in terms of living quality, urban mobility, quality of physical environment and economy. Only its demographic structure scores rather poorly in comparison with the bigger sample of European metropolises.

- Living: Living quality of Praha is particularly strong among POLYCE cities concerning health and cultural facilities, while in housing and safety the city scores below average. Interestingly, opinions of residents, expressed by Urban Audit survey-based indicators, show

great dissatisfaction with pollution, with how (public) money is spent (similarly to other post-communist cities), and criticism of quality of green spaces.

- People: In terms of demographic indicators, Praha can be classified a typical Central European city with stable population and high share of single-family and senior households. Most recent data show fluctuations in population development, thus the data from particular years may not be telling the whole story.
- Mobility: Praha as well as the metropolitan region are well accessible within the ESPON space. The satisfaction of Praha residents with public transport is worse than in Wien but better than in other POLYCE cities. However, in 2008 the transportation output of the public transport system in Praha and Budapest were the highest in Central Europe.
- Economy: Recent data on post-communist cities may be distorted by the preceding history of economic transformation. The post-communist capitals enjoyed an economic boom in the decade between the mid-1990s and mid-2000s - the bigger, the deeper the preceding decline during the transitional period had been. The Urban Audit data on GDP per capita suggests that Praha is lagging behind Wien, Bratislava and Ljubljana, while EUROSTAT data from 2008 rank Praha tenth all over Europe and ahead of Wien. This indicates that Praha's economic performance is in the meanwhile way better than illustrated by the older indicators, which were used for the analysis. Still though, Praha hosts a low number of firms quoted in national stock exchange, but both the city and metropolitan region have very low unemployment rates, which contributes positively to its economic profile. Unlike the other metropolises and metropolitan regions, Praha shows quite small disparities between the city and the surrounding region.

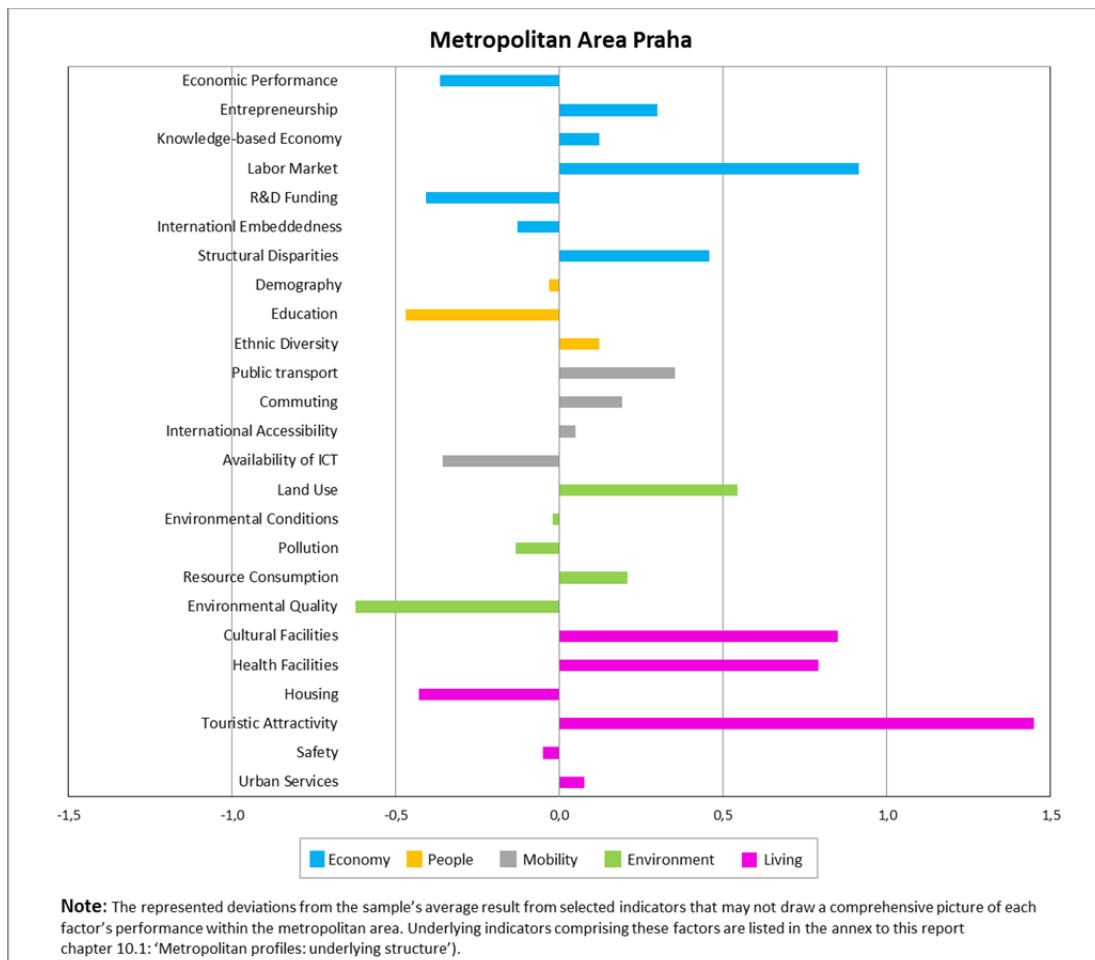


Figure 11: Profile of Praha metropolis (factor level)

5.4.3 Polycentric relations

The structure of Praha's metropolitan region is rather polycentric due to proximity of relatively large urban centers such as Mladá Boleslav, Kolín, Kladno, Beroun, Příbram. Hence, also the number of job centers within the metropolitan region is comparable to the one of Wien and is a good precondition for the development of relational polycentricity. Praha of course exceeds the other urban centers in the region in terms of population and jobs, but is still not as advanced in job decentralization as for instance Wien.

Praha's urban system still tends to be rather monocentric concerning the investigation of commuter flows. The core city has a strong position in the regional urban system, as the majority of flows is oriented to or from Praha, while there are only several tangential relations between other sub-centers. Though this dominant role is slowly diminishing, the monocentric pattern remains. Compared to the case of Wien, Praha has a substantially lower level of relational reciprocity in the commuting system. However, recent developments (since 2000) related to job decentralization in the metropolitan region are based on more reciprocal ties moving Praha to a more polycentric organization.

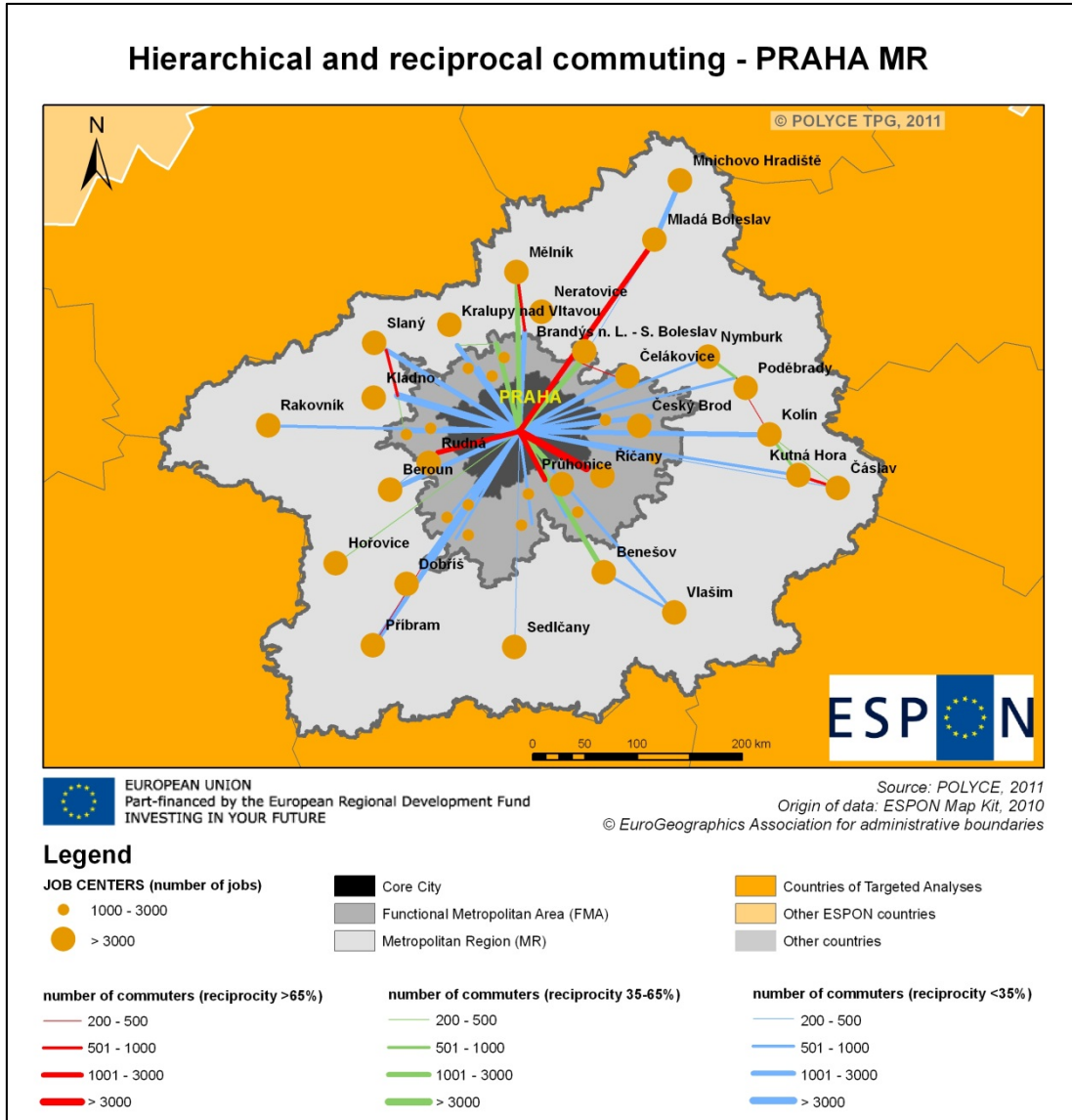
Due to its location in the North-West of the CED-zone Praha is not perfectly accessible from the other four partner cities. The distances are not short enough to allow one-day-trips to the other cities by car or train, which can only be realized by plane. Although Praha is well connected to European rail networks and there are more than ten acceptable train connections per day to Wien, Budapest and Bratislava, the average travel speed (between 75 and 80 km/h), however, is still very low in relation to comparable polycentric regions in Western Europe. The most unattractive connection concerns Ljubljana, which cannot be reached by plane directly and requires a travel time of 7 hours per car or 11 hours by train.

Since economic, social and institutional interaction is always embedded in an existing network of established relations and traditions, it is influenced by ethnic and historic relations between cities and countries (common history, culture, language, etc.). The relatively high share of foreigners (3,4%) in the Czech Republic can partly be attributed to Slovak citizens living in their former home country. Neglecting this group of people the country hosts an almost negligible number of people from the neighboring states in the CED-region, which shows that the country has not yet succeeded in keeping its historic connections in Central Europe alive. Contrary to Hungary and Slovakia the Czech Republic hosts a significant number of people from non-EU-countries, which can be considered as an opportunity for establishing international networks and co-operations.

Considering the city's embeddedness in international firm networks in the FIRE (Finance, Insurance and Real Estate) sector, the analysis of the GaWC dataset reveals that Praha finds itself in a competitive situation with Budapest and Wien, which are approximately on the same level. These three cities are also strongly connected with each other, with the strongest ties between Praha and Budapest. In total Praha hosts most locations of both European and global FIRE-firms. According to the importance of the firm location, however, Praha hosts less high-ranked firm locations than Wien and Budapest, which indicates that Praha is well integrated both in European and global networks, but is often not the first choice of FIRE-firms, which want to establish a headquarter in the CED-region.

The comparison of participations in EFP (EU Research Framework Programme) projects reveals that Praha's integration in European research networks lags behind Budapest and Wien and was not able to improve its position over the last 5 years. Of all projects with participation of research institutions from Praha only a share of only 9% of is leaded by Czech (presumably mostly located in the capital) institutions, which also underlines the improvable situation of the country in that field. The numbers of collaborations with the four partner cities show that Praha is quite independent of research co-operations within the CED-region, which be interpreted as a wasted opportunity on the one hand but also as a sign of a more global orientation of research on the other.

Hierarchical and reciprocal commuting - PRAHA MR



Map 7: Commuter flows between job centers in Praha metropolitan region

5.4.4 Praha metropolitan area in stakeholders' perceptions

Stakeholders characterize Praha as an attractive city with notable historical heritage, making it an important tourist destination. Relatedly, the revitalization of various places and districts, mostly in the inner city belt of historical suburbs, was claimed to be of high importance. Anyhow, transport infrastructure projects turned out to be the major issue among all discussed activities. Particularly the poor coordination between the constructed metropolitan sub-centers (mostly office and shopping sites) and the transport system was repeatedly mentioned. In the inner-city, vast brownfields and their reasonable, thoughtful conversion for urban use are major challenge for the spatial development.

Discussants claimed Praha's poor institutional capacity, particularly problems with administration, unsatisfying citizen's participation, and a lacking will and ability to cooperate. The lacking spatial concept of Praha and the metropolitan region, poor city management, widespread clientelism and corruption were also mentioned as challenges for metropolitan policy. Some responses reflected the existing difficulties with finding appropriate partners for Praha in the Central Bohemian Region. No particular example of established institutional collaboration between Praha and a Central Bohemian municipality was identified.

5.4.5 Towards a metropolitan agenda for Praha

Praha and the surrounding metropolitan region can be classified as winners of the transition and transformation towards market economy. They are well-equipped by 'hard' infrastructure and attract educated people from the country as well as from abroad. This makes Praha metropolitan region a leading region in the Czech economy, and, at the same time, a fully compatible and competitive partner in the metropolitan network of Central Europe.

While recent projects focused mainly the 'hard' infrastructure, desired future project ideas were balanced between 'hard' and 'soft'. Improving the institutional capacity of city and regional management turned out to be of high importance for Praha. The desirable changes can be summarized as follows:

A clear management and planning strategy for an active and strong city and region is needed. This implies governance measures, such as transparent decision-making, structured management of development on regional and city-level, and the coordination between Praha and Central Bohemian Region. A knowledge economy strategy and relevant policies in the field of research should be implemented to support higher education and technological innovations. Finally, culture must be taken into account as an engine of urban change. The care for cultural values is of decisive importance in this concern.

The cooperation of Praha with other metropolises should focus a common policy of promoting tourism, and major sports and cultural events. Specific importance is attached to knowledge exchange. Praha would appreciate learning about the experience from other cities in the fields of citizen participation, development control and mobility behavior.

5.5 Metropolitan Report Wien

For almost two decades Wien has been confronted with different challenges of economic and socio-demographic restructuring, which is mainly due to transformation processes on a higher spatial level. The decrease of barriers, in particular the fall of the Iron Curtain, and the EU integration process of Austria and other Central and Eastern European countries caused a shift of Wien's role in the European territory (Giffinger & Hamedinger, 2009), which caused a political reorientation of the Austrian capital towards becoming a Central European node (Municipal Planning Department Vienna, 2005). The referenced processes also fostered a clearer perspective in urban strategies, mainly owing to predicted urban growth⁶ and high standards in environmental and living conditions (Municipal Planning Department Vienna, 2005). This process seems to be reflected in several quality-of-life studies ranking the city among the best in a global sample – a circumstance, which the city took up as a basis to undertake efforts within the "Smart Cities" initiative only recently. Hence, Wien's biggest challenge is the conservation and improvement of high environmental and living standards despite continuing urban growth.

5.5.1 Metropolitan planning strategies for Wien

The concepts of polycentricity and metropolisation are widely acknowledged by policy makers in Wien. There is a wide range of policies that explicitly deal with both concepts and integrate them in planning strategies. On the regional level polycentricity is primarily discussed in the context of sustainable spatial development, while most attention on the European level is drawn to the integration of Wien into a wider European city network. On the regional level policies can be classified into four categories:

- Development of new, well-connected centers

⁶ 'Wien waechst wieder' ('Wien is growing again') is a popular quote from the city's Urban Development Plan 2005, which is often cited by political stakeholder as an important precondition in the context of debating about the city's urban future.

- Revitalization of existing centers
- Development of industrial clusters
- Institutional coordination of spatial development policies

These policies are considered to contribute positively to a more balanced settlement system in the Wien region and to more sustainable patterns of regional spatial development – aspects, which institutions like the City-regional Management (SUM) and Planning Association East (PGO) are already trying to take into account. Only recently, the PGO finished the process of elaborating a strategy for the development of the Eastern Austrian region (SRO). Also, the most recent strategic document of the Austrian Spatial Planning Conference (ÖROK) presents plans to develop a common agglomeration policy for Austrian agglomeration regions (ÖROK, 2012). On the European level, the emphasis of polycentricity policies lies on the intensification of transnational cooperation and coordination of spatial development. These policies aim at a better positioning of Wien in the European polycentric system and at a more balanced European city system. Besides other Austrian federal state capitals, particularly cities like Brno, Győr and Bratislava – all part of the related Centrope initiative – are ought to be part of this city system.

The discussion of metropolisation primarily deals with Wien's position as a hub to Central and Eastern Europe and with the city's role as a center of culture, tourism and business. On the regional level policies dealing with metropolisation are related to the improvement of regional accessibility, the development of new urban growth poles and the promotion of knowledge-intensive businesses. On the European level the improvement of international accessibility, the positioning of Wien as European metropolis and the cooperation with Bratislava for a common international positioning of the region are at the core of the strategies proposed.

5.5.2 Wien's metropolitan profile

Wien - including its functional metropolitan area - shows a rather specialized profile as a metropolis, indicating its specific assets for positioning in the European urban system. The city is performing exceptionally well in the field of 'living' and in environmental, economic and mobility-related matters. Still, the inhomogeneity of its metropolitan profile is notable: The enormous variation of characteristics between those scoring best and the ones below average is in line with the profiles of the two other big POLYCE metropolises: Budapest and Praha. Due to its good overall performance Wien finds itself situated in the top quarter of the 50 measured metropolises, proving that it has certain comparative advantages in the European urban system. Still, research reveals an obvious weakness concerning cosmopolitan appearance, demographic structure and education - all subsumed under the category 'people'. A look at the factors and indicators lying behind these characteristics allows for a more in-depth view:

- Living: Based on its cultural heritage, the large social housing segment and high standards in social and health services, all factors underline the good performance in metropolitan living conditions - not only within the city, but also within the metropolitan region.
- Mobility: ICT-availability, international accessibility, and commuting are well-organized. Public transport instead shows deficits, which mainly results from high monthly ticket prices – a circumstance taken into account by local policymakers already by reducing the prices for annual (€365,- instead of €449,-) and monthly (€45,- instead of €49,50,-) tickets in May 2012. Services for commuters across city borders and into neighboring areas seem to be unsatisfying, although distinct studies (Mayerhofer et al., 2010) show high standards in the organization of public transport within the city – a fact underlined by high satisfaction of inhabitants with the urban public transport system.
- Environment: Whereas the assessment of environmental conditions within the metropolitan area shows a positive result, particularly resource demand (meaning water consumption and amount of collected solid waste) is problematic in comparison to other European cities. Demographic and economic growth will be challenging for metropolitan governance in this regard, particularly considering sustainable land use. This topic is already

subject to discussion in Vienna's strategies, expressed by several projects, which try to tackle this issue.

- Economy: Embeddedness concerning economic headquarter functions and economic performance (expressed by GDP and GVA) can be named as outstanding factors. On the other hand, striking deficits in R&D-funding and labor market concerns diminish an excellent development in 'economy'. On-going processes of economic restructuring and challenges of metropolitan growth going far beyond city borders are explaining the specific deficits. These findings correspond with the increase in productivity and stagnating economic wealth and with problems at the labor market mentioned in other studies on the city's competitiveness (Mayerhofer et al., 2010)
- People: Wien is performing far below European average in this section, which results from deficits in educational standards. Socio-demographic indicators on the metropolitan level and foreign population and their status of integration have weak scores as well. With Wien's history as 'melting pot' in mind, this result sounds rather surprising. Possible reasons lie in insufficient concepts on migration and integration by the political-administrative system in Austria. Still though, Wien is currently undertaking efforts towards integration and diversity management to overcome this problematic situation.

Wien's competitiveness is mainly fostered by its good economic performance and international embeddedness, while weaknesses concerning labor market issues, too little R&D-investments and deficits in human capital are limiting it. International accessibility and living conditions are in fact the most important assets of Wien as a metropolis. Although resource demand and land use are factors that urge for improvement, even environmental standards show an above-average result and are likely to be an asset in comparison to other cities.

However, the contrast of economic performance to high unemployment rates and low income levels seems to be critical from the viewpoint of inclusive metropolitan development. Also, insufficient integration of migrants is a strong deficit in this consideration. On the other hand, the public transport system holds the potential for territorially inclusive development of the metropolis. The same is true for living and environmental conditions, meaning health and social services, housing and cultural facilities. Still, intra-metropolitan disparities in economic terms between city and region need to be mentioned critically, as they are increasing above European average.

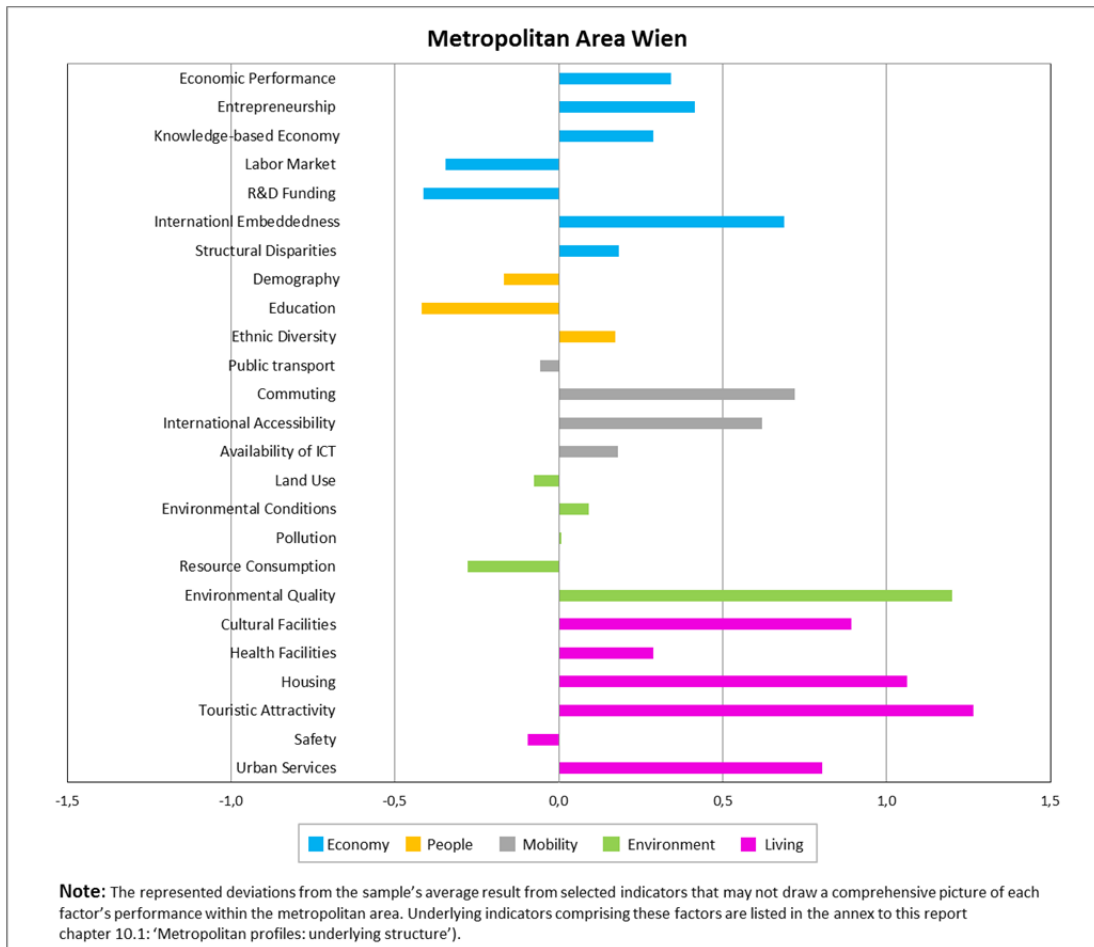


Figure 12: Profile of Wien metropolis (factor level)

5.5.3 Polycentric relations

Wien has the biggest metropolitan region and functional metropolitan area of the five POLYCE cities, while the core city is comparably smaller than Budapest and Praha. The reason is the project's spatial delimitation of areas based on commuter relations, which obviously involve a much greater space than in the other metropolitan areas. Nevertheless, Wien turns out to be a strongly monocentric region with the highest concentration of population to the core city, which doesn't strongly deviate from values in the other two big cities, while Ljubljana and Bratislava can hardly be compared due to their significantly smaller size.

The analysis of commuters shows a totally different picture. In Wien commuting flows are much less directed to the core city. The share of reciprocal flows (oriented in opposite directions) in the year 2001 was much higher than in the other cities. This result clearly demonstrates the difference between the more open and functionally integrated region of Wien and urban systems in former communist countries, which are more dominated by capital cities and their labor markets. Although Wien appears as a highly monocentric urban system from a morphological point of view, it shows a high degree of polycentricity in relational terms.

Due to its central location within the CED-zone Wien is characterized by a high accessibility of the other Central European cities with relatively short travel times in road and rail transport. The immediate vicinity of two "twin-cities" Wien and Bratislava implicates very good accessibility of the Slovakian capital, and cross-border relations with secondary cities such as Brno and Győr seem to be increasing as well. Distances to Budapest and Praha are short enough to allow one-day-trips for business meetings, whereas travels to or from Ljubljana without overnight stay can only be realized

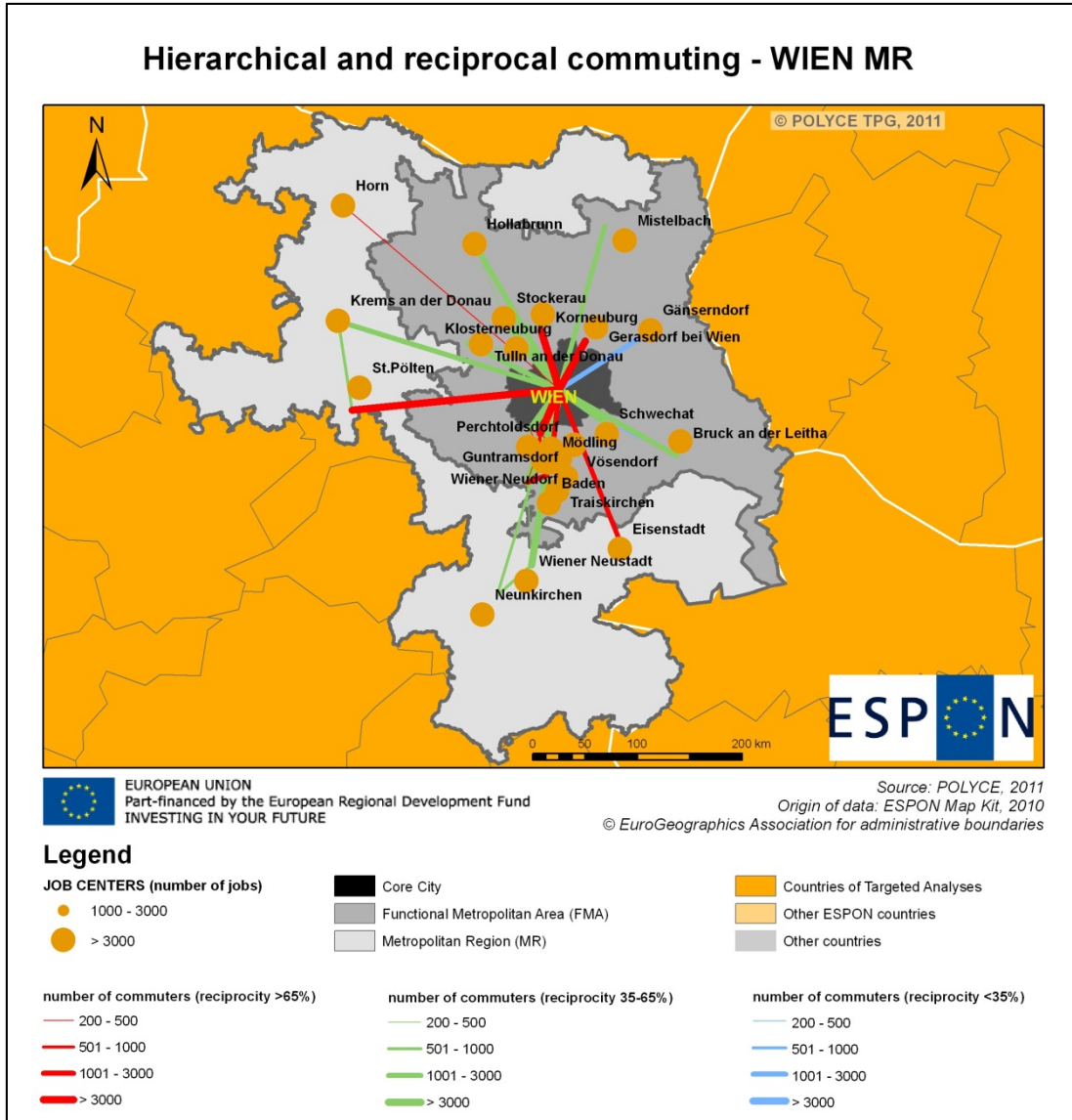
by plane. The relations to all four partner cities have an acceptable supply of train connections with at least 10 trains per day in both directions. Travel speed, however, is still very low in relation to comparable polycentric regions in Western Europe.

Since economic, social and institutional interaction is always embedded in an existing network of established relations and traditions, it is influenced by ethnic and historic relations between cities and countries (common history, culture, language, etc.). The share of foreigners proves Austria's role as an immigration country. Contrary to the four partner states, Austria has become an attractive destination for migrants over the last 50 years. Consequently it is the only country with a remarkable share (10%) of foreign population, which can presumably be considered as an asset for establishing international networks and co-operations. Regarding the CED-region only Austria hosts a remarkable number of people from the neighboring states which shows that the country has been able to keep its historic connections alive. Hence, Wien is still attractive for immigrants although deficits of integration are regarded as an important challenge in the stakeholders' view.

Wien finds itself in a competitive situation with Praha and Budapest concerning embeddedness in international firm networks. These three cities are approximately on the same level. They are also strongly connected with each other, although the strongest ties are between Praha and Budapest. This result might be related to the fact that Wien is less dependent on relations within the CED-zone and orienting itself to networks in other parts of Europe and overseas. According to the importance of the firm location Wien hosts significantly more high-ranked firm locations than their opponents, which indicates that Wien seems to cope successfully with its role as an economic center of the region with main control functions.

The city seems to be well integrated in European research networks. It ranks best at participation in research projects, which might be attributed to established networks and co-operations with Western European EU member states. The number of collaborations with the four partner cities points out that there are especially strong ties in scientific research between Wien and Budapest, which are both comparably less connected with Praha. Additionally, Wien seems to be in a comfortable situation, because in spite of a big number of project co-operations with the partner cities, the city is less dependent on them, since the share of all project participations is lower than in the other cities.

Hierarchical and reciprocal commuting - WIEN MR



Map 8: Commuter flows between job centers in Wien metropolitan region

5.5.4 Wien metropolitan area in stakeholders' perceptions

In the view of a number of selected local stakeholders, Wien is perceived as an attractive, unique and safe place that benefits from its historical heritage and its related role as a tourist destination. There is strong disagreement whether the city is affordable or expensive. According to the stakeholders, Wien is performing well in terms of infrastructural provision, economic development and environmental quality. In the view of the respondents, this positive performance is however threatened by problems related to social integration.

Projects or activities that positively influenced urban development in recent years are the improvement of public transport, the start of the Main Station Project and the Seestadt Aspern. Contrary to these positive aspects the loss of public spaces in parts of the city, the failure of several large urban development projects and the lack of programs to ensure ongoing spatial integration of different groups in the city were negatively perceived. The high quality of life and the performance of the local economy are seen as specific strengths of the city. Conversely, weaknesses are the lack of integration, the low energy and resource efficiency as well as the lack of innovative economic activities. Most promising activities for the future development of the city are the completion of large urban development projects (Main Station, Aspern), the fostering of integration as well as the

strengthening of cooperation with surrounding regions in the view of the stakeholders surveyed. The city is considered to be a very attractive partner for cooperation, mainly due to existing experience with cooperation, the geopolitical location and the well-functioning administration. Cooperation with cities in the metropolitan region of Wien is regarded essential in the fields of infrastructure development and transport, coordination of spatial development, economic development and environmental issues. For cooperation with cities outside of the metropolitan region the fields of R&D, energy, knowledge transfer, cluster networks and transport and infrastructure are regarded necessary.

The discussion of analytical results with local stakeholders revealed a number of points. Relating back to the results of the stakeholder survey, integration is considered to be among the greatest challenges ahead for Wien. Integration is thereby not only understood as ethnic but also as social integration of different groups in the city. Sustainability, in ecological but also economic and social terms, is seen as the second big challenge that the city will face in the near future. A third outcome of the discussion was the surprise among several stakeholders about the relatively low competitiveness of Wien in comparison to other European cities that was revealed by the empirical analysis. Regarding Wien's role as metropolis the stakeholders agreed that metropolisation is a process which the city is continuously confronted with. However, in many ways policies could more actively take up the process and try to build strategies on it. Polycentric structure is considered to be a desirable policy goal among stakeholders, but also a useful term for lobbying. These inconsistent and sometimes even contradictory definitions of polycentricity are hard to compare, making a policy use of the term even more difficult. There was a consensus that potential future policies dealing with polycentricity and metropolisation have to differentiate between a regional and a European level.

5.5.5 Towards a metropolitan agenda for Wien

On its way to becoming a metropolis a city's self-esteem and identity might get seriously twisted. Wien has to look for a broad strategy in this concern, meaning it needs to include those questioning this specific future development path. Such effort must be put into practice through metropolitan governance measures, implying common decision-making about the allocation of specific metropolitan functions. Objectives, costs and benefits of project initiatives need to be elaborated together by the relevant partners in the region. This might reveal new potentials, enhance existing assets, and support a metropolitan identity that builds upon common positive experiences. On a greater spatial scale this asks for 'Central European governance', starting off with knowledge exchange, meaning the physical exchange of officials between respective administrative sectors in the respective cities for short periods of time. Relatedly, common events focusing the exchange of information and good practice should be organized periodically. Such efforts support trust and help sharing experiences of stakeholders, enhancing functional and strategic relationships between metropolises and smaller cities. Besides, improvements on the level of public transport infrastructure and related services are claimed, as they enhance connectivity within the region and underpin the will for more territorial cohesion.

6 Metropolitan Agendas

Governance initiatives are necessary for strengthening smart metropolitan development, which refers to a balanced development in social, economic and political terms. This objective becomes particularly important in complex political-administrative settings like metropolitan regions, where conflicting interests regarding competitive and inclusive development come together. This asks for horizontal as well as vertical governance approaches. They need to include specific partners from the cultural, educational and social sphere, from regions and cities from neighboring countries, in order to enhance and strengthen the relational capital of all involved actors as a precondition for smart and territorially cohesive metropolitan development.

The metropolitan agendas presented in this chapter are meant as suggestions for promising future activities for the five Central European metropolises. Rather than as comprehensive metropolitan strategies, they thus represent a structured collection of possible activities. The agendas do not picture a detailed set of planning measures, but instead propose possible future development paths for the five cities. They were developed in close collaboration with a set of relevant local and regional stakeholders in the five metropolises. Above all, the agendas build upon interactive discussions of the empirical project results with a number of selected stakeholders. This open setting allowed for the development of innovative ideas that might give valuable input to policy-makers in developing future metropolitan strategies and planning approaches. Necessarily, the number of involved stakeholder was limited. Therefore, the collected ideas inevitably represent only a selective perspective. However, they originate from stakeholder discussions based on empirical project results, and therefore reflect the empirical analyses conducted in the course of the project.

For providing an easily accessible overview, the five metropolitan agendas are not only described in the text. They are also listed in a table, indicating the activities resulting in the respective agenda, the most probably needed actors for implementing it, and the supposed effects the relevant activity might have on the aspects of competitiveness and inclusion of the metropolis. Tables include the following fields of activity: Spatial structure (STRUC), Infrastructure (INFRA), Economic Activities (ECONO), Environment (ENVIR), Living Conditions (LIVIN), Image & Identity (IMAGE), and Governance (GOVER). Checkboxes on the right indicate the activity's contribution to competitiveness or inclusion. Crosses on the outer left side stand for strong positive influence on metropolitan competitiveness, crosses on the outer right side stand for strong positive influence on metropolitan inclusion.

6.1 Metropolitan Agenda Bratislava

Most of the activities named in Bratislava refer to infrastructure, environment or governance, while there were only a few ideas on spatial structure, economy, living or image. The most prominent field of action is infrastructure, in which an adequate connection of centers to high-ranked infrastructure is postulated. Furthermore multimodal regional transport networks need to be provided. Referring to environmental matters, the awareness and efficiency of energy use in urban development needs to be enhanced. Furthermore, the quality of local recreational areas needs to be strengthened and protected by adequate measures.

In order to improve institutional conditions for future politics, new forms of governance have to be established in the whole metropolitan region. Here a special emphasis lies on a concerted development strategy for cross-border spatial development and proper platforms (e.g. common databases, internet forums, regular meetings) for permanent information exchange of the actors involved.

With regard to spatial structure the distribution of metropolitan functions on different municipalities within the Metropolitan Area has to be considered against the background of changing economic and social conditions, which will require a clear positioning and specialization of the existing (sub-) centers in their functional and economic orientation. In order to come up with the requirements of knowledge economy this specialization should be directed at establishing knowledge-intensive

services and R&D-clusters. All these measures and strategies aim at sharpening the identity and image of Bratislava, fostering its unique profile and competitiveness. The clearer the image of the metropolis is defined and communicated, the better the perspective of Bratislava regarding its economic development. The citizens of Bratislava and its metropolitan region should be involved to participate in this process.

While some infrastructural and institutional measures have a tendency towards being inclusive, those activities related to economic specialization and image strategies are only very strongly fostering the metropolitan competitiveness. What is interesting though, is the fact that only infrastructure provision measures can only be interpreted as being of an inclusive character, while most environmental and governance measures must be understood as having an inclusive tendency only in the first run, with the ability of improving the competitive behavior of the Bratislava.

Field of action	Activity	Actors	Fostering			
			Comp.	-	Incl.	
STRUC	Effective distribution of metropolitan functions by clear positioning and specialization of (sub-) centers	Core city and regional municipal administrations, Regional planning bodies	X			
INFRA	Connect new and existing centers to high-ranked infrastructure (e.g. new Central Bus station)	Core city and regional municipal administrations, Regional planning bodies, national ministries, infrastructure provision bodies	X		X	
	Provide multimodal regional transport network	Core city and regional municipal administrations, Regional planning bodies, Public transport providers, infrastructure provision bodies			X	
	Expand road infrastructure in the South to strengthen polycentric structure	Core city and regional municipal administrations, Regional planning bodies, national ministries			X	
ECONO	Foster economic specialization by establishing knowledge-intensive services and R&D-clusters	Core city and regional municipal administrations, research institutes, Universities, R&D-businesses	X			
ENVIR	Improve energy-awareness and –efficiency in urban development (e.g. ‘green’ transport systems)	Core city and regional municipal administrations, Regional planning bodies, green technology businesses, research institutes	X		X	
	Strengthen and protect quality of local recreational areas (e.g. vineyards, bike lane network)	Core city and regional municipal administrations, regional planning bodies	X		X	
LIVIN	Improve the quality of living conditions (accessibility, social housing, public transport, public services)	Core city and regional municipal administrations	X			X
IMAGE	Sharpen metropolitan identity and image with participatory methods	Core city and regional municipal administrations, regional planning bodies, marketing agencies, Universities, research institutions	X		X	
GOVER	Joint cross-border spatial development strategy for Bratislava region	Core city and regional municipal administrations, Regional planning bodies, national ministries, marketing strategy, research institutions, planning bureaus	X			X
	Develop information- and knowledge-exchange-platform	Core city and regional municipal administrations, Regional planning bodies, private planning bureaus	X		X	

Figure 13: Metropolitan agenda Bratislava: activities, actors, implications

6.2 Metropolitan Agenda Budapest

In the stakeholders’ mentions, Budapest’s most important field of activity has to be the metropolitan infrastructure. Besides some specific local measures, activities should tackle the metropolitan

character of Budapest by improving the regional high-ranked infrastructure. Relatedly, institutional activities concerning the coordination in questions on mobility and transport are claimed. Further coordination must be undertaken in the city concerning its development strategies and planning approaches of the Budapest districts. Economic activities should foster the development of metropolitan regional centers in research and development, while numerous commercial, business and logistics centers near the airport are claimed a potential for the future – even if the latest bankruptcy of the national aviation company can threaten their market position.

Interestingly, in Budapest’s metropolitan agenda an emphasis lies on the Danube and related projects. While environmental measures have to tackle poor water and environmental quality, the river should play an important role in touristic and marketing activities of the city. This might be of vital importance to some actors in the Budapest metropolitan region, concerning the city’s positioning in the Danube Region.

Generally, governance activities solely seem to have an inclusive character, which stresses the stakeholders’ impression of a lack of collaboration in the metropolitan territory of Budapest. Improving poorly available green space as well as contributing to a sustainable city via running waste management programmes on a metropolitan scale are also proved to support inclusive growth. While touristic and, more generally, economic activities are aiming at the competitive profile of the city, infrastructural measures draw a more complex picture, with airport and motorway expansions having also an effect on Budapest’s competitiveness. What is interesting is the fact, that - as in other cities - economy-oriented measures, as they were named, do not contribute to an inclusive metropolitan development. The same is true for image-related activities. While marketing is targeted, no identity-oriented, inclusive measure can be found in the list. The other way round this is also true for the field of environmental activities, where none of the measures are thematizing metropolitan competitiveness. Therefore Budapest’s metropolitan development needs to take these gaps into account - either as part of their profile, or by defining aims and activities that are able to tackle both sides of what makes smart metropolitan development.

Field of action	Activity	Actors	Fostering			
			Comp.	-	Incl.	
STRUC	establish novel city centers in the suburbs and at the metropolitan periphery (KöKi Terminal, Tópark)	core city and regional municipal administrations, private investors, public transport providers		X		X
INFRA	Expand Budapest Airport capacity (Budapest Airport terminal 2)	Private investors	X			
	Improve suburban railway service	Public transport provider				X
	Improve P+R capacities and intermodal nodes	Public transport providers, core city and regional municipal administrations				X
	Improvement of sewerage in the Southern agglomeration to utilize Central Sewage Plant’s maximum capacity	core city and regional municipal administrations			X	
	Expand M0 to western section	core city and regional municipal administrations, national ministries		X		X
	New Danube bridge (pedestrian/cycle crossing in the downtown, residential and business bridge at Albertfalva)	City administration, private investors				X
ECONO	Promote R&D clusters (e.g. Bio-Info-Medical Innovation Park, Q2 Science Park, Aquincum Institute of Technology, etc.)	City administration, research institutes, universities, private business actors	X			

Field of action	Activity	Actors	Fostering				
			Comp.	-	Incl.		
	Promote investment in, and clustering of economic activities around Budapest Airport and MO zone (manufacturing, logistic, trade and retail)	Private investors, city administration	X				
ENVIR	Improve Danube's water quality by reaching Central Sewage Plant's maximal capacity	City administration				X	
	Improve environmental quality of the Danube-branch Ráckeve-Soroksár	Central Danube Valley Water Authority				X	
LIVIN	Encourage tourism development at the waterfront Ráckeve-Soroksár Danube -branch (e.g. watersports)	core city and regional municipal administrations, private investors, tourism agency		X			
IMAGE	Market priority area Danube riverside (e.g. Castle Garden Bazar)	core city and regional municipal administrations, Regional Development Agency of the Central Hungarian Region	X				
GOVER	Establish National Transport Holding by apportioning Budapest Transport Company	National government				X	
	Ongoing reconciliation of local development strategies in Budapest Agglomeration Development Council	core city and regional municipal administrations, Budapest Agglomeration Development Council					X
	Establish alliance of Budapest districts	municipal administrations		X			X

Figure 14: Metropolitan agenda Budapest: activities, actors, implications

6.3 Metropolitan Agenda Ljubljana

Stakeholders' recommendations for Ljubljana comprise most fields of action, but concentrate particularly on issues of governance. Facing trends of urban sprawl, a predominant aim is the development of a sustainable spatial structure. This includes the construction of new and revitalization of existing centers - not only within, but also in the suburban areas of Ljubljana. These (sub)-urban centers should be connected to the core city through high ranked infrastructure, and especially an improved public transport system. Consequently, these activities touch upon the urban structure and infrastructure at the same time and need to be organized by actors from the city municipality of Ljubljana and other municipalities in the urban region or Central Slovenian statistical NUTS 3 region, but also from the national level and public transport providers. On the regional, as well as on the transnational level, Ljubljana is keen on taking up infrastructural initiatives. For instance, alternative power exploitation on the rivers Sava and Ljubljanica, and transnational tourism routes along these rivers are planned. Regarding improvements of the international accessibility, measures have been taken as well already (e.g. corridor TEN-T X).

Economic activities have to target knowledge intensive activities, in particular research and development and teaching services. However, there are no efforts undertaken concerning economic clustering, while Ljubljana's role as a university city is of high importance. Along with these activities the image of Ljubljana should be developed and modified towards a city of innovation and sustainable urban-regional development. Even proposed activities regarding the environmental sector are in line with the expected image change: environmental quality standards and recreational areas should be protected or even improved. Of course, corresponding activities should include actors from economy and politics of different levels (municipalities, national ministries) and must be steered by planning bodies on the urban-regional level.

Cooperation between the core city and other municipalities should be strengthened or even institutionalized, based on a corresponding (statistical) Central Slovenian (functional) metropolitan region. This might improve information on urban-regional trends. Anyhow, common governance efforts for the metropolitan area of Ljubljana will need a harmonized funding system for joint activities.

While most of the proposed activities seem to have both competitive and inclusive effects at the same time, particularly those activities related to economic functions might strengthen Ljubljana's competitive position. Hence, governance efforts like institutionalized cooperation and harmonized funding are very important for a smart and balanced development as they are supporters of a territorially inclusive development.

Field of action	Activity	Actors	Fostering			
			Comp.	-	Incl.	
STRUC	Develop new and revitalize existing centers and sub-centers	Core city and regional municipal administrations, regional development agencies, private sector		X		X
INFRA	Connect new and existing centers to high-ranked infrastructure (new railway and bus stations)	Core city and regional municipal administrations, regional development agencies, national ministries, public transport providers, private sector		X		X
	Use infrastructure development to strengthen polycentric structure (links from Ljubljana airport to other urban centers)	Core city and regional municipal administrations, regional development agencies, national ministries, public transport providers		X		X
ECONO	Promote service-sector- and R&D-sector development and clustering	Core city and regional municipal administrations, regional development agencies, private business actors, private sector	X			
	Develop Ljubljana as a University location (e.g. new University library)	Core city and regional municipal administrations, regional development agencies, national ministries, Universities		X		
ENVIR	Strengthen and protect quality of local recreational areas (e.g. bicycle lane networks)	Core city and regional municipal administrations, regional development agencies		X		X
LIVIN	Preservation of natural and cultural heritage areas and local identity in city-region and promotion of tourism	Core city and regional municipal administrations, regional development agencies, tourism organizations, heritage organizations, private sector		X		X
IMAGE	Promote Ljubljana as smart, innovative, and sustainable city region	Core city and regional municipal administrations, regional development agencies, marketing agency, research institutes, private sector	X			X
GOVER	Develop information- and knowledge-exchange platform	Core city and regional municipal administrations, regional development agencies, national ministries, private sector		X		X
	Institutionalize cooperation between core city, and other municipalities of the region (i.e. establishment of administrative regions)	Core city and regional municipal administrations, regional development agencies, national ministries		X		X
	Harmonize statistical (administrative) regions	Core city and regional municipal administrations, regional development agencies, national ministries			X	
	Joint project funding between municipalities, state, EU funds	Core city and regional municipal administrations, regional development agencies, national ministries, private sector		X		X

Figure 15: Metropolitan agenda Ljubljana: activities, actors, implications

6.4 Metropolitan Agenda Praha

According to the stakeholders questioned, Praha should focus its activities primarily on the fields of governance and infrastructure. In the field of infrastructure, the newly proposed measures focus on public transport, which should compensate for the existing ambitious projects related to the improvement of the road infrastructure network. The governance-related activities that were raised by the stakeholders suggest that coordination should be high up on the city's agenda. Coordination of spatial development on a regional level, but also of public transport and service provision is considered to be an important future activity, for which a more open, comprehensive and coordinated spatial and sectoral planning is needed. Measures that foster information and knowledge exchange among relevant actors could be a first step to achieve such closer collaboration. In the field of economy, a focus should be on research and development activities and knowledge intensive services more generally. A sustainability-related activity that is considered promising is to secure energy supply for the country through increasing the capacity of natural gas storage tanks. Finally, in terms of image creation, the efforts should be focused on enriching Praha's identity by combining it with the identity of the metropolitan region, possibly by making use of the existing local cultural heritage and natural values. Of course most of the proposed new activities will have multiple effects for several fields of action.

For the implementation of these activities a multitude of actors is needed. They have to span different sectors and spatial scales, including local, regional and in some cases also the national level. In particular the scalar dimension seems to be of importance for the realization of an inclusive and competitive metropolitan region. Most of the proposed activities require not only local but also regional and even national actors. This again points to the necessity of close coordination of actors on a regional level.

Overall, the proposed activities can be expected to contribute both to Praha's competitiveness and inclusiveness. From the perspective of competitiveness, the promotion of R&D activities, as well as image-related activities can be expected to have the greatest effect. On the other hand, it is the coordination of public transport as well as governance-related activities that might foster the inclusiveness of the FMA.

Field of action	Activity	Actors	Fostering			
			Comp.	-	Incl.	
STRUC	Link planned intense urban use to capacity of public transport	Core city and regional municipal administrations, planning bodies, public transport providers		X		X
INFRA	Focus transportation investment on public transport	Core city and regional municipal administrations, public transport providers		X		X
	Coordinate public transport on regional level (Central Bohemia)	Core city and regional municipal administrations, national ministries		X		X
	Improve quality, capacity, and supply of rail services on regional level	Core city and Regional Authority of the Central Bohemian Region, public transport providers, Ministry of Transportation		X		X
ECONO	Promote R&D and knowledge-intensive activities	City administration, research institutes, universities	X			
ENVIR	Increase energy safety (increased capacity of natural gas storage tanks)	National ministries, energy providers			X	
LIVIN	Provide public services and other improved facilities of everyday use for residents in walking distance	Core city and local municipal administrations, planning offices			X	X
IMAGE	Enrich the cultural identity and image of Praha by identity and image of Central Bohemia	Core city and regional municipal administrations, regional development agency, tourist agencies	X			X
	Market local cultural heritage (e.g. Czech cuisine)	Regional development agency, tourist agencies, tourist businesses	X			X

Field of action	Activity	Actors	Fostering			
			Comp.	-	Incl.	
GOVER	Develop multi-level and multi-sectoral governance framework	All levels of governance		X		X
	Coordinate development of Praha and Central Bohemian Region	Core city and regional municipal administrations		X		X
	Information and exchange platform for metropolitan region	Core city and regional municipal administrations, local planning bureaus, research institutes		X		X
	Coordinate public service provision to maximize accessibility and supply	Core city and regional municipal administrations, Regional planning bodies				X
	Coordinate public transport development with settlement structure	Core city and regional municipal administrations, public transport providers, regional planning bodies			X	

Figure 16: Metropolitan agenda Praha: activities, actors, implications

6.5 Metropolitan Agenda Wien

Obviously, most of the proposed activities for Wien are related to the field of infrastructure. Interestingly, there are no activities that are mainly concerned with the spatial structure of the city, albeit infrastructure measures indirectly also constitute interventions in the city's spatial structure.

The proposed infrastructure activities mentioned and discussed during the stakeholder workshop in Wien are fairly diverse and range from a general improvement of accessibility to specific measures to connect the city to particular functions in the metropolitan region. They target both more traditional modes of transportation (e.g. car) and more alternative ones (public transport, bike), although the share of public transport in the modal split is comparably high already, particularly in the core city. An integrated public transport information system could be a useful tool in supporting these improvements. Within the Centrope initiative this is already an agreed goal to be realized. In the field of economy the focus is on knowledge creation and exchange. This should comprise not only private actors but also exchanges between governmental and private actors. Environment-related activities suggest to further focus attention on environmental technologies and governance issues, a field in which Wien already has shown some success in the past but needs further initiatives to meet the challenges of a sustainable resource management and land use development. Activities in the field of living should aim at changing mobility patterns and diversity strategies. In terms of image, Wien needs to further position itself on one side as green and sustainable, and as multi-cultural, open and diverse on the other side. Finally, the focus of governance activities is on developing long-term strategies for the future metropolitan development of Wien and on fostering knowledge exchange on a regional level. Partly this has been incorporated into metropolitan policy already. Particularly activities fostering debates about a metropolitan region as such are already at the forefront of Wien's policy, as the city is responsible for coordinating the related priority in the EUSDR Action Plan (Priority 10: 'Build metropolitan regions in the Danube Region'). The debates about smart urban development have, at least partly, also been taken up already. The most recent ÖREK strategy presents "smart cities" as one key task for the next years (ÖROK 'Development of an agglomeration policy for all of Austria').

It comes as no surprise that for the practical implementation of such activities a variety of actors is needed, including governmental and private actors located both on the local and the regional level. Especially the latter point appears to be crucial, namely that for the realization of a metropolitan, regionally inclusive development the participation of, as well as the cooperation with, regional actors is of high importance. Hence, a specific governance approach incorporating specific interests of actors from different administrative sectors and spatial levels as well as existing initiatives (such as SUM, VOR, PGO dealing with the coordination of urban development on a regional scale) should be implemented. The good efforts already undertaken in processes such as the SRO elaboration

(strategy for spatial development of the Eastern Austrian region) should be maintained. Also, the most recent strategic document of the Austrian Spatial Planning Conference (ÖROK) that presents plans to develop a common agglomeration policy for Austrian agglomeration regions should be brought forward (ÖROK 'Development of an agglomeration policy for all of Austria'). As a next step, evidence based policies should be elaborated and based on relevant information and knowledge about most recent trends and challenges of development within the metropolitan area.

The proposed activities can be expected to contribute predominantly either to the competitiveness or to the inclusiveness of the city of Wien. More concretely, especially measures in the field of the proposed infrastructure provision can be expected to be fairly inclusive in their effects. On the other hand, it is the provision of specific infrastructure links (to airport and business parks), the promotion of environmental technologies and specific, image-related activities that can be expected to have a strong effect on the city's competitiveness. Finally, measures in the field of governance can be expected to be fairly inclusive in their effects or at least to balance the respective effects in a smart way.

Field of action	Activity	Actors	Fostering			
			Comp.	-	Incl.	
STRUC						
INFRA	Improve intra-regional accessibility	Regional planning bodies, infrastructure provision bodies, public transport providers				X
	Develop regional public transport system	Regional planning bodies, national ministries, public transport providers		X		X
	Expand road infrastructure in North	Core city and regional municipal administrations, national ministries, infrastructure provision bodies, regional planning bodies		X		X
	Expand and improve bike lane network	Core city and regional municipal administrations, regional planning bodies				X
	Expand highway links to airport (A4 between Wien and Wien airport)	National ministries, infrastructure provision bodies, regional planning bodies	X			
	Connect business parks with regional public transport network	Regional planning bodies, public transport providers	X			X
ECONO	Develop new feasibility study- and transport funding models for urban mega-projects	Core city and regional municipal administrations, research institutes, public transport providers, infrastructure provision bodies				X
	Develop regional information and knowledge exchange platform	Core city and regional municipal administrations, local planning bureaus, research institutes				X
ENVIR	Foster the implementation of environmental technologies	Core city and regional municipal administrations, national ministries, research institutes, green technology businesses	X			
LIVIN	Change in mobility behavior	Core city and regional municipal administrations, national ministries, regional planning bodies		X		X
	Define and communicate equal opportunity- and diversity strategies	Core city and regional municipal administrations, national ministries		X		X
IMAGE	Strengthen the position of Wien as green city	Core city and regional municipal administrations, green technology businesses, marketing agencies	X			
	Improve cosmopolitan appearance	Core city and regional municipal administrations, national ministries				X

Field of action	Activity	Actors	Fostering			
			Comp.	-	Incl.	
GOVER	Develop concerted metropolitan policy (common urban growth management on metropolitan level; institutional definition of metropolitan agglomeration)	Core city and regional municipal administrations, regional planning bodies, national ministries		X		X
	Develop regional information and knowledge exchange platform	Core city and regional municipal administrations, local planning bureaus, research institutes		X		X

Figure 17: Metropolitan agenda Wien: activities, actors, implications

7 A Central European Development Agenda

7.1 The European Context: Embedding POLYCE in European policy

An examination of existing strategies, policies and networks on the European or transnational level indicates that there are many different documents or initiatives, which might provide a framework for the development of common agendas and projects of the 5 Central European metropolises aiming at increasing cohesion of the Central European macro-region and an improved competitiveness in a wider context.

7.1.1 EU Cohesion Policy

EU Cohesion Policy is the main instrument for pursuing the EU's economic, social and territorial cohesion objectives. It accounts for the second largest share of the EU budget, encompasses several funds and is aligned with the EU's overarching growth and jobs strategy. The debate on the post-2013 Cohesion Policy mainly deals with:

- focusing the policy on a limited number of EU priorities aligned with Europe 2020, notably research and innovation, low-carbon economy, human capital
- requiring a more visible and effective performance by improving the monitoring and evaluation of the Operational Programmes
- a different alignment of funding instruments
- achieving more strategic coherence between relevant policy areas through (for example) joint strategic planning or programming of all EU funding
- Strengthening the territorial dimension, including territorial cooperation, by defining macro-regions and functional areas as a base for planning/intervention
- Reviewing administrative procedures, with potential differentiation of management and control requirements and other simplification measures (EP, 2011: 17)

A shift from the traditional cohesion policy concept as redistributive mechanism towards the 'allocative' perspective of the place-based policy with developmental mission is the core of the EC Cohesion Policy after 2013. The Fifth Cohesion Report European Commission (EC, 2010) emphasized a functional and flexible approach. Depending on the issue, the appropriate geographical dimension ranges from a macro region, such as the Baltic Sea or the Danube region, to metropolitan and cross-border regions or a group of rural areas and market towns. Such a flexible geography can better capture the positive and negative externalities of concentration, improve connections and facilitate cooperation and so be more effective in furthering territorial cohesion.

7.1.2 European Union Strategy for the Danube Region

In 2010, the European Commission adopted the EU Strategy for the Danube Region following a request from the Member States. This is a comprehensive strategy, covering several Community policies and targeting a 'macro-region'. The strategy takes the form of a communication and an action plan which will be reviewed regularly. The Danube region, which covers parts of 8 EU countries (Germany, Austria, Hungary, Czech Republic, Slovak Republic, Slovenia, Bulgaria and Romania) and 6 non-EU countries (Croatia, Serbia, Bosnia and Herzegovina, Montenegro, Ukraine and Moldova) is facing complex challenges, which require better coordination and cooperation in the following priority areas:

- Improve mobility and intermodality
- Encourage more sustainable energy
- Promote culture and tourism, people to people contacts

- Restore and maintain the quality of waters
- Manage environmental risks
- Preserve biodiversity, landscapes and the quality of air and soils
- Develop the knowledge society: research, education and ICT
- Support the competitiveness of enterprises
- Invest in people and skills
- Step up institutional capacity and cooperation
- Work together to tackle security and organized crime

Most priority areas mentioned relate to the POLYCE themes. The strategy comprises the action 'Build Metropolitan Regions in the Danube Region', which should initiate a platform of existing and emerging metropolis regions in order to establish a framework for learning and development of common ideas in all areas relevant to metropolitan development. City networks should promote cooperation and exchange of information and experience among the relevant actors (e.g. administrative experts, municipal and regional parliaments). There is a scope for knowledge exchange of agglomeration development strategies, which will enhance dissemination of good practice and detect promising fields of cooperation among public authorities and businesses. Priority Area 10 ('Capacity Building') could be of specific importance to the POLYCE cities, as Austria and Slovenia together hold the function of coordinating this Priority Area.

7.1.3 Strategy Europe 2020

The EU's Europe 2020 strategy for smart, sustainable and inclusive growth was launched by the European Commission in March 2010 and approved by the Heads of States and Governments of EU countries in June 2010. The strategy identified four priorities:

- Smart growth – improving performance in education, research and digital society;
- Sustainable growth – building a more competitive low-carbon economy, protecting the environment, green technologies and production methods, efficient smart electricity grids, harnessing EU-scale business networks and improving the business environment;
- Inclusive growth – more and better jobs, investment in skills & training, modernizing labor markets and welfare systems, ensuring the benefits of growth reach all parts of the EU;
- Economic governance – closer EU surveillance of economy, actions to safeguard the stability of the Euro area and to repair the financial sector.

Within the framework of the Europe 2020 strategy, internal market, global competitiveness, cohesion and environmental issues, in particular de-carbonization of transport, are objectives which will require balanced solutions. In order to monitor how the priorities are being accomplished, the strategy sets five EU-wide common headline targets in the fields of employment, research and development/innovation, energy/climate change, education, and poverty/social exclusion. All member countries translated these targets into individual indicators for their national reform programmes. In that way, the priorities of the Europe 2020 strategy should be reflected in planning strategies and also strategic projects on all territorial levels.

7.1.4 EU Territorial Agenda

The original document of the Territorial Agenda of the EU (CEC, 2007) was the first step towards institutionalization of the territorial cohesion that became a shared responsibility among EU and Member States. The amendment of the Territorial Agenda for 2020 identified promoting polycentric and balanced territorial development as "key element of territorial cohesion to foster territorial competitiveness of the EU. Cities should form innovative networks to improve their global competitiveness and promote sustainable development. Polycentric development is necessary at the macro-regional, cross-border and national and regional levels. Polarization between capitals, metropolitan areas and medium sized towns should be avoided and policy should contribute to reducing territorial polarization and regional disparities by addressing bottlenecks to growth in line with Europe 2020 Strategy" (Territorial Agenda for 2020).

7.1.5 Visegrád Group

The Visegrád Group, also called the Visegrád Four or V4, was established in 1991, as an alliance of Czech Republic, Hungary, Poland and Slovakia for the purposes of cooperation and furthering their European integration. The 'Common spatial development document', which was prepared for a meeting of ministries in 2010, mainly pursues two goals:

- Delineation of development poles, development axes and transport networks on the territory of V4+2 (Romania and Bulgaria) countries and the detection of their no-continuations
- Proposal for further works on the Common spatial development document – common approach towards the withdrawal of barriers in spatial development of V4+2 countries; further cooperation of V4+2 countries in the field of spatial development

The document is not explicitly related to polycentricity and metropolisation but will presumably contribute to the polycentric development on Central European macro-regional level.

7.1.6 Trans-European Networks

The idea of Trans-European Networks (TEN) emerged by the end of the 1980s in conjunction with the proposed Single Market. The construction of Trans-European Networks is considered as a key element of the Internal Market, of economic growth and employment and of economic and social Cohesion. According to these objectives, the Community develops guidelines covering the objectives, priorities and projects of common interest for transport (TEN-T) and energy (TEN-E). The third sector of telecommunications (eTEN) was finished in 2006 and it is followed by the ICT policy Support Programme. Many projects of common interest have benefited from financial support through the TEN-budget and the Structural Funds or by loans of the European Investment Bank (EIB).

According to the Union guidelines for the development of the trans-European transport network (Decision No 661/2010/EU) all TEN-T projects have to be assessed as for their socio- economic impact and their impact on the environment, including their impact on trade and the free movement of persons and goods between Member States, on territorial cohesion and on sustainable development. Whereas the effects on polycentric development are not explicitly pronounced, obviously the impact on spatial patterns is expected. The decision identified the following priority links to be started in 2010 that relate to the POLYCE space:

- Railway axis Paris-Strasbourg-Stuttgart-Vienna-Bratislava, including the Salzburg-Vienna section (2012) and Vienna-Bratislava (2010) cross-border section
- Rhine/Meuse-Main-Danube inland waterway axis, including the Vienna-Bratislava cross-border section (2015), and the Sap-Mohács section (2014)
- Athens-Sofia-Budapest-Vienna-Prague-Nuremberg/Dresden rail link, with the Budapest-Vienna cross-border section (2010); railway Břeclav-Prague-Nuremberg (2010), with Nuremberg-Prague as cross-border section; railway axis Prague-Linz (2016)
- Railway axis Gdańsk-Warsaw-Brno/Bratislava-Vienna, consisting of the connections Gdańsk-Warsaw-Katowice (2015), Katowice-Břeclav (2010) and Katowice-Žilina-Nové Mesto (2010)
- Motorway axis Gdańsk-Brno/Bratislava-Vienna, with the motorways Gdańsk-Katowice (2010), Katowice-Brno/Žilina (2010) and cross-border section of the motorway Brno-Vienna (2009)
- Railway axis Lyon-Trieste-Divača/Koper- Divača-Ljubljana-Budapest-Ukrainian border (2015)
- Sea highway in Southeastern Europe; link between the Adriatic and Ionian Sea and Eastern Mediterranean with Cyprus (2010)

7.1.7 CENTROPE

CENTROPE is a joint initiative of the Austrian Federal Provinces of Vienna, Lower Austria and Burgenland, the Czech Region of South Moravia, the Slovak Regions of Bratislava and Trnava, the Hungarian Counties of Győr-Moson-Sopron and Vas as well as the Cities of Bratislava, Brno,

Eisenstadt, Győr, Sopron, St. Pölten, Szombathely and Trnava, which was founded in 2003 in order to create a Central European Region, where cross-border cooperation is rooted in all areas of life. To work towards the attainment of this goal, CENTROPE will pursue four specific development goals until 2012: knowledge region; human capital; spatial integration; culture and tourism.

7.1.8 Cities for Cohesion

This initiative, which was established to respond to the EU Green Paper on Territorial Cohesion, deals with the urban dimension of cohesion policy insisting that the macro-regional approach should be applied in cohesion policy. The cities and metropolitan regions involved in the network (Wien, Praha and 14 non-POLYCE cities) sought for increased cooperation across regional and national borders through governance, which should be encouraged by EC through the EU Structural Funds. Furthermore the territorial impact of all EU- policies that contribute to territorial cohesion should be given more consideration.

7.2 Comparative Analysis of the POLYCE City Agendas

All POLYCE cities have pronounced their spatial policies in strategic plans, making polycentric development a cornerstone of the spatial concept in these strategies. While infrastructure projects are the most common activities to pursue polycentric development, comparatively fewer projects are oriented towards environmental, cultural or quality of living issues. The recommendations for new projects typically extend, update and enrich the existing strategies coping with newly emerging issues and challenges that were also raised by recent EU documents (e.g. Europe 2020). Some projects particularly target new or improved facilities for knowledge economy or aim at enhancing metropolitan governance. Furthermore, some new infrastructure projects complement the existing ones by more environment-friendly modes. **The following similarities and differences that are shared among the POLYCE cities can be classified:**

- The challenges of suburban sprawl outside the core city need to be tackled. Suburban areas should be better structured and provided with jobs, infrastructures and services (Budapest, Ljubljana, and Praha)
- Infrastructures connecting the city and metropolitan area with facilities of specific functions (e.g. science and business) are important to strengthen the competitive position (all cities)
- Infrastructure improvements should target environment-friendly modes, while the urban and regional highway network should be expanded to improve overall accessibility. The same is true for rail networks and airport connections (Ljubljana, Wien, Praha).
- City and regional development must be coordinated (Bratislava, Ljubljana, Praha).

In all cities, infrastructure strategies consider the whole metropolitan areas, while other issues often neglect the regional dimension. This can be explained by an administrative division between the cities and surrounding regions in the cases of Wien, Praha and Ljubljana, which pushes the coordination between the metropolitan city and its regional hinterland to the supra-regional i.e. national level. Consequently, all metropolitan regions seek for some kind of institutionalized cross-regional coordination. Apparently, the most pronounced and structured approaches of coordination exist in Vienna, which has the longest tradition of suburbanization across city limits. The existing strategic projects in all POLYCE cities are rather aimed at increasing the competitiveness of the city/metropolitan region while the projects for improved accessibility within the cities and metropolitan regions should enhance metropolitan integration and cohesion. The results from the POLYCE research suggest that the public awareness of the insufficient coordination within the metropolitan regions is increasing in all metropolises.

7.3 Common Activities of the POLYCE Metropolises

The macro-regional dimension is pronounced in all strategies. They reflect the specific position of a particular metropolis on European development axes and within the wider European space. The dimension of the CED-zone is not explicitly mentioned. Recommended actions therefore start from the recognition of their specific potentials and challenges and also reflect inconsistencies between existing strategies:

- The strategic projects for Bratislava and Vienna reflect the unique position of the ‘twin capitals’, aiming at strengthening the Vienna – Bratislava axis.
- The contributions of Budapest and Ljubljana emphasize the cooperation in the implementation of the overall Danube Strategy, in the case of Ljubljana mostly in education and research collaboration.
- The recommendations given in Praha emphasize a ‘soft’ dimension of collaboration with education, culture and tourism, balancing existing strategies and projects for high-ranked transport infrastructures.

The following table shows recommended aims and examples of activities (major projects, policies, strategies) that are considered to have importance for the polycentric and metropolitan development within Central Europe, namely in the metropolitan regions of the POLYCE capitals.

Field of action	Aim	Activity	Spatial entity	Actors	Fostering Comp. - Incl.					
STRUC	Enhance cross-border polycentric development of spatial structure	‘Spatialization’ of CENTROPE (Wien-Bratislava-Győr-Budapest axis)	BRA, BUD, WIE, Brno, Győr	Regional planning bodies , national gov’s, city admin’s, planners		X			X	
	Coordinate national spatial planning strategies	Coordinate development axes of national importance (extending V 4+2)	AT, CZ, HU, SK, SI	National gov’s , regional planning bodies, city admin’s, planners		X				
		Implementation of CED-zone development strategy	All POLYCE states and metropolises	National gov’s , regional planning bodies, city admin’s, planners		X				
INFRA	Improve connectivity of capital cities	Develop high-ranked infrastructure between POLYCE metropolises	All POLYCE states and metropolises	National gov’s , regional planning bodies, transport provision bodies, city admin’s		X			X	
		‘Interrail’ for Central Europe	All POLYCE states	Public transport providers		X			X	
		Improve (rail) access to metropolitan airports	LJU, PRA, WIE	Public transport providers , regional planning bodies, city admin’s, planners	X					
		Improve public transport network	BRA, LJU (implicitly also other metropolises)	City and regional admin’s , planners, regional planning bodies						X
ECONO	Facilitate information flows for knowledge economy	Contact points for knowledge-economy infrastructure and business sector	All POLYCE metropolises	City admin’s , education and research facilities, business sector	X					
	Implement media cooperation of the five POLYCE	Common magazine ‘5’ for the five POLYCE cities	All POLYCE metropolises	City admin’s, publisher , planners, cultural institutions		X			X	

Field of action	Aim	Activity	Spatial entity	Actors	Fostering Comp. - Incl.			
	cities	Common TV-platform for Eastern Europe ('ARTE East')	All POLYCE states and metropolises	Media company, regional administrations		X		X
	Foster higher education and R&D-capacity	CEEPUS - exchange programme for university students in Central Europe and Balkans	All POLYCE states and metropolises	Higher education facilities, CEEPUS administration		X		X
ENVIR	Strengthen transnational bio-corridors	Alps-Carpathian Bio-corridor, Danube Bio-corridor	AT, HU, SK, SI	National gov's, regional planning bodies, city and regional admin's, planners			X	
	Increase energy safety and substitutability of energy carriers	Implement joint energy supply strategies	All POLYCE states (linked to EUSDR Priorities and V4 activities)	Energy suppliers, planners, city and regional admin's	X			
LIVIN	Promote culture as driving force of prosperity	POLYCE city cultural exchange	All POLYCE metropolises	Cultural institutions, city admin's		X		
IMAGE	Implement joint tourism and marketing strategies	Market CE cities as joint and interconnected tourist destination	All POLYCE metropolises	Regional development agencies, tourist agencies, city admin's		X		
		Establish informal city-network (EUROCITIES, Metrex, Opencities, ...)	All POLYCE metropolises	Chambers of commerce, city admin's		X		X
GOVER	Implement a common platform of the POLYCE cities	Further identify potentials for specialization and cooperation	All POLYCE metropolises	City and regional admin's, chambers of commerce		X		X
		Common representation of Central European topics on EU level	All POLYCE metropolises	City and regional admin's, chambers of commerce	X			
	Coordinate spatial planning	POLYCE planning network	All POLYCE metropolises	Regional planning bodies, planners, city and regional admin's		X		X
	Encourage PPPs on Central European level	Support CED-zone companies to participate in PPPs	All POLYCE metropolises	City and regional admin's, chambers of commerce, business sector		X		

Note: Key actors or potential initiators of an activity are printed in bold

Figure 18: Central European agenda: aims, activities, actors, implications

The shared strategies and projects mostly derive from existing programmes and initiatives, namely the EU Strategy for the Danube Region, CENTROPE and the V2+4 Initiative. As such, some of them may not involve all the POLYCE metropolises. This makes recommendation of shared POLYCE activities quite open and flexible to actual circumstances. The activities proposed cover all fields of action, some expand beyond the scope of power and responsibility of the POLYCE partners: activities dealing with (macro-regional) spatial structures, infrastructures, environment and energy have to be tackled by national governments and ministries, or even the EU.

The actions that can be effectively undertaken by actors on city and/or regional level deal with rather 'soft' development factors: knowledge, living and culture, image and identity, governance. **Unlike the 'hard' investments in physical structures and infrastructures that are often already involved in the existing strategies and plans, 'soft' investments in human capital, knowledge and**

identity should be the focus of activities in a potential POLYCE network. Typically they require involvement of both public and private actors, requiring the cooperation of various institutions. The key role for certain activities in the field of spatial structure is assigned to the national governments (in the case of Vienna to the Bundesländer), which are responsible for the management and coordination of spatial change. Existing varieties in administration patterns and responsibilities will require further capacities to overcome formal discontinuities.

7.4 Recommended Shared Activities

The potentials for cooperation among the POLYCE metropolises were found particularly in the fields of knowledge economy, management of transportation and metropolitan governance. Cooperation and institutional capacity of administration and spatial planning are prerequisites for the recommended activities, which makes all issues referring to governance of prime importance. In that field two essential aims were identified that lie within the responsibility of administrations of the cities and their metropolitan regions:

- **Incorporating a common POLYCE platform** – inspired by the G4 network of the Dutch metropolitan cities of Amsterdam, Den Haag, Rotterdam and Utrecht. The first task of the platform, which should include the cities, regional administrations and development agencies, will be to clarify potentials for specialization and cooperation and, consequently, to set the agenda for shared strategies of the POLYCE cities. The platform shall represent the shared interests of the POLYCE network towards EC institutions and join relevant European initiatives (e.g. Cities for Cohesion). In the process of establishing the POLYCE platform the experiences of the CENTROPE initiative should be considered, keeping in mind that it refers to a different model of polycentricity and spatial scale.
- **Exchange of experience in coordinating regional governance** – both within the regions and among them. Since the conditions in the five metropolitan areas are different, the experience in coordinated planning should be transferred from Vienna and Bratislava to the other partners in the initial stage. The organizational pattern for particular metropolitan regions should be adjusted to specific local conditions. Inter-metropolitan cooperation should start from informal networks (e.g. organizing regular meetings of stakeholders) and develop to a more robust structure. On the national level, the network should be linked to the Visegrád group and extended to Austria and Germany within the framework of the Danube Region.

The POLYCE metropolises should act as facilitators of information exchange and business contacts within the network. As shown in the table above, many of these activities cannot be realized by public institutions, but need participation of the private sector. Still, public actors can incite or foster projects by providing financial or organizational support. The collaboration of administrative units and private businesses in public-private partnerships seems to be a possible way to integrate a variety of relevant actors and to pool all available resources. This approach seems to be of high importance in the fields of knowledge economy, sustainable energy, living and culture, and marketing. The recommendations mentioned above mainly include 'soft' activities to support consciousness by means of information, media, culture and education. The effects of these efforts are expected as externalities for economy, especially in the fields of tourism, energy safety and environmental quality. The table above suggests some examples, but is by no means exhaustive.

The 'hard' infrastructure activities affecting accessibility of the Central European metropolitan zone have to be planned and implemented on the supra-regional level by the coordination of national spatial planning strategies and (in the case of Vienna & Bratislava) cross-border polycentric development. The designated activities will have multiple effects on various themes and fields of action. They will contribute both to the internal cohesion and integration of the five metropolitan regions and to the competitiveness of the Central European zone. Besides, the networking process itself will strengthen the links among the POLYCE metropolises by inducing collective learning, the exchange of experiences and the identification of best practices.

8 Conclusions

The basic objectives of POLYCE are defined in the introduction to this report (chapter 1.1). Two main goals were pursued with this research:

- Identify the importance of the mutual links between the processes of metropolisation and polycentric development
- Elaborate the challenges and perspectives of future urban development

8.1 Strengthening Metropolitan Positioning and Cohesive Territorial Development

Polycentricity - its differentiated understanding and importance for cohesive metropolitan development

- The analysis of the five metropolises shows clear differences in morphological and relational polycentricity and a specific pattern of functional relations in terms of research and firm networks. This underlines the distinctive characters of the five metropolitan regions and the unequal intensity of interaction and co-operation among them.
- Functional polycentric relations between the metropolises do exist (in terms of research and firm relations) but differ strongly across cities. In addition, cities – from the stakeholders’ perspective – consider their function and position regarding polycentric development in different ways: Wien and Bratislava are seen in a clear twin-city-situation in which agglomeration issues (size, settlement structure, good internal accessibility, functional economic relations) are regarded as very important. At the same time, stakeholders in Praha, Bratislava and Budapest see the position of their metropolis in a different geographic context (Praha: Germany and Berlin; Ljubljana: gateway and research center towards the Western Balkan and other macro-regions; Budapest gateway towards newly accessed countries and other East European countries).
- According to the stakeholders strategic polycentric relations hardly exist in the region, except strategic endeavors between Wien and Bratislava based on the CENTROPE-initiative – which has recently focused on intensifying research cooperation. As a result of missing strong common polycentric links between all five metropolises, infrastructure-based accessibility between them is rather unequally developed. Whereas Bratislava and Wien show rather high standards of accessibility in private and public transport systems on the international level (because of their central position within this ‘polygon’), Ljubljana and Praha are not equally well accessible.

Metropolitan growth and its preconditions

- A micro-economic analysis of urban growth factors revealed clearly that (1) a small group of factors are determining costs and benefits of metropolitan size and that (2) metropolitan power functions as well as polycentricity do have a positive impact on metropolitan size.. In other words, metropolitan functions and polycentricity have a decisive positive impact on demographic growth of metropolitan areas and not just of the core cities, whereas trends of sprawl are identified to have a negative impact.
- The five metropolises show different polycentric preconditions in morphological and functional terms. Therefore, polycentric preconditions play different roles for metropolitan growth in the five metropolises.
- Less developed polycentric structures in the metropolitan regions of Budapest, Praha and Wien go along with findings on urban sprawl as a risk and potential cost factor. Hence, a lack of polycentric development will negatively influence further demographic or economic growth. However, it is not evident that this risk can also be regarded as a barrier for the establishment of further metropolitan functions.

- Different strategic approaches exist to strengthen polycentric development in the five metropolitan functional agglomerations. Following different institutional settings and concomitant approaches to inter-municipal collaboration, the quality of infrastructure and transport organization differs. Also the improvement of infrastructure (in particular public transport system) can be assumed not to be equally important in the five metropolises.

Metropolitan profiles indicating challenges and chances of smart metropolitan development

- Metropolitan profiles were elaborated to show differences and similarities between the metropolises. The approach allows for a comparison of one metropolis against selected others, and the comparison with the 'average metropolis'. Metropolitan profiles were developed on the aggregate-level of five development characteristics with underlying factors that are again defined by groups of relevant indicators.
- Differences between metropolitan profiles are readily observable - also in comparison of the five POLYCE metropolises. They indicate (1) that processes of urbanization, economic restructuring, socio-demographic change and metropolisation are having different impacts on the metropolitan level and that (2) a high quality of living characterizes all of them. At the same time there is a clear specialization in other fields of metropolitan development, indicating specific assets for positioning and future strategic endeavors. Underlying factor values show convincingly that the metropolises differ in their competitive and social inclusion features.
- Strengths and weaknesses in the various fields of urban development were discussed with stakeholders to identify possible future perspectives of smart development. These discussions revealed that smart metropolitan development has to be actively supported with suitable measures and activities. The differentiated agendas for the five metropolises demonstrate the comprehensiveness of this discussion and finally its importance regarding the strengthening of competitive and inclusive development. Very specific bundles of activities (agendas) were elaborated for the five metropolises aiming to steer and strengthen smart, territorially cohesive development.

8.2 Strategic Recommendations

8.2.1 Strategic endeavors supporting smart metropolitan positioning and growth of the five metropolises

A metropolitan Agenda should be based on the delimitation of a metropolitan area and metropolitan region according to their morphological and functional polycentricity. Empirical study for the five cases showed that there was no adequate approach defined which was neither accepted from an analytical nor a strategic point of view. Future empirical research as well as strategic endeavors should concentrate on this spatial entities

- A new approach overbridging deficits in existing approaches delimitating metropolitan entities was elaborated by the POLYCE team. It is based on distinct important approaches of former ESPON-studies and at the same time is based on more recent data and clearer understanding of spatial metropolitan development.

The importance of polycentric development within metropolitan regions and functional metropolitan areas should be put forward in strategic discussions and respective endeavors based on identified deficits. In order to apply for financial support in an effective way, cities with their respective stakeholders should aim at a re-definition of programme areas in the forthcoming financing period.

- Empirical evidence shows more or less polycentric structures in the five metropolitan regions but to a different extent and with differentiated meaning (morphological, functional). Hence, preconditions for metropolitan development and its possibilities to steer differ greatly. In order to strengthen inclusive development a more polycentric approach

has to be discussed in more details and in a place based way. There is no common recommendation possible. However, in all five cases it was emphasized that polycentric approaches and respective activities for urban-regional cooperation have to be developed in a comprehensive way. In the case of Wien this was not as strong because of already existing specific approaches for urban-regional cooperation.

- With regard to relational polycentricity on the micro (intra-regional) level, the development of networks between the core cities and their surrounding areas can be financially supported by existing “Convergence” or “Regional Competitiveness and Employment” objective programmes. In some cases, however, the programme area does not correspond to the Functional Metropolitan Area or even the Metropolitan Region, which might be a serious obstacle for many integrative initiatives. In recognizing this fact, the cities should reconsider the spatial delimitations of the programme areas in the forthcoming financing period, considering functional relations more than administrative borders.

A basic agenda consisting of strategic endeavors and activities steering the process of metropolisation and polycentric development in the metropolitan region as elaborated above are a precondition for territorially cohesive development. The five metropolises need an evidence-based strategy that are tailored to their specific conditions of growth and their existing assets and identified potentials. Stakeholders and researchers should collaborate in a continuous way discussing research findings and recent trends from respective analytical and socio-political perspectives.

- Research findings show that the preconditions for metropolitan growth as well as the process of urban restructuring leading to specific profiles are rather different in comparison of the five metropolises – expressing specific conditions of metropolitan development in the context of growing competition.
- Discussions with stakeholders revealed that there exist in some crucial aspects different opinion and no clear understanding up-to-now. Hence, the need for an intensified collaboration in order to elaborate a strategic agenda regarding smart metropolitan development balancing competitiveness and social inclusion within each metropolitan region is very obvious.

Metropolitan agendas need to be place-based considering not only the core city but at least the respective functional metropolitan area or even the metropolitan region. These agendas seem necessary in order to take into account relevant strategic endeavors towards competitiveness and inclusion across the whole territory.

Strategic discussions and recent approaches are rather different in comparison of five metropolises. Vienna - through its strong administrative-political position as an own federal state – already initiated multifaceted traditional planning as well as strategic initiatives aiming to steer metropolitan development or to position itself in a European context. At the same time, stakeholders from the remaining metropolises emphasize a more or less clear necessity of strategic efforts for discussing and implementing polycentric development in the respective metropolitan region.

8.2.2 Strategic endeavors for polycentric development in the CED-zone as part of the Danube region

Relational capital between stakeholders (planners, stakeholders in culture, city marketing, tourism management, and others) should be strengthened through improved conditions to cooperate and the development of common objectives (vision). Cities should start to organize meetings in form of workshops and small conferences of interested metropolises (Central Europe, Danube Region) providing opportunities for cooperative initiatives and empowering academic or strategic networks.

- Very obviously, some specific proposals are less related to concrete multilateral activities implementing functional relations in the economic sphere but emphasize the necessity of the improvement of relational capital (language, new administrative or strategic capacity)

between actors from the five stakeholder metropolises: This includes (1) improving of contacts and accessibility to information, (2) transforming information into valuable knowledge about partner cities as output of continuous and systematic contact facilities, (3) producing a broader basis of truth and (4) improving the common interests of partners in CED-zone within the wider Danube region.

Information exchange deficits should be tackled through a more structured elaboration and exchange of information on metropolitan development and corresponding activities on the micro, meso and macro level. Possibilities for common strategic discussions should be created and activities for better positioning and lobbying effectively supported.

- Empirical results showed that functional and strategic polycentricity (as supporters of territorial cohesion in the CED-zone) are not yet on top of the agenda of stakeholders. In particular the improvement of accessibility through infrastructure investments should be more prominent in the agenda of the five metropolises and directed towards the TEN policy priorities (corridor definitions and respective planned activities on the European level).
- Discussions even showed that different foci and strategic activities are regarded as being of high importance. All metropolises regard themselves as important centers or hubs in their own geographical context towards outside neighboring regions and countries. Not surprising, metropolitan profiles show strongly differentiated profiles as a productive starting point for further efforts on positioning. Obviously, a territorially cohesive development within the CED-zone needs new and more strategic endeavors than activities improving accessibility through infrastructure investments.

Bilateral strategic activities should be fostered in a multifaceted way. In particular, metropolises should activate and enforce their links to other medium sized cities in order to strengthen the city network in Central Europe but even in the European context.

- Strategic efforts should concentrate on a more specialized cooperative approach between Bratislava and Wien because of their geographical situation which already lead to manifold relations but only few common strategic activities in the frame of or in addition to the CENTROPE-initiative. Other strategic activities are mentioned which not necessarily will include all five metropolises but only bi-lateral collaboration. The purpose and the challenges of the CENTROPE-region have to be identified precisely in order to discuss relevant challenges of this process of metropolisation. In the run of this discussion, the advantages and challenges of a polycentric network based approach for cohesive development have to be identified and further medium sized cities like Brno, Győr, etc. included into this approach. Empowering through capacity building of these medium or even small sized cities is a precondition because otherwise larger cities are dominating this process endangering the polycentric and cohesive idea.
- In a more general perspective, the tight historical, social and economic ties of the five metropolises could be a proper base for further cooperation between public institutions, society and private businesses. These relations can be extended and deepened by different cross-border networking projects, which can well be subsidized within existing EU-Regional Policy Programmes: in the current period (2007-2013) the Programmes under the objective 'European Territorial Cooperation' (ETC) can still be exploited for reasonable cooperative initiatives. Since the majority of existing cross-border cooperation programmes do not cover the capital regions, the development of bilateral relations can rather be supported by the interregional co-operation programme, which aims at fostering all kinds of city networks. In that context the URBACT II-programme, which is especially directed at information exchange of cities, should be considered. Furthermore, the transnational co-operation programme 'Central-Europe', which covers not only the five cities but also their hinterlands could be a suitable platform for cooperation projects in all relevant issues. Since the programme area also includes Poland, Eastern and Southern parts of Germany and the North of Italy, this programme places the POLYCE cities in a wider spatial context, connecting them to cities as Berlin, Warsaw, Munich and Milano, which are highly relevant

partners for the POLYCE region. Therefore the five cities and their national governments should seriously aim at maintaining and strengthening this 'Central-Europe' co-operation programme in the forthcoming financing period, trying to act as the core of this dynamic region.

Cooperative activities of the five metropolises should serve as good practice for strategic endeavors with other metropolises in the Danube region.

- Activities in strategic form should be based on the EUSDR (European Strategy for the Danube Region), starting from the five metropolises as part of the Danube Region. Obviously a promising and stimulating attitude of the five to act as important drivers and initiators of specific issues of development already exists. However, the five stakeholder cities obviously see their responsibility in a wider European Danube region context.
- For instance, capacity building is already a main topic of Ljubljana and Vienna in the Danube Region Strategy. However, it should be enforced as example and starting point for further activities with other cities and metropolises like Belgrade.

8.3 Options for further research

8.3.1 Data limitations

The results presented above and in the scientific report indicate that empirical research in specific fields of metropolisation and polycentricity is constrained by the lack of relevant data. These data limitations are an obstacle for tackling some of the questions of this project empirically.

- **Availability of cross-border relational data:** availability is rather poor as the basis for empirically analyzing relational polycentricity. There is no sufficient information source on capital flows (e.g. Foreign Direct Investments), migration (on the regional level) or the transport of goods. The data used in this field of research (GaWC, CORDIS, Google) can be considered as ambitious efforts to define proxies, but are far from giving a comprehensive picture on inter-urban relations and do not seriously allow to make significant statements on changes over time.
- **Intra-metropolitan scale of metropolisation and polycentricity:** availability of reliable data is much better due to national data sources. Therefore, a lot of relevant indicators describing the regional conditions can be defined on the micro level. The problem, however, lies in the different survey methods of these data, which partly limits their comparability.
- **Harmonization of databases:** a fundamental step to harmonize metropolitan data from different sources has already been done by Eurostat in launching the Urban Audit database and in organizing data in the ESPON database. These efforts should be continued by defining general guidelines for data collection, preparation and presentation, which should be applied by all further activities on data production and collection.
- **Harmonizing territorial concepts:** harmonizing the existing territorial concepts used by Urban Audit and in different ESPON projects is urgent to make data comparable. The goal of these efforts should not only consist in improving data availability for further research, but especially in preparing a suitable source of information, which can easily be accessed by stakeholders, decision-makers, investors or other relevant actors. The HyperAtlas, which is based on the multi-scalar territorial analysis concept, can be seen as a promising example of such an analytical tool allowing metropolitan actors to get comparable information on their city/region on different spatial scales.

8.3.2 Issues of further research

Due to the abovementioned data limitations and the limited timeframe of the targeted analysis many questions could only be tackled on a superficial level, which means there are still a lot of potential activities for future research.

First, the issue of relational polycentricity on all spatial scales needs further investigation. The description and analysis of all kinds of flows, co-operations and networks both between the five POLYCE cities and with other European or global cities can definitely be extended and deepened in order to explore existing social and economic ties and to get evidence on driving forces and mutual interrelations. In this context the question of the relative importance of the POLYCE network in comparison to other networks has to be approached in more detail: as long as the relations to the other POLYCE cities play a rather negligible role, the idea of fostering an integrated region has to be questioned basically.

As was found during the implementation of the project, medium-sized cities seem to be an important connecting element of the Central European metropolises analyzed within this research. The assumption is that they might play an important role concerning territorial cohesion, particularly when related to concepts of polycentricity. Therefore, an in-depth research of the role of medium-sized cities as supporters or even foundation of polycentric European urban networks is suggested.

Regarding the delimitation of metropolitan areas, more sophisticated methods could be applied for measuring the morphological structure and functional relations within the metropolitan regions: the spatial distribution of population and employment on the one hand and the analysis of commuter flows on the other could presumably be extended to other factors in order to get a more stable picture of functionally integrated metropolitan areas and regions. Additionally, the indicators used in the metropolitan profiles should be more oriented towards 'soft' location factors (e.g. cooperative networks, governance approaches, relational capital), which go far beyond classical economic or demographic conditions.

The role of the city administrations as project partners should be defined more clearly from the beginning, as it has not always been clear to what degree they are obliged to provide the research group with institutional information, organizational support, or empirical data. Furthermore the participation of non-governmental organizations or institutions should be intensified in order to consider a broader range of opinions, goals and interests in the whole process. In this context a trade-off between the scope and depth of research could be discussed: although the extension of participating cities would reduce the accuracy of the results, it would improve the comparative aspect of the research.

Time pressure was a general problematic factor in conducting this research. This point is even weightier, when processes integrating a variety of local stakeholders are a methodological precondition. As is widely acknowledged, implementing such governance approaches is a long-lasting and therefore time-consuming task. In that sense targeted analyses would need far more time, if integrative approaches shall not always fail to go into sufficient depth.

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11 Annexes

11.1 Metropolitan profiles: underlying structure

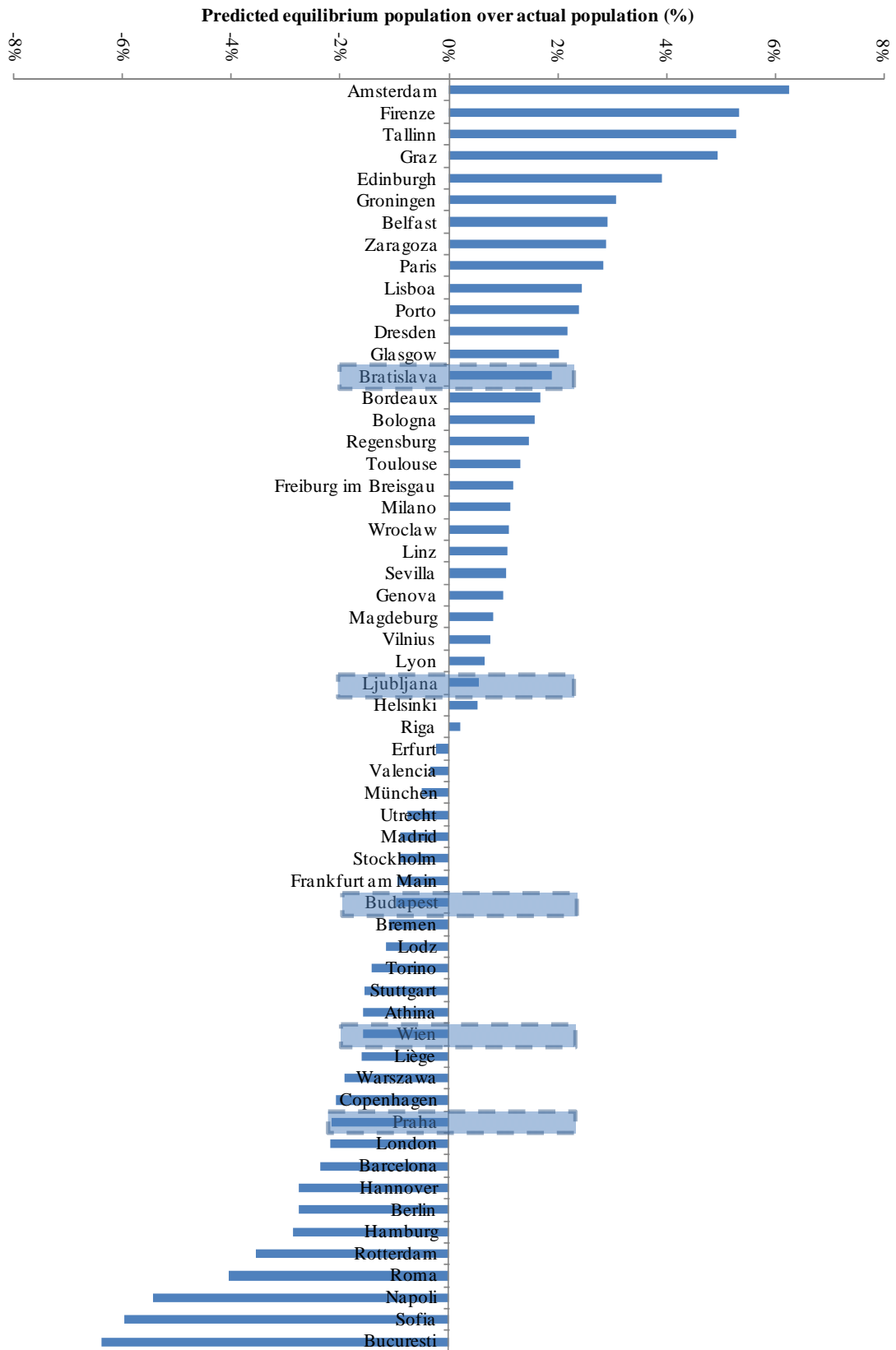
	FACTORS	INDICATORS	spatial level	data source
ECONOMY	Economic Performance	GDP (PPS) per capita	regional	FOCI/Eurostat
		Difference between GDP (PPS) per capita according to EU average	regional	FOCI/Eurostat
		Difference between GDP (PPS) per capita according to EU average 1995-2006	regional	FOCI/Eurostat
		Total GVA of LUZ	regional	FOCI/Eurostat
		Total GVA per capita in LUZ	regional	FOCI/Eurostat
		GVA NACE (J-K) in total GVA (%)	regional	FOCI/Eurostat
		Disposable income	regional	ATTREG/Eurostat
	Entrepreneurship	New businesses registered	local	UA
		Companies gone bankrupt	local	UA
		Companies with HQ in the city quoted on stock market	local	UA
		Number of congresses held in region	regional	ATTREG/ICCA
		Private sector employment	regional	ATTREG/Eurostat
		Self employed	regional	FOCI/Eurostat
	Knowledge-based Economy	R&D expenditure of GDP	regional	FOCI/Eurostat
		Scientific and technical employment	regional	FOCI/Eurostat
		Creative class	regional	ATTREG/Labour Force Survey
		Patent applications	regional	EUROSTAT
	Labor Market	Unemployment rate in LUZ	regional	FOCI/Eurostat
		Unemployment rate LUZ/national	regional	FOCI
		Public sector employment	regional	ATTREG/Eurostat
		Perception to find a good job (survey)	local	FOCI/UA
		Difficulty paying the bills at the end of the month (survey)	local	FOCI/UA
	R&D Funding	ERDF funding	regional	ATTREG/Eurostat
		Regional policy funding	regional	ATTREG/Eurostat
	International Embeddedness	Number of headquarters of transnational firms	regional	FOCI/FORBES
		Foreign subsidiaries owned by HQ located in MEGA	MEGA	FOCI/ORBIS
		Foreign subsidiaries owned by HQ located in MEGA (%)	MEGA	FOCI/ORBIS
	Structural Disparities	Change of disparities in the development level between the metropolis and its region	regional	FOCI
		A synthetic view of the structural differences between the metropolis and the region for the three principal sectors.	regional	FOCI
		Structural similarity changes in metropolis-region	regional	FOCI

	FACTORS	INDICATORS	spatial level	data source
PEOPLE	Demography	Population of LUZ	local	FOCI/UA
		Population density of LUZ	local	FOCI/UA
		Average growth of LUZ	local	FOCI/UA
		Life expectancy	regional	ATTREG/Eurostat
		Elderly population in LUZ	local	UA
		Demographic dependency: (<20 + >65) / 20-64 in LUZ	local	FOCI/UA
		One-person households in LUZ	local	UA
		Net in-migration rate	regional	ATTREG/DEMIFER
		Net out-migration rate	regional	ATTREG/DEMIFER
	Education	Active population with tertiary diploma in LUZ	regional	FOCI/EUROSTAT
		Population qualified at levels 5-6 ISCED in region	regional	ATTREG/Eurostat
		Students at universities in CC	local	UA
		Students at universities in region among 15-24 age groups	regional	ATRREG/Eurostat
		Participation in life-long-learning	regional	EUROSTAT
	Ethnic Diversity	EU nationals	local	FOCI/UA
		Non-EU nationals	local	UA
Erasmus students		regional	ATTREG	
Foreigner here are well integrated (survey)		local	FOCI/UA	
MOBILITY	Public Transport	Public transport network per inhabitant	local	UA
		Public transport ticket	local	UA
		Satisfaction with public transport (survey)	local	FOCI/UA
	Commuting	Inbound/outbound commuters per inhabitant	local	UA
		Journey to work by car in CC	local	UA
		Register cars in LUZ	local	UA
		Time of journey to work in CC	local	UA
		Road accidents	local	UA
	International Accessibility	Potential ESPON accessibility	regional	ESPON 1.2.1
		Accessibility of MEGA	MEGA	FOCI/OAG
		Air transport of passengers	regional	EUROSTAT
		Air transport of freight	regional	EUROSTAT
	Availability of ICT	Households with Internet access (at home)	regional	EUROSTAT
		Households with broadband access	regional	EUROSTAT
		Satisfaction with public internet access	local	FOCI/UA
Satisfaction with internet access (at home)		local	FOCI/UA	

	FACTORS	INDICATORS	spatial level	data source
ENVIRONMENT	Land Use	Land area of LUZ	local	FOCI/UA/EEA
		Total area of CC divided by total area of LUZ	local	FOCI/UA/EEA
		Share of built-up area of LUZ	local	FOCI/UA/EEA
		Increase of built-up areas in LUZ 1990-2000	local	FOCI/UA/EEA
		Increase of built-up areas in LUZ 2000-2006	local	FOCI/UA/EEA
		Growth rate of residential areas in LUZ 1990-2000	local	FOCI/UA/EEA
		Growth rate of residential areas in the LUZ 2000-2006	local	FOCI/UA/EEA
		Share of new industrial, commercial and transport in new built-up areas in LUZ 1990-2000	local	FOCI/UA/EEA
		Share of new industrial, commercial and transport in new built-up areas in LUZ 2000-2006	local	FOCI/UA/EEA
		Sealed area per inhabitant in CC	local	FOCI/UA/EEA
		Environmental Conditions	Sunshine	local
	Rainy days		local	UA
	Cold temperature		local	UA
	Warm temperature		local	UA
	Tourism Climatic index in warm months		regional	ATTREG
	Pollution	Summer smog	local	UA
		Particulate matter	local	UA
		Fatal chronic lower respiratory diseases	regional	EUROSTAT
	Resource Consumption	Consumption of water	local	UA
		Collected solid waste	local	UA
		Regional generation / treatment of municipal waste pc	regional	EUROSTAT
		<i>Green space</i>	local	UA
		NATURA 2000	regional	ATTREG/EEA
	Environmental Quality	Resources are spent in a responsible way (survey)	local	FOCI/UA
		This is a clean city (survey)	local	FOCI/UA
		Air pollution is a big problem here (survey)	local	FOCI/UA
		Noise is a big problem here (survey)	local	FOCI/UA
		Satisfied with green space (survey)	local	FOCI/UA

	FACTORS	INDICATORS	spatial level	data source
LIVING	Cultural Facilities	Cinema attendance	local	UA
		Cinema capacities	local	UA
		Museums	local	UA
		Museums visits	local	UA
		Theatres	local	UA
		Theatre attendance	local	UA
	Health Facilities	Hospital beds in CC	local	UA
		Hospital beds in region	regional	ATTREG
		Doctors	regional	ATTREG/Eurostat
		Number of hospital discharges of in-patients per capita	local	UA
	Housing	Average living area per person in LUZ	local	UA
		Owner-occupied dwellings in CC	local	UA
		Owner-occupied dwellings in LUZ	local	UA
	Touristic Attractivity	Tourist overnights	regional	ATTREG/Eurostat
		Foreign overnights in hotels	regional	ATTREG/Eurostat
		Non-resident arrivals	regional	ATTREG/Eurostat
		Tourist overnights in CC	local	UA
		Monuments and tourist sights	regional	ATTREG/TCI
	Safety	Crime rate per inhabitant	local	UA
		Car thefts	local	UA
		Homicides	local	FOCI/UA
		Suicides	local	FOCI/UA
	Urban Services	Satisfied with hospitals (survey)	local	FOCI/UA
		Satisfied with doctors (survey)	local	FOCI/UA
		Satisfied with cinemas (survey)	local	FOCI/UA
		Satisfied with cultural facilities (survey)	local	FOCI/UA
		Easy to find good housing at reasonable price (survey)	local	FOCI/UA
		Satisfied with schools (survey)	local	FOCI/UA
		Feel safe in this city (survey)	local	FOCI/UA
		Satisfied with sport facilities (survey)	local	FOCI/UA
Satisfied to live in this city (survey)		local	FOCI/UA	
<i>synthetic indicator of satisfaction</i>		local	FOCI/UA	

11.2 Equilibrium size of metropolises



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